



Kitting Up the Advanced Crew

15 November 1315 – a 2000-strong army of the Habsburgs marched from Zug, in what is now Switzerland, toward Schwyz to suppress the resident peasants and ‘teach them a lesson’. These peasants, aware of this advance, prepared an ambush and completely annihilated the army with one-tenth of the force using stones, halberds and crossbows. Had the Habsburg army displayed the foresight to send in a few scouts to provide forward observation intelligence, Zurich might today be the capital of Austria.

Johnny Keggler

The situation referred to above is not so common today – but it does illustrate the need for most forces to employ some sort of forward expeditionary force. Such a requirement is as old as conflict itself and continues today, with myriad special operation forces online in as many countries.

Training and preparing individuals and teams to infiltrate hostile soil, perform reconnaissance, surveillance and/or combat-related missions, then exfiltrate and return home is a prodigious task in itself. For the troops to achieve these feats covertly requires a combination of training, experience, some luck and, most importantly, the right equipment. Although McGuyver could do all this armed with nothing but a seven-tool Swiss Army knife; in reality it is a very different story.

Armada International produces a Complete Guide to Special Operations Equipment supplement to every year’s issue 6 (December/January). While that Guide includes aircraft, vehicles, naval vessels and, usually, communication equipment, this article will strive to get closer to the actual soldier/sailor/airman

on the ground and explore some examples of his in-hand gear.

Before We Go . . .

. . .can we get back? In an emergency a downed pilot or on-the-ground operative needs to ensure that others are aware of the situation and can find him. Combat Search And Rescue (Csar) is often the only option, and a Csar radio can be the deciding factor.

In April of this year Boeing delivered the first 5053 full-rate production units of its Combat Survivor Evader Locator (Csel) radio under a \$ 43.6 million order from the US Air Force. The Csel provides geopositioning information, secure two-way communication through three separate ‘segments’:

- ▶ the user equipment segment includes a multi-functional radio and theatre mission planning computers as well as GPS key loaders. It provides aircraft interrogation, precise geopositioning and Sar aircraft-compatible line-of-site voice and beacon communication
- ▶ the ground segment is interoperable with other government networks and workstations and provides a mapping display
- ▶ the OTH relay segment uses multiple US Department of Defense communica-

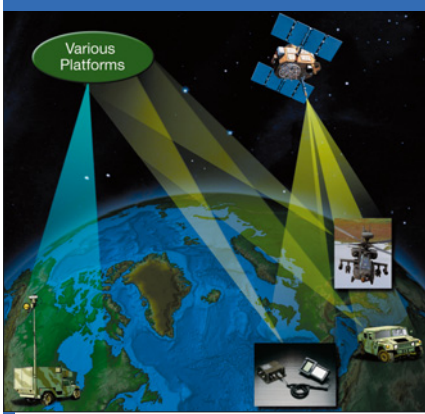
tion channels to ensure transmission and reception of message traffic.

The Hook2 from General Dynamics C4 Systems is considered by many to be a primary US, Nato and coalition Csar radio system. There are currently in excess of 19,000 radios in more than 20 nations.

A popular feature of the Hook2 is the Situation Report, by virtue of which it transmits – in one information burst – the answers to 15 fixed questions describing



Before going in anywhere it is always advisable to ensure an emergency exit path is devised. GDC4S has delivered more than 19,000 Hook2 combat search and rescue radio systems to 20 nations. The Hook2 provides GPS, burst communication and over-the-horizon messaging. (General Dynamics C4 Systems)



The Boeing Grenadier Beyond Line-of-Sight system is a Blue Force tracking transponder that can be carried or mounted in a vehicle to provide position data to monitoring aircraft, ships, ground forces and command centres via secure satellite communication. Short bursts prevent interception or detection. (Boeing)

the local environment, health status and other information about the downed pilot or crewmember. Prior to the Situation Report, downed personnel had to answer each question individually, sending multiple data bursts which increased their susceptibility to detection. The unit's newer features include satellite communication, over-the-horizon messaging and GPS interference detection.

To and Fro

Insertion methods are many and varied, so little ink need be spilled on that subject. Suf-



If seeing is believing then the Vector 23 binocular/laser rangefinder from Switzerland's Vectronix is a valuable tool (with a 20 km reach). The French Section Technique de l'Armée de Terre, Surveillance du Champ de Bataille and the artillery school have recently been testing the -23 with outstanding results. The recent French order for 750 Vector 21 units was completed at the end of 2006. (Vectronix)

ficie it to say that Zodiac has developed a new version of its 'Special Forces boat', with the FC (Futura Commando) 470 Evo 7 receiving a new high-pressure inflatable, reinforced floor and a modified hull shape that helps make it easier to mount (good news for many). The boat is 30 kg lighter than previous versions and maximum engine power rating is raised to 55 hp.

Northrop Grumman and Aluminum Chambered Boats have recently tested a new concept in military combat river vessels, the Joint Multi-mission Expeditionary Craft. The 41-foot-long boat has a draught of only 28 inches and is powered

and signalling ([the] lights can be seen up to one mile away in the dark).

As with many unique items used by expeditionary forces today (and covered in this article), MTM often sells handfuls of its products at a time, as many special operations units have the freedom to purchase on an as-needed basis, as opposed to having to go through regular logistical channels, and some operators buy to suit their personal choice.

Commercial GPS units are available, with many commandoes buying these as a primary or backup system. Garmin, one of the leaders in the GPS field, offers



The Commando Ops Navigator from MTM is a dual unit system (watch and GPS) that provides such a wide array of precision features that the company is quick to remind potential users, «Some technical experience is recommended to use this package». (MTM)

by two Cummins WSC 8.3-litre, 540-hp turbocharged diesel engines, pushing it up to 77 km/h. Northrop Grumman has designed a suite of network-centric warfare mission systems and weaponry for the craft, which was deemed 'Urgent Mission Essential' by the US Navy.

Stidd produces one of the most unique diver delivery systems on the market today – unfortunately the manufacturer could not provide any recent information, photos or illustrations.

So... Where Are We?

Stepping from boat to beach, or dropping, swimming or driving into the mission operating area demands that the next task be one of orientation. Fortunately, the days of the compass have long past and a GPS fix is the order of the day.

Today, all manner of GPS gear is available, but with the plethora of equipment that the 'First In' troops must carry, size does matter. In this vein Multi-Time-Machine (MTM) produces the Commando Ops Navigator dual-unit GPS system that includes a watch and a transceiver that is real-time updated every second. Speed measurement range is between 0.0 to 644 km/h. MTM is best known for its Spec Ops line of rugged watches with a unique system of illumination. The company told Armada: MTM was approached by a Special Operations unit in the USA who, «... asked for an external light that could illuminate up a map at night or light up a small room; and they wanted the light to be highly visible to use for extractions

many units that could be 'militarised'. The Rino 530, for example, is waterproof, offers a FRS/GMRS radio with five-watt transmitting power, GPS navigation using 500 waypoints and a position reporting feature, electronic compass and barometric altimeter.

First Steps

Once on the move the GPS units are invaluable, as mission preparation inevitably included GoTo points, but movement is never as easy as 'point and walk'. In a combat zone each step could be hazardous.



Today's technology makes most items on this SOS survival kit from Ranger Rick seem obsolete, but when GPS batteries die or if one of a number of problems with digital equipment arises any team member operating alone will welcome these 'analogue' survival assistance items. (Armada/JK)



Datron World Communications has stepped up to a new level with its 7700 family of radios. A complement to its predecessor the Spectre-V, which remains popular with forward operating units, seen here the HH7700 is a software-defined handheld with embedded GPS, Comsec and ECCM. (DTWC)

Qinetiq was recently awarded an £ 800,000 contract from the British Ministry of Defence's Mobility Integrated Project Team Leader to develop a sensor that can detect the trip- and command wires that are frequently found on many conventional munitions, mines and IEDs.

The programme's aim is to develop a portable electro-optical sensor that works within high background-noise/signal-to-clutter environments and can overcome several forms of camouflage, concealment and deception. For this programme Qinetiq has partnered with Qioptic; a company that develops military electro-optic sensors.

Keeping the team in touch with each other's movement and intentions is critical. Silyn Communications develops inter-team communication systems specifically for US Special Operations Command (Socom) and other nations' special operations forces. The company's Eagle waterproof (to 28-metres) headset with wireless PTT system was designed



The Silyn Quiet Ops tactical communication headset and ear protector provides a passive and active noise attenuation system that lowers the level of high-decibel environments, such as that found in military aircraft or high-intensity impulse noise (e.g. weapon fire). (Silyn)

for use with the Thales Communications Multiband Inter/Intra Team Radio (Mbitr). The Mbitr is the premier JTRS-capable radio with the US Special Forces units – the US Army recently purchased another 5000 units in February of this year, bringing the total used by the US services to more than 31,000.

You Heard it Hear First

ITT Aerospace/Communications puts a very tiny radio into the hands of soldiers with its 650-gram Spearhead frequency-hopping VHF radio. The Singcars unit's measurements are 199 × 60 × 46 mm sans battery (which provides twelve hours of continuous operation), and it communicates on the 30 to 88 MHz VHF FM frequency range being pushed by either 3 or 5 watts or 100 milliwatts of power (external GPS unit on option).

The Spearhead ties into the Singcars net (good news, as ITT had, at time of

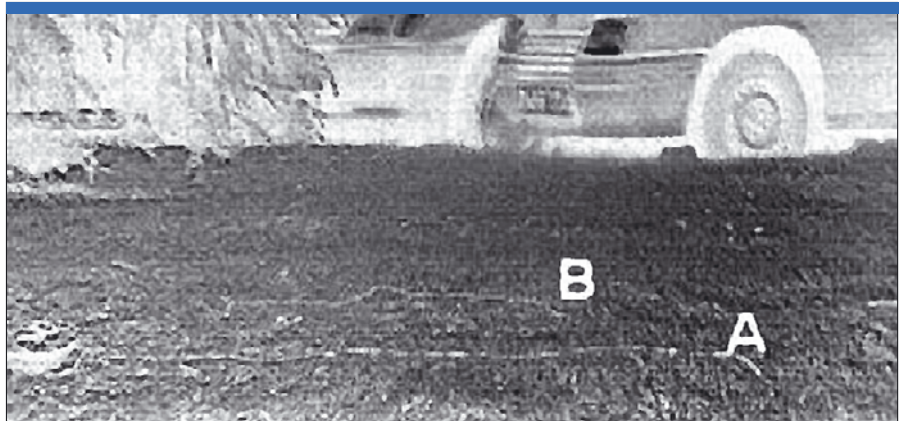
is overlaid on topographic and orthophoto maps. There is also a top layer for free-hand sketching.

The RPDA-55 calculates target acquisition information based on the observer's GPS location and transmits this data via a tactical radio link. A medevac feature allows the user to define the type and extent of casualty injuries and co-ordinates an extraction point.

Another option to help keep tabs on the team is Boeing's Grenadier Beyond Line-of-Sight Reporting and Tracking system (Gbrat). A blue force tracking tool, the Gbrat is a man-portable or vehicular-mounted, compact and lightweight transponder that provides positional data to aircraft, ships, ground forces and command centres via secure satellite links.

Radio On Wheels

DRS Technologies' Codem Systems unit demonstrated its X-band Satellite Com-



Although highly pixelated, this image gives an idea of the advancements in sensor technology with respect to tripwire detection. Qinetiq and Qioptic have partnered under a British Ministry of Defence contract to develop a portable tripwire detection sensor. (Qinetiq)

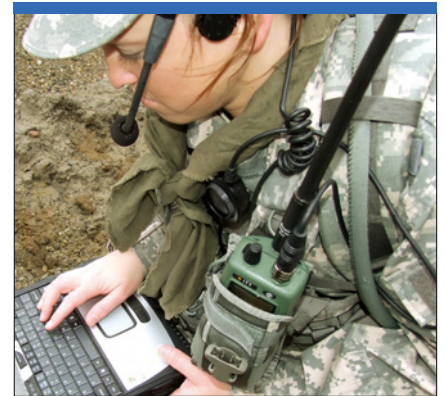
writing, just reported producing its 350,000th Singcars radio for the military) and has been offered to a couple of Middle Eastern countries thus far. Some contract details are in the pipeline but the company is safeguarding this information, for obvious reasons.

Datron World Communications introduced its RT-7700 at the Idex trade show in February of this year. The software-defined radio is an IP-addressable, digital transceiver with integrated ALE and HF modems. The company has developed a complete 7700 series that will include a VHF manpack with voice and data capabilities, GPS, ECCM and Comsec.

The hand-held version, which could be available sometime in 2007, will offer five watts of VHF-FM communication on 2320 channels at 25 KHz spacing (plus 16 programmable direct access channels) on the 30 to 88 MHz bandwidth.

Tadiran Communications offers a combat-proven rugged personal digital assistant, the RPDA-55, that provides a level of situational awareness with terrain analysis and field-of-view coverage that is based on digital terrain model mapping. The situational awareness data

communications-On-The-Move (Cotm) capabilities recently onboard the US Navy's experimental craft Stiletto whilst steaming at more than 40 knots off the coast of Virginia. This satellite Cotm only requires a small, lightweight antenna and



Arguably the smallest hand-held radio available, ITT's Spearhead has drawn from attention from operators who realise the kitbag is becoming heavier and heavier with each mission. The unit is rated Mil-Std-810 for humidity, salt, fog, dust, drop and immersion. (ITT)



This photo is a low-resolution screen shot of the captivating Bigdog video that is available on the Boston Dynamics website (found at: bostondynamics.com). Thus far in development the robotic pack mule has trotted along at around five km/h, climbed a 35° slope and carried a 55-kg load. (Boston Dynamics)

terminal mounted on or in a vessel, thereby providing X-band (and spot beam) transformational communications.

At the October 2006 AUSA convention in Washington, DC, DRS profiled its X-band Cotm solution fitted in a Hummer. Ideally suited to carry expeditionary forces on a long off-road trek, the vehicle provides high-bandwidth voice, video and data communication in a highly-mobile platform.

The range of vehicles on option for expeditionary forces is almost mind-boggling. Again, Armada International's Complete Guide to Special Operations Equipment covers this mobility aspect, but one vehicle that has garnered much attention as well as contracts from the special Operations community is the Prowler from ATC.

This four-wheeled all-terrain vehicle is sold through Diamondback Tactical, primarily to US Air Force STS and Air Mobility Operations Group detachments



The Short Range Throwing Camera from Macroswiss is not a throw-away camera but a 'throw-to' remote observation system designed to broadcast a panoramic view of the surrounding area (in a room, over a wall, in a street, etc) to a remote operator. The self-righting ball transmits video information on the 2.4 GHz band, to 300 metres for up to five hours. (Macroswiss)

as well as Socom Special Forces groups 1, 5 and 7, and US Tacom is purchasing more vehicles under the Foreign Military Sales programme.

Two fully-armed Prowlers fit comfortably in a CV-22 and all CH-46/47/53/ 54/60 series helicopters, and a special variant has been designed to fit into the reduced-egress clearance of an NH90.

And of Robots

Vehicles get team and gear as close to the action as possible – but when the going really gets rough how does a team 'hump' their supplies? One truly innovative solution is being developed by Boston Dynamics. The company's Bigdog is touted as the most advanced quadruped robot on earth. The robot really looks like two sets of human legs walking a gurney with a load of equipment. In reality the legs are, as the company mentions on its website, «[...] articulated like an animal's, and have compliant elements that absorb shock and recycle energy from one step to the next.»

The Bigdog is one metre long, 0.7 metres tall and weighs 75 kg. Roughly the size of a large dog the unit could be thought of as a robotic pack mule, the Bigdog is being developed in conjunction with Darpa, Foster Miller and the Jet Propulsion Laboratory with an eye to military applications.

Medical situations can halt a team in its tracks, and in this vein Vecna Robotics has developed the Battlefield Extraction-Assist Robot (Bear). The Bear is roughly

the size and shape of an adult human but is an extremely strong and agile robot designed to lift humans and carry them to safety; out of harm's way.

The Bear is being designed specifically for military applications to save downed humans from battlefields, biological or radiation-contaminated areas or unsafe buildings. The Bear has been designed to resemble a human as the dynamics of human mobility is well understood and could be leveraged to make controlling the robot easier (as it has a human operator). The bear can walk upright, kneel, bend over, crouch and crawl through buildings, up and down stairs and over rocky or hilly ter-



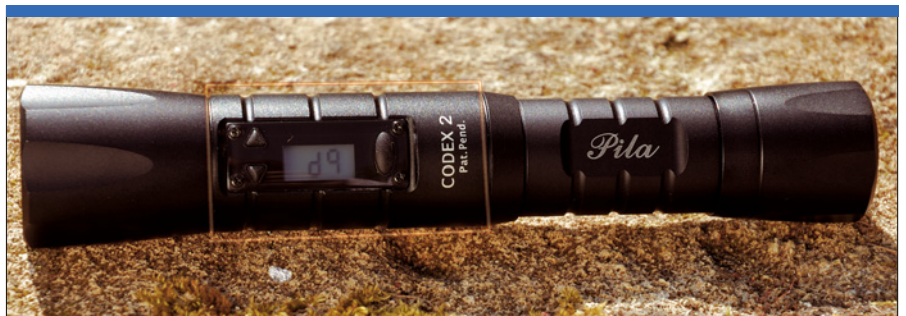
Scheduled for a 2008 release date the Bear from Vecna Robotics is being designed to safely transport human casualties out of dangerous combat and contaminated areas. The robot will have 20 joints, stand two metres tall and weigh around 100 kilos, not counting its, up to 181 kg, casualty load. (Vecna Robotics)

rain/woods – all with a fully weighted adult 'casualty' in its arms.

Seeing is Believing

Tactical light systems, whether weapon- or soldier body-mounted or carried, are strictly necessary for most any combat troops, but some lights are reserved for those who dare to go first.

The Pila flashlight system from Permalight is a high-power (120 lumens)



The Pila flashlight with Codex module (highlighted) provides an extremely high-intensity light and user-programmable signal combination that can be used for combat action, pathfinding, map reading and extraction signalling. (Armada/JK)



Let's face it – if one can't see what one is doing then all is for naught. Eye protection specialists Eye Safety Systems (ESS) has taken this to heart and redesigned its Profile Turbofan series by moving the on/off switch to the back and made it easy to operate with gloves. The powerpod is waterproof and activates the fan at top that circulates air through the mask to ensure no fogging during high-intensity activity. (Armada/JK)

lighting device built from aircraft-grade aluminium and is water resistant down to 20 metres. The Pila system includes a Codex module that is attached between the light head and body to provide digital user-programmable codes and signals with selectable light intensities.

Short, intensive strobes can be programmed and used to disorient an aggressor, or brief Morse code messages can be input. The options are almost endless. Four user-programmable settings allow up to nine programmable frames/sequences per setting, with five light intensity settings at intervals anywhere between 0.1 to 9.9 seconds. An automatic SOS code is preset and a bypass function overrides the Codex module to use the flashlight normally.



B.E. Meyers offers a weapon-mounted, day/night illuminator/pointer called the Gri2p (LA4/PEQ) that fires an infrared or visible green laser beam for target illumination. 250 mW green and 1000 mW infrared laser beams are emitted with a 0.1-mrad convergence. (Armada/JK)

Surefire is a name synonymous with combat light sources, and the company's extensive product line is rife with combat-proven samples. The company produces a Helmet Light that is used by US Marine Special Operations, US Navy Seals, Air Force Para Rescuemen and Combat Controllers and other military units.

The Helmet Light was created in 2006 to mount directly to the side of the TC 2000 Modular Integrated Communications Helmet. The unit features a primary light with three LEDs, a secondary light with two night-vision-friendly blue LEDs

and a tertiary IFF light on the side with a single, continually blinking infrared LED for signalling.

Weapon lights are a must-have in today's urban warfare environment, but once a combatant is encountered, putting a bright red laser dot on his chest is a definite disabler. One of Crimson Trace's mottos is «Helping bad guys make informed decisions».

Crimson Trace's laser grips for the Beretta M9 are listed as «vital to national defense» by the US government, and several laser grip models have National Stocking Numbers and are in use by all branches of the US armed forces.

A laser grip is an aiming aid and many times the sight of a red laser dot calms the situation enough so engaging the opponent is not required.

Trijicon provides another favourite aiming device of the expeditionary forces, in fact, its Advanced Combat Optical Gunsight (Acog) 4 × 32 was chosen by the US Special Operations Command as standard issue for all Special Operations forces. The dual-illuminated reticle is powered by fibre optics and tritium, therefore alleviating the need for a battery-powered solution.

The optic functions in bright light, low light or even when no light is available, and ranging is built into the parallax-free reticle. Trijicon also promotes the Bindon Aiming Concept, which facilitates both-eyes-open shooting for quicker target acquisition.

With precision expected from the Swiss, the Pocket Laser Range Finder from Vectronix doesn't add much weight to the warrior's load (620 grams) but the benefits are obvious. The waterproof, class 1 eye-safe laser rangefinder provides more than 5000 measurements on a pair of 3V lithium batteries, offers 6x magnification from a minimum five metres out to three km. An RS232 interface allows data to be fed into a computer or GPS device.

Back to the Back

Hydration systems seem to be a standard and ubiquitous piece of gear these days. Long gone are the metal and, later, plas-

tic canteens. Everyone has either a Hydrostorm or Camelbak system on his back over the uniform. Many low-profile systems are available, some with pockets (for even more gear) and most with removable, cleanable bladders.

Accomplishing the mission requires, as stated above, a combination of elements. Having to cancel the mission due to a spider bite, jellyfish sting or any combination of land- or marine-based 'critters' is something one doesn't write home about. As an antidote to this situation Remedy Marketing has developed the Sting Thing; a sim-



Sometimes hands-free lighting is the order of the day. Surefire developed its Helmet Light, which allow operators to be able to train their head and eyes at something that 'also' needs to be lit whilst keeping a weapon trained in another direction. The lightweight, compact Neoprene unit has a runtime of 350 hours. (Surefire)

ple one-time-use swab that provides natural pain relief and neutralises the toxins of stings and bites from bees, wasps, flies, mosquitoes, ticks, fire coral, jellyfish, sea lice, fire ants... the list goes on.

Special forces team members and emergency medical service units have already found the Sting Thing to be an invaluable addition to their online gear. A first aid kit in a small pocket can go a long way toward saving time, pain and sometimes the mission. □



Armor Holdings produces ballistic protection for the extremities – shoulders, biceps and thigh area – with its Limbs (Lightweight Integrated Mobility Body armor System) family. The shoulder/bicep system weighs only 1.8 kg and the thigh system 0.7 kg. (Armor Holdings)