

# New Frontier in Afghanistan

Steve Rist, Product Manager, Racal Acoustics, reviews the company's integrated approach to hearing protection

**Racal Acoustics' new Frontier1000 communications headset is now being deployed in significant numbers as the British Army's first, widely deployed in-ear solution for hearing protection. Steve Rist, Product Manager at Racal Acoustics, said, "Deployed troops have been using this new and innovative headset and we are starting to receive substantial positive feedback from Operations. The initial view is that the product is working well, that it has met all of the Key User Requirements set out in the Urgent Operational Requirement (UOR) and is providing the required levels of protection against impulse noise. Racal Acoustics were asked to manufacture and deploy this product in an extremely challenging timescale in order to meet the operational training and deployment timelines of the British Army in Afghanistan. We rose to the challenge and soldiers are now reaping the benefits of this capability on Ops."**

The technical challenge was significant as the UOR specified the following Key User Requirements:

- Clear radio communications, and
- Hearing protection against impulse noise, and
- Maintenance of at least the same levels of Situational Awareness whilst wearing the headset (ie whilst protected) as when not wearing the headset
- The system must fail safely (ie the continued ability to communicate even when the battery was exhausted)

The capability, known locally as Frontier1000 and to the Armed Forces as the Personal Interfaced Hearing Protection (PIHP) was delivered in a lightweight, easy to use package that could be used effectively on a range of mission profiles.

Through the development and manufacturing processes and the initial deployment both Racal and the

MoD have continued to learn and understand how the product is intended to be used. This has required Racal Acoustics to have considerable discipline and control in managing the requirements in order to control timescales and costs whilst ensuring the solution delivers our troops the optimum operational solution.

The Frontier1000 communication system is deliberately designed to be simple to use and comprises of an In the Ear (ITE) headset with talk-through capability. Rist said, "We fully understand the Army acronym of 'KISS', (Keep It Simple, Stupid), and have deliberately tailored our solution to meet the exact needs of the User Requirement Document - No more, No less. It would have been possible to have offered a product with many more advanced technical features, but operationally it may have proven too complicated to use. On the battlefield that is Afghanistan, soldiers deserve a communications system that is effective, very easy to use, and which comes with the minimum of training burden."

"Our system is intuitive, very small and extremely light. It delivers effective communications, good situational awareness and proven hearing protection. In short, it does exactly what was written (requested) on the Tin!"

Frontier1000 (PIHP) is being delivered in two phases, initially the taking of impressions, production of and delivery of custom moulded earplugs which commenced at RAF Brize Norton, for soldiers already committed to deployment, within hours of being cleared to proceed by the Capability Integration Working Group. Delivery of those earplugs followed shortly after and there are now over 6000 troops in receipt of their personalised plugs. The second phase involved an initial deployment of 5000 headset systems, which closely followed the initial impression taking, to provide trials and operational evaluation capability. This number is

currently being supplemented by the delivery of the remaining contract quantity.

Rist explained the process, "We took ear impressions as soldiers were deploying and within a few weeks supplied them with their own custom moulded plugs. The moulded ear plugs, made of two grades of medical silicone, provide a stable platform in which the ITE earpiece can be easily and comfortably inserted. The earplugs have a communications channel through them to allow the incoming radio and situational awareness signals to be presented to the ear canal. The earplugs can also be used as a passive hearing defender by inserting the stoppers on the end of a lanyard into the communications channel. We are initially supplying each soldier with four sets of custom moulded plugs, and we understand the intent is to issue the soldiers two pairs (one for use and the other as an "on the body spare") and two further sets held elsewhere in the Army supply chain. In this way, if an earplug is lost or damaged, the second can be brought into use immediately and the supply chain can push the spares forward, whilst prompting resupply action. This strategy is intended to minimise the risk that a soldier gets through all four pairs of his plugs before resupply can be conducted. Each plug has the individual's service number etched into them for identification and the inner tip is coloured bright orange in an attempt to allow them to be found easily if dropped, even in sand! The impression is retained by Racal for up to four years to allow additional earplugs to be manufactured as required.

The in-ear headset, which houses the electronics for the talk through, the earphone transducers and the microphone transducers, has been designed to be small, lightweight and rugged. The headset or "top-end" connects to a simple switchbox, in a Molle compatible pouch, which in turn connects to the soldier's personal

radio. The upper cable, switchbox and lower cable are all connected via "snatch" connectors, to prevent damage if snagged and facilitate easy, low cost replacement. The switchbox provides the controls for the Talk Through capability and ensures that only sounds of a safe level are presented to the ear canal.

For a variety of reasons, not every soldier suits a moulded ear piece, so Frontier1000 is also compatible with a foam eartip, similar to the yellow "foamies" that are commonplace in the military. As a back-up, the 3-leaf yellow silicone earpiece from the In-Service E.A.R earplug can be removed from its spigot and used on the Frontier headset as a "get you home capability". Rist noted that it was his belief that the MoD preferred custom moulded earpieces over 'foamies' largely for reasons of improved ear hygiene (as foamies are inserted by rolling them between your fingers). Foamies will be the preferred solution for certain users especially where the ear impression taking process is difficult to manage.

Rist added that the MoD has not as yet discussed with them the possibility of adding an over ear solution as an alternative to the Frontier1000 although if that was required, the existing Staff User Headset, or Racal's Raptor could be used by those who didn't want an in ear device but still wanted talk through and hearing protection.

Providing an in-ear solution to the British Army or indeed any force at short notice is a self evident challenge. Rist explained how Racal Acoustics, in partnership with the customer developed approaches to overcome the challenges of meeting this UOR based hearing protection requirement.

Rist commented, "Whenever you are trying to develop and deploy things quickly there is always the

question of whether you have captured all the parameters you need to make the product ideally suited to the situation. The answer is yes for 70-80 percent of the requirement but there are always things that you can do to improve them. We are for example making a couple of changes to the custom mould, based on feedback, to make them more usable."

The Frontier1000 was produced with the requirement for small, light and easy to use, foremost in designer minds. The development path for the family will in the future see advanced features being added. Rist said, "We now need to look at how to maintain the current form factor and its ease of use to integrate further capabilities. One example would be the ability to key a radio from the same form factor box. Beyond that, we are talking about another range of products to look at the more advanced capabilities that we may need to support as we go forward."

New, more advanced radios are already providing new capabilities that need to be assessed by Armies around the world. Rist cited the example of Harris's Secure Personal Radio, the Raytheon Microlight the ITT Spearnet and the Kongsberg SR600 which each having the ability to support talk groups in stereo.

Rist said, "You could have a squad commander with one channel for his squad, with three voices coming at him from his squad, the second channel could be for an intra-squad command channel with two or three more voices in that ear from his commander and his counterparts in other squad as well. When he gets into the back of a vehicle, he also needs to maintain communications with the vehicle crew and to use the vehicle's radios to communicate with his command structure. We are now talking about as many as eight

possible channels of incoming communications that the user might want to communicate out on."

"One of the big challenges for everybody in our arena is how we manage that: to what extent they are used, how they are going to be used and operational scenarios for those kinds of capabilities. There is a lot of figuring out still to be done on that topic. It is possible to do that digitally, while still keeping the box a reasonable size. Then it becomes a question of how you make that as intelligible as possible."

Rist believes direction will have to be given by the user community – with differences from country to country as to how this is done. He commented, "It may be that they say that they know they can potentially have all this capability delivered to these radios, but actually want to limit it to just one voice per channel. They may say that their soldiers are really capable, have five voices in each ear and can figure out what they need to listen to. It is the next interesting area for us to tackle."

An enhanced hearing mode for situational awareness is another option. The Frontier1000 is currently a unity design with no enhancement made to incoming sound. That is likely to change on more complex products as users demand it. Rist said, "On our Raptor products, we have already included a stepped talk through capability which means you can have the outside noise attenuated by 6dB, have it unity or have it enhanced at either six or 12dB."

He adds that there is a debate over whether a separate radio volume control is needed or whether this could be combined with the radios existing device. "Where we place the functionality is very important because users need to determine what they need to control and what they don't."

**EU DIRECTIVES**

While considerable effort is being put into new capabilities for troops in theatre, the clock is ticking for militaries in EU member states to meet the Commission's Noise at Work Directive. By July 2010, the Directive, which limits noise levels to 85dB and requires organisations to prove that they are protecting users to that level, ceases to be an advisory measure and becomes mandatory.

Rist said, "That places a whole lot more challenges on industry to support the ability to provide protection levels. With brand new headsets under warranty, that is reasonably easy but once you go beyond a certain age and with product abuse and misuse, it inevitably becomes more marginal as to whether it is protecting you to that level. That is where things like some noise measurement in the ear shell becomes useful and will tell you what sort of exposure the user is experiencing. If you are supporting that capability on a digital platform then it can open up the ability for other applications such as gunshot detection and 3D placement of sounds." ■



*The difference between the mounted and dismounted user impacts how any system deals with noise, or at least should © DoD*