

Lightweight Counter-Mortar Radar

By Scott R. Gourley

It's the middle of the night and U.S. Army Rangers are conducting an airborne assault to seize a foreign airfield. As enemy ground forces fall back, they begin peppering U.S. troops with highly lethal indirect fires from their ubiquitous mortar assets. It is a *very* hostile environment.

"One of the most difficult mission profiles for the 75th Ranger Regiment is the execution of an airfield seizure operation," explains Maj. Robert (Derek) Long. "You can imagine that in the conduct of an airfield seizure the battlefield is chaotic: it's night; you're in-filling via static-line airborne operations; you're on the ground trying to assemble; you're trying to establish security on that airfield; and you're being engaged not only with direct fire but also with harassing indirect mortar fire. Harassing mortars can disrupt the mission and create the potential for casualties and damage to equipment."

As the systems acquisition manager for Command, Control, Communications, Computers and Intelligence, Special Programs, Combat Development Division, U.S. Army Special Operations Command (USASOC), Maj. Long is working on a new solution to this very old problem. Known as the lightweight counter-mortar radar (LCMR), the new system will address those indirect fire threats by providing U.S. special operations forces with the ability to rapidly detect the origin of enemy mortar fire.

Originally called the man-portable counter mortar radar, the LCMR program emerged from requirements first identified by the 75th Ranger Regiment. Unit members surfaced the need for a lightweight counter-mortar system that could conduct autonomous search and location operations while the Rangers continued their combat activities.

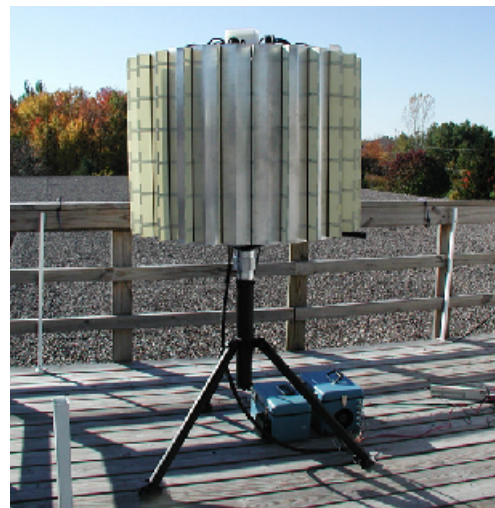
"That's the beauty of this system," Maj. Long adds. "It operates autonomously and provides an omni-directional detection capability. As an enemy mortar round is detected, the system provides a wireless digital transmission to the unit's command and control node. Transmitted data will include a grid coordinate indicating where that round originated, allowing the unit to take that information and employ either organic or aerial fire support assets to suppress that target."

Organic assets within the Ranger Regiment include 60 mm mortars, 81 mm mortars or 120 mm mortars. External aerial assets include a combination of both rotary-wing and fixed-wing fire support platforms.

Unlike the Army's existing firefinder radar systems that look at the counterfire fight in support of maneuver commanders, LCMR is being designed to protect a smaller force operating in a fixed site for extended periods of time with little or no adjacent support.

Requirement planners describe an LCMR system package as a two-man-portable system consisting of two 60-pound components that can be easily assembled following insertion. The 60-pound package load is dictated by worst-case equipment weight constraints associated with static line airborne operations.

"If you're going to in-fill this system via static line airborne operations, the jumper will have to rig the equipment consistent with techniques currently executed for assigned personal equipment and weapons," Maj. Long explains.





"He can weigh no more than 360 pounds as he exits the door of the aircraft. To meet this restriction, we knew that we couldn't exceed 60 pounds in any one package. This reality forced us to look at a solution that consisted of at least two components."

LCMR uses radio frequency technology to locate targets using a directional or omni-directional feature that can also be manipulated to a specific sector of interest. Based on Ranger mission profiles, the operational requirements document (ORD) reportedly calls for a target location accuracy of 100 meters circular error probable (CEP) at a range of 5 km. Narrowing the selected search sector provides even greater acquisition ranges. "From a planning

perspective the Rangers felt that if they could get accurate grid locations at a range of at least 5 km, then they could certainly engage those targets with organic assets," Maj. Long says.

LCMR started in 1999 as a special operations technology development effort funded by U.S. Special Operations Command. Phase one of the two-phase program involved development of an initial prototype that would demonstrate the performance articulated in the ORD.

The prototype system was built by Syracuse Research, Inc. and the specified ORD performance levels were not only demonstrated but exceeded during live-fire tests conducted at Aberdeen Proving Ground, Md., in December 2001.

"It did much better than the 100 meter CEP. We shot six rounds and five of them were located within the 100 meter accuracy requirement. In fact, more than half of the rounds were located within 50 meters of their origin. The contractor is very excited about this. They're doing some things on their own -- doing some small things to try to miniaturize the receiver/signal processor which is the brains of the system and they continue to do some of the ruggedization efforts because, in the end, that's where we want to go with our phase two efforts. We were fortunate to receive \$3 million plus in the fiscal year (FY) 2002 defense budget. We hope that money is going to go towards transitioning LCMR from a science and technology initiative into an acquisition program. Although all of the details still haven't been worked out, the plan is to take the phase-one prototype and move it to a phase-two prototype that would be operationally configured for use and employment: one that's rugged, miniaturized and suitable for operational use. That's what we intend to do with the FY 2002 funds," Maj. Long added.

In addition to application by the 75th Ranger Regiment, LCMR would have obvious use across the special operations community and beyond. USASOC planners quickly recognized applications for Special Forces units at battalion-level fixed sites and forward-operating bases. Once USASOC identified a requirement for both Ranger and Special Forces Command units, the requirement was subsequently staffed with the United States Special Operations Command where it was identified as having joint potential. Some observers feel that LCMR even has the long-term potential to provide a significant tactical enhancement to some selected "conventional" U.S. Army elements, including the emerging brigade combat teams. Maj. Long acknowledges that the LCMR ORD has been staffed within the U.S. Army's Training and Doctrine Command and that both the Infantry and Field Artillery Schools have provided valuable insights into the development of the system's requirements.

"We're trying to solve what, in our view, is a half century old problem," Maj. Long concludes. "The ability for friendly forces to detect and locate an enemy mortar threat continues to be a source of concern for ground commanders. Mission disruption and destruction of personnel and equipment -- whether you're in a rural or an urban environment -- is a real threat. And as you look at the world today, this is the kind of threat that is there every day when our forces are operationally deployed. We continue to get feedback from deployed units who require this capability. The USASOC chain of command is very eager to provide this kind of capability to the force because it's a capability-based initiative that will ultimately enhance the lethality and survivability of the special operations forces operator. That's why we believe it is so important and that's why we are committed to pursuing it."

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