

Spread thin, like school jam...

Brian O'Shea looks at the world of man-portable jammers and wonders if they are the coming thing

When the editorial equivalent of spin the bottle gifted me with the opportunity of writing the man-portable electronic countermeasures (ECM) piece, it didn't seem like it was going to be much of a lemon. The need for man-portable jammers would seem to be a given; as much as it would be pleasant to sit in air-conditioned comfort, in either vehicles or facilities, land is held at the point of the bayonet and, at some point, that realisation is going to become predominant in Iraq and Afghanistan. Then those terrorists, fundamentalists and ne'er-do-wells who have been gifted with the realisation they cannot win in a square fight will end up targeting squads with IEDs.

As delightful as the ECM suite might well be in the mine resistant ambush protected (MRAP) vehicle, it does very little for the squad when the vehicle cannot follow their progress. Steve Hill, Director at the ECM

consultancy Electronic Warfare Solutions, agreed. "RCIEDs have become synonymous with the phrase 'roadside bomb,' which is why ECM has been focused on providing vehicle systems to protect convoys," he said. "If you look at the warfare we are fighting, it is important there is a relationship built with the populace – the hearts and minds approach that has been proven time and again – and you can't do that bypassing villages in an MRAP. It is the classic counter-insurgency dichotomy. Eventually, soldiers are going to have to dismount – they are doing this in Afghanistan – and do routine patrols. That means they are susceptible to the IED and RCIED. So man-portables are going to develop over the coming years, as there will be a shift in the way operations in Iraq and Afghanistan function. There will be more foot patrols, more interface with the population and more man-portables – they will become increasingly important."

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There is a wide variety of man-portable ECMs out there, and it would seem that, as the demand rises, the industry would have a variety of new products it would be keen to talk about. Not so. Selex, L3-TRL and Kirintec all declined opportunities for interviews, and SESP informed us they had withdrawn their man-portable ECM – but were not able to provide a reason for doing so. For what is supposed to be such a vibrant and nascent market, there is a great deal of shyness out

there. Clearly part of it is the desire not to give any information out to “red force”; some of it is clearly the EOD mindset – if we don’t absolutely have to say something, then let’s not – but there is a reticence to speak about man-portable ECM that is not applicable to other forms of ECM.

Part of this reticence is possibly down to health and safety issues – the idea being that, a bit like live agent training, if we pretend it doesn’t exist then we don’t need to talk about it. Not

only do man-portable ECMs kick out a considerable amount of heat, but also a lesser amount of non-ionising radiation. One of the reasons early man-portable ECM had the bearer/user wearing a shiny silver foil headpiece was to try and deflect the heat, but it also goes to show there is a certain amount of trepidation among the users – there can’t be a fight to wear the pack!

Yet the heat and RF emissions are part and parcel of the job of the jammer: kicking out enough watts to provide a safe bubble within which the unit can operate safe from the RCIED. Is this then the technical challenge of the device – finding the right balance between health and safety and protection? Mr Hill suggested it came down to national tactics rather than technology. “What you will see internationally is a wide spread of different approaches to doing this, and they are all loosely based around the individual countries Conops,” he said. “Some people have rigorous health and safety standards. Stanag 2345 lays down a set of guidelines for personal exposure limits, but they are guidelines and are not necessarily enforced. There are ways and means of spreading out your exposure; if you employ safe and effective drills to swap over the equipment between users during the patrol, you limit individual exposure. Spacing will also contribute to minimising exposure, but it does present an issue. How major that issue is compared to the protection against an IED that device is supposed to offer is a question of balance. Some countries will decide they want large equipment carried by one person in the middle of the patrol; others will distribute it among the patrol, meaning they need smaller, less powerful units and it is easier in terms of health and safety and in weight.”

Clearly, man-portable ECM has to be seen as a component of the force protection. There is little point reducing the watts to its “safest” level if that means the squad is so tightly clustered they become a target for other weapons. Steve Hill suggested people need to think about the protection offered by man-portable ECM in a different way



URC's man portable jammer ©URC

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than they do about the vehicle systems. "People get a vision that a "bubble" is one big bubble but in actuality it is a combination of different sized, constantly changing bubbles. The issues are not insurmountable, but do require an understanding of the system and how it is affected by the urban and rural environments, atmospheric conditions and proximity to other ECM. All those requirements need to come together with a knowledge base so people can adequately and safely deploy these systems. This is not always commonplace – ECM went "global" over the last five to six years, and before that it was constrained to a certain number of countries. So, in a lot of instances, the new countries are still developing doctrine, TTPs and an understanding of how the equipment they have procured functions. Those lessons learned are happening rapidly – they have to."

One company working on man-portable ECM – that was able to speak – was Czech Company URC Systems, which has a range of "Star" jammers. "There are four versions of the Star: the Manpack; the new vehicle jammer, Starlight 3, which has an output of 200w; Starlight 6, our six-module jammer; and Star V which is the biggest with output of 740w," said Milan Janicek, Managing Director of URC.

URC'S Manpack jammer is in service with the Czech Army and has a modular system. Each squad has two packs, made up of two 20w modules – so the total of four modules can be set to a different sub bands (such as VHF, UHF, GSM and WiFi). Their latest system allows for all the bands to be covered, but at a lower frequency. "You can get only two modules which cover all the bands, so you get lower power," said Milan Janicek. "Each one would be 20w, but module one would have VHF and UHF and the other would do all the rest. So, while both modules would be 20w each, and you can could cover all the bands, you would get lower output power."

Unlike SESP, which has discontinued its man-portable system, URC are finding an increase in interest for its version. "The Manpack requirement is becoming more

urgent," said Janicek. "Convoy protection will always be important, but patrolling and IED teams or search operations require Manpack because, if you come to a building with a yard behind the building, vehicle jammers will not be effective behind the building. So you have to take the jammer on your back and go into the building with it – it make a smaller protection umbrella but is better than the umbrella from the vehicle."

One of Steve Hill's concerns was that of battery changing. With an eight-hour patrol, there is likely to be periodic battery changes – and TTPs need to be set up to deal with this. URC Systems feels it has a solution to this with its modular system which allows you to change batteries per module – which minimises the down-time. In addition, by using lithium ferite batteries, they can recharge them in the vehicle in the same time they are drained.

Mr Janicek admitted emissions and heat were a technical issue, but were not suffered by the Manpack system unduly. "We have done tests which fulfil the requirement of European Standards – 61V per metre," he said. "If there is a problem we can complement our jammer with a special rod with silver plated fabric, which decreases significantly the radiation into the head. The antennas are close to the head and are 55cm high, of which 20cm is empty space at head level, and the radiator is above the head. This has two advantages. One is the European standard, and the second is better radiation pattern – as if you radiate into the head or helmet you have a loss, and the space in front of you is not well covered."

As technology improves and tactics mature, new ways of using the jammers and capability will emerge. One step that would presumably free the manufacturer from some of the health and safety issues would be to mount the Manpack on a "mule"-type UGV, which would allow a heavier, more capable system. There would be technical challenges – such as ensuring that the mule is still able to function when the jammer is on. "Potentially it

could [be the way forward], providing the mule is capable of working within that RF environment. Also, the patrol members will still need to be within the jammers effective range, so it doesn't totally remove the health and safety consideration totally," said Steve Hill. "Before you put the jammer on the robot, you need to ensure the two aren't adversely affecting each other. From a mobility perspective, in my opinion, it is best to keep it on the soldiers' backs – as the Afghan urban environment is not necessarily mule-friendly plus you have the risk of the mule inadvertently initiating other IED types. If you have a robotic vehicle on an eight-hour patrol, it will have to carry its own batteries, and if you have someone on a patrol constantly monitoring the mule then he is not an effective part of that patrol."

Instead, Mr Hill suggested any advance would have to come out of the technological left field. "Technically, I would argue that the vast majority of systems follow a similar form of technological roadmap," he said. "They have all been developed along similar lines so who is going to make the next step and move countermeasures on? We are aware of some innovative companies that are looking at developing potentially better and more efficient technologies. If these technologies progress then they could rewrite the rule book and provide a quantum leap forward in threat defeat. The emphasis is on these companies to continue pushing the envelope and hopefully moving these technically advanced developments into in-service systems."

One way that URC Systems is looking to deal with the next technological change is to see it as a reactive system, as Milan Janicek explained. "Our future development is based around the development of reactive jammers," he said. "A lot of the information is not for publication but it is intended for vehicles and individuals, and we should have a prototype this year. Then we can use it as a core for all our jammers. The system will not be too big, and the jammer becomes lighter, smaller and less of a health issue."

Richard Bouma, Senior Scientist at the Netherlands Organisation for Applied Scientific Research (TNO), describes the European Defence Agency's work on explosive containment

Just contain yourself!

Improved explosives devices (IEDs), and the potential use of chemical, biological, radiological and nuclear (CBRN) agents, are among the greatest threats facing European Union operations. The enhancement of capabilities in the field of explosive ordnance disposal (EOD) of devices with CBRN agents is on the agenda of the CBRN EOD project team of the European Defence Agency (EDA). Its members have identified the need for a physical containment system for unexploded ordnance including IEDs with CBR payloads, as a capability requirement, and have asked TNO Defence, Security and Safety in the Netherlands to investigate the whole range of CBR and explosive effects and hazards and propose innovative and cutting edge technological solutions.

TNO has experience in both CBRN protection and munition and weapons effects. Its expertise contributes to the mission effectiveness and reduced vulnerability of the Dutch forces in Afghanistan. Dedicated facilities are used for experimental studies into protection against IEDs, the performance of armour materials and the performance of protective measures such as gas masks and clothing against toxic agents. Training related to CBRN incidents is provided and advice is given for protective measures and the munition storage layout at the Dutch compound in Uruzgan. Specialists from the energetic materials and the CBRN protection groups jointly worked on this containment study for EDA.

A CBR and explosive threat analysis was made, and user requirements were obtained through interviews with representatives from the nations in the EDA CBRN EOD Project Team. In the Netherlands, a national workshop was held with broad representation from the military forces, the police and the forensics institute. Acceptable levels for chemical, biological and radiological agent release were determined for credible threats, based on toxicity

levels as well as minimum safe distances that have to be respected by the public in accordance with the specific scenario and the instructions received by competent personnel managing the event.

procedures. These detailed requirements may be made available through the EDA.

Commercial off-the shelf solutions were reviewed and their performance assessed by grouping them into the following generic classes: bomb-proof



Containment is especially important for CBR-IEDs as the threat from accidental detonation is far greater than conventional ones ©DoD

Important issues from the point of view of the various users include the need to deal with a device in situ, the speed of the operation, non-interference of containment system with the render-safe procedure, portability, handling of containment with limited number of personnel, and ballistic-proof walls. The translation from threats and user requirements into technical requirements for a containment system was obtained by distinguishing between safe procedures. Each render-safe procedure has a different risk in terms of agent release; therefore technical requirements are set separately for each of them. The technical requirements have been grouped regarding the containment effectiveness, the containment structure and logistics, the render-safe procedure related requirements and post render-safe

waste bins, suspect mail/baggage containment units, IED/UXO containment and removal, on-site mitigation and containment, CB containment, and specialties. Their performance was evaluated against the technical requirements. In the end it is the combination of the containment structure and the specific render-safe procedure that will determine the overall effectiveness. One situation was identified where no dedicated commercial off-the-shelf solution exists, although improvised measures could be and were taken in real scenarios.

For this particular situation a concept design solution is given. With the technical requirements in the final report, it should be possible to fill this gap through research, development and engineering of a dedicated containment system.

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