

Modular, Reconfigurable & Realistic

Feedback that matters and lessons learned; Chuck Weirauch takes a close look at armored vehicle training.

I hit the group of three close-together hillocks going far too fast; I didn't know any better.

My M1A2 Abrams tank wildly and violently pitched up and then down, snapping my head back and forth like a yo-yo gone mad. Great feedback and my still-sore neck underscores the lesson learned, reminding me to take more care next time I drive through that terrain. Fortunately, not having broken either my neck or the Abrams M1A2 variant of the SAIC Common Driver Trainer (CDT), there will be a next time. I know better now and I will do better traversing the tank driving course in SAIC's Orlando Integrated Simulation Center, and that's the whole point – doing better next time.

That all-too-real pitching motion is driven by a Moog electric six-degree-of-freedom (6DOF) motion platform to which the actual driver's cab of an Abrams is attached. Under a US Army Program Executive Office for Simulation, Training and Instrumentation (PEO STRI) contract, SAIC will provide 18 Abrams CDT variants to the Army's Fort Benning in Georgia by this December.

Modular and Reconfigurable

The beauty of this configuration is that any number of different actual vehicle cabs can be mounted on the electric motion platform. Just switch out the cab of an Abrams with that of a Mine Resistant Ambush Protected (MRAP)

armored vehicle, for example, and you have a full-motion driver trainer for that particular vehicle. As SAIC Vice President Dutch Sley explained, the CDT software is "smart enough" to automatically reconfigure the trainer from a tracked vehicle to a wheeled one, for example, programming the motion platform to match the dynamic motion performance of the reconfigured vehicle cab.

The Army has embraced the modular CDT concept, and in fact PEO STRI initiated the CDT approach, starting with a contract with SAIC, which partnered with FAAC to develop a Stryker armored vehicle CDT. Since that time, PEO and SAIC have worked together to additionally provide CDTs for a number of different MRAP armored vehicles, the most recently the MRAP All Terrain vehicle (M-ATV). Work is also underway to employ the CDT Tank Variant for the Abrams for the Joint Assault Bridge (JAB) and Assault Breacher (AB) armored tracked vehicles as well.

At the 2010 Training & Simulation Industry Symposium (TSIS) in Orlando in June, PEO STRI announced a \$350 million CDT request for proposal (RFP). Some of this funding will go to establish a CDT Program of Record, which will assure that the CDT program will be a line item for funding consideration in future Army budgets. This effort will help facilitate the Army's goal of having one

common driver training system for all of its combat vehicles.

According to Lt. Col. Charlie Stein, PEO STRI Product Manager for Ground Combat Tactical Trainers (GCTT), the requirement for the CDT program is currently being finalized. He expects the CDT competition to take place in the 2nd quarter of FY 2011. The vehicles that the contract action will cover is still being developed, but generically it will cover the Joint Light Tactical Vehicle (JLTV), Family of Medium Tactical Vehicles (FMTV), Heavy Equipment Transporter (HET) and Armored Security Vehicle (ASV) lines, as well as more Stryker and MRAP vehicle CDTs. However, "once we show the goodness of the CDT tank variant," more of those trainers will be allocated, Stein feels. There is also a considerable need for a CDT for the MRAP-based armored route clearance vehicles such as the Buffalo, he added.

Motion and MRAP All Terrain Vehicle

The CDT 6DOF motion platform is a particularly valuable asset in training drivers to operate in the steep, mountainous terrain of Afghanistan, where the few roads are narrow with pitched soft shoulders. Recognizing that large, high-center-of-gravity conventional MRAP vehicles cannot be driven safely in such an environment, the Army awarded



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a \$1 billion contract to produce more than 2,200 of the smaller, more off-road-capable M-ATVs to Oshkosh Defense in July 2009.

With all M-ATVs being rapidly deployed directly to Afghanistan, there was an urgent need to provide a device to train US armed services personnel in M-ATV safe operation Stateside before they were deployed. According to both Stein and Sley, the production of the M-ATV CDTs had the highest government priority; PEO STRI and SAIC team, with assistance from Oshkosh Defense, were able to deliver the trainers in just 128 days.

As with the Abrams CDT that I drove, the M-ATV 6DOF motion platform can provide the vital real-time feedback of terrain and weather conditions that one needs to experience to learn to drive in the treacherous Afghan environment. While my CDT employed a generic terrain database, the M-ATV CDT features an Afghanistan geo-specific Synthetic Environment (SE) Core database.

So far SAIC has delivered 13 mobile M-ATVs based in trailers that are being rotated around to Army training centers throughout the US. An additional seven M-ATV CDT driver cabs have also been delivered which can be mounted on any of the 21 Army bases in the Continental US (CONUS) that have a CDT in place. Stein said that building the mobile 6DOF system in a trailer was a challenge because of stability issues. However, now, with those issues resolved, the mobile system can serve as a base for conventional MRAP, Stryker and tank training because cabs for those vehicles can be employed on the mobile motion base as well, he pointed out.

"We're taking the training to the troops with the mobile CDTs instead of them coming to the training, and that's a win-win for everyone," Sley said.

Gunnery

The next step in embedded vehicle gunnery training primarily for the Abrams and Bradley Fighting Vehicle platforms is being provided by Oasis Advanced Engineering's contract with the Army's Program Management Office Heavy Brigade Combat Team (PM HBCT) to develop the Common Embedded Training System (CETS). The CETS software,

which will undergo initial evaluation in a Bradley this November, will be used to sustain gunnery skills onboard the vehicle, according to Jorge Cadiz, Oasis Manager for Programs and Business Development.

The CETS software will also be incorporated into the new, stand-alone Conduct of Fire Trainer Situational Awareness (COFT -SA) trainer. This trainer is being developed by prime contractor Oasis with team member subcontractor Cubic Simulation Systems Division for the Army National Guard under a recently awarded \$13 million Program Executive Office for Simulation, Training and Instrumentation (PEO STRI) contract. The reuse of CETS software in the COFT-SA will provide a commonality of training element between COFT-SA desktop trainers, the stand-alone COFT-SA trainers and the CETS-based embedded gunnery training system onboard the Bradley, Cadiz explained.

The COFT-SA, which will be delivered as fixed units for schoolhouses and in mobile trailers, will resemble the earlier Bradley Advanced Training System (BATS) trainers but will provide improved training capabilities, Cadiz said. Oasis is providing the COFT-SA system software and program management, while Cubic is providing the system hardware and the Commander/Gunner turret crew station, the main feature of the system. The initial delivery will be for 15 mobile and nine fixed-site trainers, with options up to 45 over the four-year contract, as well as 69 individual commander, gunner and crew station tabletop trainers, which also can be linked together for full crew training. Deliveries are scheduled to begin in May 2011.

"In addition to the CETS software, there are substantial improvements in reliability and maintainability with the COFT-SA over legacy trainers," said Cubic program manager Mike Hoffman. "Since National Guard personnel have a very limited amount of time to train, maintaining trainer uptime is a critical factor. The COFT-SA is also based on the Bradley model which the National Guard will be getting for the most part, the M2/M3A2 Operation Desert Storm vehicle upgraded to ODS-Situational Awareness."

One of the most prolific armored vehicle gunnery trainers is the Advanced



Above
The CAE-built T-90 tank driver trainer.
Image credit: CAE.

Gunnery Training System (AGTS) produced by Lockheed Martin Global Training and Logistics. The AGTS is used to provide gunnery training for more than a dozen armored vehicles, including the Abrams, Bradley and Stryker vehicles, the most recent addition being for the Stryker Mobile Gun System that features a 105-millimeter cannon.

According to Andre Elias, Director of Virtual Training Solutions for Lockheed Martin Global Training and Logistics, the company's most recent effort to support the US Army has been to match the training system to changes on the Abrams tank platform. One of the most recent changes has been the addition of the Tank Urban Survivability Kit (TUSK), which includes such features as a crew remotely operated 50-millimeter machine gun. Nearly 900 Abrams tanks are now equipped with the TUSK.

"One example of such upgrading is that urban part of the TUSK requires close-range gunnery, so the training system software has to change since the weapons system is more orientated towards closer combat than traditional long-range tank gunnery," Elias explained. "The virtual environment also has to be updated to replicate training scenarios that are specifically aimed at an urban environment versus a long-range one. Keeping up with platforms is our number one priority, but fortunately technology advances allow us to do so in a much shorter timeframe than in the past."

Overall, military budgets are strongly

influencing the drive towards more simulation for tank training, Elias pointed out.

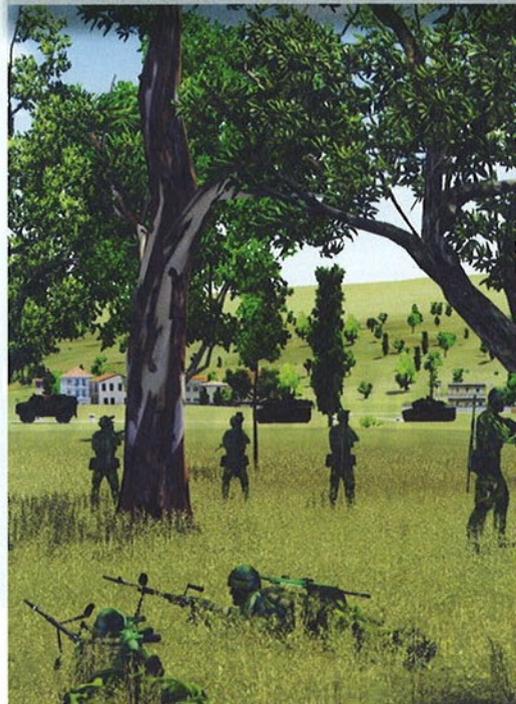
"Obviously there will be less money and resources to buy ammunition, for example," Elias summed up. "I think that the reliance on simulation to sustain skills is going to be as important as it ever was, with more customers looking at how they can do more in simulations."

T-90

The search for effectiveness and economy in training armored units is not unique to America. CAE India and TATA Advanced Systems Limited (TASL) have teamed up to develop a complete T-90 training system that includes a T-90 driver trainer, a T-90 gunner trainer, and a T-90 gunnery crew trainer. They have opted for an electric 6DOF full-motion platform. The Indian Army is currently in the request for proposal process to acquire a comprehensive suite of both T-90 and T-72 tank training systems.

CAE has also developed a training system for India's domestically developed and produced Arjun main battle tank. The Arjun driver trainer also employs a 6DOF motion platform. The training system includes a turret trainer for commander and gunner training. In August, India opened a Simulation Training Centre for the Arjun. **ms&t**

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