

Convoy evolution

New vehicle trainer delivers 360 degrees of reality



LOCKHEED MARTIN

By KRISTIN QUINN

U.S. Army convoy regulations from 1861 state that if a convoy is halted and an attack is feared, the wagons should form a square, with the rear wheels on the outside and the horses on the inside. Today, it is still common for halted convoys to assume a box formation.

"The only difference is the technology," said Arnold "Buck" Shaw, a convoy protection training specialist with the U.S. Army Combined Arms Support Command (CASCOM). "Convoy doctrine itself has remained virtually unchanged for 150 years."

Virtual convoy training, however, has advanced considerably since its inception seven years ago.

In 2003, with roadside bombs accounting for a third of U.S. casualties in Iraq, the Army issued an urgent plea to industry rather than a set of formal requirements, so that a life-saving system could be fast-tracked into the field. Two companies, Lockheed Martin and Raydon Corp., quickly developed the Virtual Combat Convoy Trainer (VCCT). The Army Program Executive Office for Simulation,



U.S. ARMY

The Reconfigurable Vehicle Tactical Trainer surrounds soldiers in a virtual environment. RVTT operators, above, control a convoy scenario at the Grafenwoehr Training Area in Germany.

Training and Instrumentation (PEO STRI) received government funding within 10 days of its request, and Lockheed Martin and Raydon each fielded two simulators within 45 days of the contract award.

"The initial activity was more of an experiment," said Andre Elias, Lockheed Martin's director of virtual training solutions. "The Army said, 'How quick can you give us something?'"

The Army's VCCT program officially ended Sept. 30, to be phased out by a new program, the Lockheed-built Reconfigurable Vehicle Tactical Trainer (RVTT). According to John Foster, PEO STRI's assistant project manag-

er for the Close Combat Tactical Trainer, the Army will continue to support the VCCT program throughout the transition until all VCCTs are replaced with RVTTs by April 30. The Army has 21 RVTT suites either fielded or on contract and plans to purchase a total of 47, Foster said.

The RVTT is Lockheed's third generation in a series of convoy training systems designed to prepare soldiers to face modern threats such as improvised explosive devices (IEDs).

Lockheed's original VCCT has a full-scale Humvee mounted in the center of a trailer, with sides that pop out, allowing screens to drop in front of and at the sides of the

Humvee for a 180-degree view of the simulated environment. Raydon's version of the original VCCT requires soldiers to wear helmets with 360-degree views of the simulated environment. Students sit at different stations within the trailer, but in the virtual world they are all in the same Humvee.

THE THIRD GENERATION

Michael O'Bea, the Army Training and Doctrine Command's (TRADOC) capability manager for virtual training at the Combined Arms Center-Training, predicted the transition to a new convoy trainer in a paper he presented at IITSEC in 2006.

"The VCCT was created and delivered so quickly," O'Bea said. "It's got some bugs that we never spent the money to work out."

Shortly after the VCCT was fielded, Lockheed began to develop its Reconfigurable Vehicle Simulator (RVS), using lessons learned from the VCCT acquisition. The RVS can be configured to simulate a variety of vehicles, such as different types of Humvees and Heavy Expanded Mobility Tactical Trucks. The new system fits two vehicle simulators into an expandable trailer with 360-degree views, as opposed to one vehicle with a 180-degree view.

The RVS is part of the Army's family of Close Combat Tactical Trainers, and can be networked with other systems in that family, as well as the Army's Aviation Combined Arms Tactical Trainer, allowing soldiers to communicate with other ground and air crews. An RVS system connected with an after-action review capability is known as the RVTT, and often called the RVTT-RVS, according to Lockheed.

CASCOM was slated to have its VCCT replaced with an RVTT in September.

"It's going to be a more realistic training device," Shaw said. "The capabilities are going to be expanded considerably and the soldiers are going to have a more advanced system to work with."

A PERSISTENT THREAT

Despite the end of combat operations in Iraq, the Army doesn't expect the need for convoy training to decrease. As U.S. troops surged into Afghanistan this summer, insurgents responded with more IEDs. According to the Pentagon's Joint IED Defeat Organization (JIEDDO), the use of IEDs in Iraq has declined since 2003, but has significantly increased in Afghanistan each year since 2005.

The IED threat in Afghanistan tends to in-

volve less-sophisticated devices used as initiators for more complex insurgent attacks, according to JIEDDO. Shaw said there are several factors to take into consideration when training convoys for Afghanistan as opposed to Iraq, such as the rural, mountainous terrain, the indigenous materials used to construct IEDs, and the cultural and political variations.

While the need for convoy training isn't diminishing, it is changing. According to O'Bea, the use of virtual convoy training has become much more widely accepted since the development of the VCCT. This is further demonstrated by the industry's steady sprint to keep pace with the numerous threats soldiers face in the field as well as customer demands.

"Just keeping up with the different vehicle types and the different technologies [the military] puts out on the field is a challenge," said Mike Syfert, Raydon's product domain capabilities manager.

An adaptable enemy drives this circular evolution. "Every time we find some way to train the soldiers, as soon as they get skilled in it, the insurgents change and have a different tactic or procedure to utilize," Syfert said.

For example, if U.S. forces develop and train for a new technology to defeat a certain

Training to make life-or-death decisions

Convoy leaders in training at the U.S. Army Combined Arms Support Command (CASCOM) at Fort Lee, Va., use a computer-based trainer to practice making life-or-death decisions in combat operations. The Convoy Leadership Decision Trainer (CLDT) partners with Bohemia Interactive's Virtual Battlespace 2 (VBS2) software to give soldiers the opportunity to perform a leadership role in a simulated environment.

"The purpose of the VBS2 is to train the leaders in the decisions they're going to have to make out there as opposed to training them to drive," said Arnold "Buck" Shaw, a convoy protection training specialist at CASCOM. When using the CLDT system, students click a mouse rather than turn a steering wheel or shift gears as they would in a simulator such as Lockheed Martin's Reconfigurable Vehicle Tactical Trainer (RVTT). This allows convoy leaders to focus entirely on decision making.

The CLDT suite at Fort Lee is set up for 30 students and primarily trains junior- and senior-level noncommissioned officers. The CLDT suite can leverage technol-



U.S. ARMY

The Convoy Leadership Decision Trainer is a laptop computer-based training tool for U.S. Army noncommissioned officers.

ogy to train soldiers at an interactive level, said Sgt. 1st Class Donald Jackson, a senior instructor in transportation for the Army's Advanced Leaders Course. "It simulates what's going to happen to them in an actual environment," he said. "The integration of training taking place back here in the states is the same thing that will be replicated in theater."

VBS2 software has advanced considerably since CASCOM introduced the CLDT in 2006, Jackson said. Originally, the instructor would create a scenario, let it

play out and observe how the soldier reacted. Now, the instructor can tailor each scenario based upon the individual student's skill level and analyze that specific skill set. "The software itself is responsive to the decisions they're making," Jackson said. "The instructor can increase or decrease the challenges."

Similar to simulators for convoy training, the CLDT suite has incorporated geospecific maps to enhance the soldier's realistic feel for an actual combat environment. VBS2 software is simpler and quicker to upgrade than

simulators, said Michael O'Bea, the Training and Doctrine Command's capability manager for virtual training at the Combined Arms Center-Training. For example, an upgrade to equipment or weapons in a simulator might take six months to go through the requirements, proposal and contracting, O'Bea said, but the same upgrade using VBS2 software would take only two or three weeks.

However, each training method has its shortcomings, O'Bea said. Whereas laptop computer training is less expensive than live field training, it is also less realistic than a simulator. "If all a soldier has ever done is fire a weapon by the click of a mouse, they won't be as efficient the first couple of times they use it for real," O'Bea said.

Jackson said each training method is only a piece to the puzzle, and soldiers should have a combined experience of live and simulated training, with convoy leaders participating in decision-specific training such as the CLDT.

"You might die 1,000 deaths in a simulated environment," Jackson said. "But, by the time you die those 1,000 deaths, you learn something." ■

— Kristin Quinn

type of IED, insurgents adapt by making a new type of IED. "We drive the enemy's tactics, techniques and procedures, and he drives ours," Shaw said.

Perhaps the most significant evolution is the use of realistic, geospecific databases.

"If you are looking at a building in a simulator, it is a building that does in fact exist somewhere," O'Bea said.

Elias said Lockheed's VCCT began with only three small areas of Iraq: Baghdad, Fal-lujah and Tikrit. Lockheed has since equipped its RVTT software with geospecific databases to reflect a more realistic virtual experience specific to Afghanistan's topography and the long-distance fighting that occurs in a rural environment.

"We've made the hardware changes to keep up with customer demands," Elias said. "But more importantly, the training experience has evolved to keep up with the fight."

Since the VCCT, Raydon has shifted its focus to route clearance training services through PEO STRI, as well as developing a line of Mine Resistant Ambush Protected vehicle trainers, which it hopes to sell to the U.S. National Guard. Raydon already has 69 Virtual Combat Operations Trainers fielded with the National Guard. The company has also implemented a new scenario-generation tool called SimCore GT, which allows data fields to be populated more quickly, the company said. SimCore GT

increases Raydon's library of training scenarios, making it faster and easier to change the virtual environment, such as integrating or removing insurgents, or increasing the amount of traffic and pedestrians.

In addition to geospecific databases, Lockheed is concerned with the behavior of entities in the simulation.

"The more of these things you do, the better the training experience will be," Elias said.

"It's not just having a virtual environment of the area that you're training for, but it's also all the little details that are specific to that."

Elias described this ability as a library of training experiences that keeps expanding. For example, modeling different ways to camouflage IEDs, changing the behavior of a crowd as the convoy approaches, or moving snipers from rooftops to windows. "The No. 1 priority is to stay current with the evolving equipment and tactics," Elias said.

As the use of unmanned aerial systems becomes more prevalent, the evolution of convoy training is far from complete. As recently as 2007, the only people who could see videos from unmanned aircraft were the operators, and it could take days to get the information to the troops on the ground. Now, convoys can be equipped with improved situational awareness by simultaneously receiving sensor feeds and data from manned and unmanned systems.

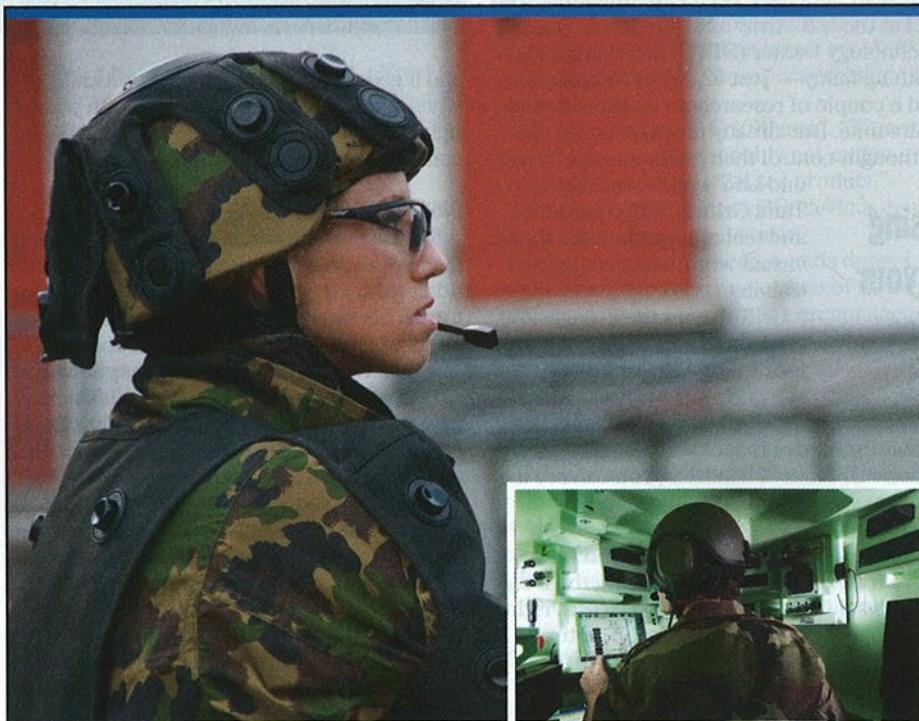
During a session titled "Cooperative Convoy Protection" at the Association for Unmanned Vehicle Systems International conference in August, capability manager for unmanned aircraft systems at TRADOC, Col. Robert Sova, said, "We need to train convoy commanders at all levels as to the capability of [unmanned] systems. We need to train people with manned systems how to operate with unmanned systems."

Another convoy concept discussed at AUVSI was the use of automated technology for convoy vehicles. Lockheed presented its Convoy Active Safety Technology, an unmanned system capable of vehicle and road following, interval maintenance and obstacle avoidance. If automated technology for convoys became widely used, it would allow soldiers to focus more on situational awareness and less on operating the convoy vehicle. However, soldiers would still require training in how to operate the automated system, Elias said.

Shaw emphasized that convoy training is an ongoing necessity.

"As long as there is a soldier deployed somewhere that needs supplies, as long as there is a unit that needs to get from point A to point B, there will be convoys," he said.

"We had convoys in 1861 and we will still have them in 3016. Who knows what they will look like? But soldiers will still have to train to use them." ■



RUAG

RUAG provides sophisticated training solutions tailored to its customers' requirements.

Products range from **virtual simulation systems** for driver and gunnery training, to crew training for light armoured vehicles, main battle tanks and howitzers, to tactical training.

Live simulation systems include laser-based precision training for gunnery and anti-tank weapons, small arms, improvised explosive devices, and urban operations, as well as complete combat training centres.

Your Partner for Live and Virtual Training Solutions

RUAG Electronics AG

Simulation & Training · P.O. Box · 3000 Berne 22 · Switzerland

Tel. +41 31 376 66 00 · marketing.electronics@ruag.com · www.ruag.com

Please visit us at the I/ITSEC in Orlando, USA, from 29 November – 2 December 2010, booth 1685