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## in the lab

Each day, RDECOM's talented scientists and engineers research innovative technologies that position the U.S. Army as the world's premiere land force. "In the lab" highlights recent and on-going initiatives that will benefit soldiers.

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## Future Warrior Uniform Returns—With Changes

*Natick Soldier Center*

Natick, Mass. – Nothing works on Future Warrior, and that's the way it's supposed to be. The uniform ensemble, first assembled at the Natick Soldier Center in 1999, was redesigned for 2003 to better depict technology that is decades away from reality for soldiers. While the Objective Force Warrior soldier weapon platform prepares for fielding within the decade, Future Warrior is set apart as a mostly visionary tool for researchers, said Cheryl Stewardson, the integrated protection functional area leader for the Natick Soldier Center's OFW program.

Future Warrior was reintroduced at the May 22 opening of the Institute for Soldier Nanotechnologies, a new partnership between the Army and Massachusetts Institute of Technology. "We wanted to showcase now the concepts they're working on for the future," Stewardson said. "Seeing (concepts) on a human form helps us see how (technologies) might be used and their limitations."

During the past three years, scientists and engineers have experimented with concepts to determine their feasibility with OFW, Stewardson said. What's out of bounds for OFW ended up on Future Warrior.

Looking menacing from head to toe in an all-black, custom-fit uniform, Future Warrior is portrayed by Sgt. Raul Lopez, liaison sergeant with the Operational Forces Interface Group. Replacing the modified motorcycle helmet used in the previous Future Warrior concept, the custom-designed helmet Lopez wears is leaner and incorporates several features representing upcoming technology. A blue-tinted visor signifies agile eye protection against tunable lasers, while inside a new projection display technology based off the Joint Strike Fighter helmet is now more accurately shown.

"We have sensors now for thermal and image intensification, but making them small enough, fusing the images and projecting them onto the visor – that's the leap," said Stewardson.

Openings at the top of the helmet fit in with the idea of a 3-D audio and visual sensor suite. They restore natural hearing lost in an encapsulated space and enhance long-range hearing. Cameras enhance vision from the sides and behind. A smaller halo on the helmet represents a tracking system for friendly and enemy forces. By reshaping the helmet, Future Warrior has an expanded field of view.

Protection against chemical and biological agents is more realistic with a respirator tube that attaches to the back of the helmet and connects to a low-profile air purifier that forces cool air into the helmet for comfort and visor defogging.

"It was envisioned to come down very sleek into the body, but we couldn't find a material to do it in the short time we had to put this concept prototype together," said Stewardson.

Another major change in the uniform is the addition of protruding, interconnecting black pieces of plastic on the legs that represent a lower-body exoskeleton. It will connect through the boots up to the waist and enable the wearer the ability to carry up to 200 pounds.

Above the waist, MIT's research on nanomuscles for advanced arm and torso strength may be linked to the exoskeleton to give Future Warrior potentially superhuman ability to move or carry. A flexible display on the forearm of Future Warrior glows when switched on and draws attention to the simulated touch screen keypad for information input and output for tasks such as navigation, physiological status monitoring and command communication.



Above the waist, MIT's research on nanomuscles for advanced arm and torso strength may be linked to the exoskeleton to give Future Warrior potentially superhuman ability to move or carry.

The display is connected into a compact computer worn on an armored belt around the waist. Attached to the arm is a slim box representative of the remote control unit for any system that might be used, such as a robotic mule or unmanned aerial vehicle.

Found near the top of the torso front and back are what look like quarter-sized buttons built into the fabric depicting a nanostructure sensor array to detect weapons of mass destruction, friendly or enemy lasers, or even weather.

“(The sensors) could trigger a response in the uniform to open or close the fibers depending on temperature or precipitation,” said Stewardson.

Black was chosen as the color to clue observers that it's the future, she said, although the

aim is for a uniform that's invisible. Speaking of stealth, much of the futuristic capability can't be shown at least in part because of nanotechnology.

Along the black stretch fabric are custom-fitted plastics and foams that take the place of liquid body armor that will instantly solidify when struck. “All the parts are much harder than we wanted. We haven't figured out how to portray (liquid armor),” Stewardson said.

Through nanotechnology, multifunctional materials will be able to transport power and data. The materials will also be able to fend off chemical and biological agent attacks, self-decontaminate and become waterproof.

“I believe nanotechnology is going to give us much more than we can even envision today. This is just a sampling,” Stewardson said.

In many ways, the revised Future Warrior is the same. A microturbine will provide power for items such as the microclimate conditioning system for heating and cooling. The weapon remains a fire-and-forget system using soft-launch seeking missiles. A transdermal nutrient delivery system provides the nourishment to get through a battle. The Future Warrior will be a moving target for researchers, shedding workable technology for the next greatest thing.

“There's always going to be a Future Warrior,” Stewardson said. “In the soldier business, you can never rest on your laurels. Somebody is always out there to beat you.”

**“There's always going to be a Future Warrior...in the soldier business, you can never rest on your laurels. Somebody is always out there to beat you.”**

**—Cheryl Stewardson,  
Natick Soldier Center**

## Tank-automotive Leads Dragonfire Project

By Shawn Keller

Warren, Mich. – A new 120mm rifled mortar with a semi-automatic loader, called Dragonfire, which can be mounted on a Light Armored Vehicle 25, is being demonstrated at Quantico, Va. A joint design of the Tank-automotive Research, Development and Engineering Center and the Marine Corps War Fighting Lab, Dragonfire's computerized fire control system takes commands remotely and automatically points and fires the projectile.

The advantage of the LAV 25-Dragonfire is that the mortar can be operationally deployed in a variety of ways. The mortar can be fired under armor from within the LAV 25. The Dragonfire can also be rolled off for air transport via the V22-Osprey or stationary deployment on the ground. If necessary, the Dragonfire can be towed by the HMMWV or the FMTV.

TARDEC developed the prototype, and Armaments Research, Development and Engineering Center tested the mortar loading and unloading. The loader system is a prototype of French design, while ARDEC designed the fire control system. After the testing, at the request of the customer, the vehicle was returned to TARDEC for incorporation of a few minor design modifications to enhance the efficiency of the mortar loading/unloading operation. The design modifications were completed successfully, and the vehicle was shipped to Quantico, Va., on July 14, 2003, for a demonstration.

The project was initiated in second quarter 2002. Many obstacles were overcome to design a modification to the LAV 25 in order to accommodate the Dragonfire. This required extending the hull; replacing the rear doors with a hydraulically actuated ramp; replacing the top hatches with larger hydraulically actuated doors; developing a means of inserting, securing and extracting the Dragonfire; and providing storage for the projectiles and other equipment. Many structural changes also were needed in the successful completion of this project. The rear of the LAV 25 was cut off and extended by 12 inches. The top opening of the vehicle was enlarged to enable the mortar to be traversed 360 degrees at a minimum elevation of 40 degrees. Ramps and a new rear hydraulic ramp door were fabricated. Also fabricated were exterior storage brackets for the loading ramps and mortar components. A winch was integrated in the vehicle for pulling in the mortar, and a complete hydraulic system was installed for top and rear doors.



Dragonfire is a new 120mm rifled mortar with a semi-automatic loader that can be mounted on a Light Armored Vehicle 25.



The Dragonfire mortar can be fired under armor from within the LAV 25, rolled off for air transport via the V22-Osprey, deployed on the ground or towed by the HMMWV or the FMTV.

TARDEC's Design and Digital Mock-up Team used Pro Engineer CAD software to design an efficient mechanism for loading and unloading the mortar. Pro Engineer CAD software provides up-front virtual prototyping of real-world mechanisms, which allows design engineers to solve complex engineering problems efficiently. The value of 3D CAD solid modeling was also demonstrated by the fact that most of the vehicle modifications were designed using a CAD model of the Dragonfire. This was necessary because there is only one Dragonfire prototype in existence, and it was not available for most of the vehicle design effort.

This was an excellent example of collaborating team effort within RDECOM in order to generate, provide and sustain mobility, lethality, and survivability for our soldiers. Project teams included Design & Digital Mock-up Team: Mike Manceor, Pete Pfister, Nick Goutis and Nick Logreco; Physical Prototyping Team: Chris Boughton, Roger Furman, Greg Carter, Skip McLeod, Rich Line, Danny Looney, Bob Petrovich, and Henry Chaffin; and ARDEC Engineers.

**“Dragonfire’s design modifications were completed successfully, and the vehicle was recently shipped to Quantico, Va., for a demonstration.”**

## Compact Kinetic Energy Missile Moves to Advanced Tech Demo

By Jim Bowne

Redstone Arsenal, Ala. – The Army's mandate is to become more responsive, lethal, agile, versatile, survivable and sustainable to meet the needs of national defense. The Aviation and Missile Research, Development and Engineering Center is providing a solution to support this mandate – the Compact Kinetic Energy Missile. This system is currently transitioning to the Advanced Technology Demonstration phase to support a system development and demonstration effort scheduled to begin in fiscal year 2006.

According to George Snyder, program manager, the Compact Kinetic Energy Missile weapon system is lighter, smaller, faster, smarter and more lethal. The Compact Kinetic Energy Missile ATD will develop and demonstrate an advanced anti-armor weapon system comprised of two primary components. These components include (1) a compact kinetic energy missile, based heavily on missile technologies the center currently is developing and demonstrating and (2) a fire control system (based primarily on Future Combat System-compatible components), which will be integrated into a combat vehicle and tested in a series of flight tests, including engagements against threat-representative armor and other hardened targets at ranges to 5 km or greater.

The challenge is to demonstrate that a dramatically smaller missile (half the size of the current kinetic energy missile) can provide overmatch lethality against current tanks and future threat armor. Tracking threat-representative targets and engaging three targets within 10 seconds are among other capabilities that will be demonstrated. Separate lethality tests and simulations will be conducted to confirm overmatch lethality against the projected threat, including Explosive Reactive Armor.

"The (Compact Kinetic Energy Missile) weapon system is being developed to provide the Future Combat Systems, the Objective Force and the current Light Force with a lightweight, kinetic energy weapon that will deliver overwhelming lethality against present and future threats," said Snyder. "(It) will demonstrate an anti-weapon system that is half the size and weight of the current generation Kinetic Energy Missile, while maintaining lethality overmatch. This objective requires major advances in the development of critical technologies."

The project began as a science and technology objective in 1999. According to Snyder, the transition to ATD was made possible through technology maturation, successfully demonstrated through a partnership effort with the Army Research Laboratory, the Program Executive Office for Tactical Missiles, industry, and most importantly, the "user" over the past 30 months.

"The program's success to date has depended on close collaboration with industry and all disciplines and directorates across the center," Snyder explained. "It has also required major technical development – propulsion, electronics, simulations, guidance, lethality –involving multiple directorates and labs within the AMRDEC."

Snyder said that the missile will be more lethal than currently fielded anti-armor system, because it will provide overmatch against advanced armor and will be capable of defeating Energetic Reactive Armor 1 – 3 and threat Active Protection Systems. Also, it will be more versatile, as it will be compatible with a variety of weapon platforms, including



The Combat Kinetic Energy Missile leaves the launch rail during a flight test.



A fireball from the Combat Kinetic Energy Missile's impact on a main battle tank is demonstrated as part of a high-speed rail test.

the Future Combat System, as well as other ground combat vehicles that will give the Army the ability to achieve a versatile, rapidly-deployable, fast-moving, highly-responsive force.

The kinetic energy missile also will increase survivability because it will provide an effective counter to enemy armor, providing lethal fires to a range of 5km, well beyond the current tank gun range. It will also have improved sustainability because of the large number of stowed kills achievable with this second generation Kinetic Energy Missile. In addition, fewer troops and equipment will be needed on the battlefield for resupply operations.

Moreover, the new weapon system's military significance lies in the fact that it is sized to integrate into the Army's new, smaller and lighter combat systems that can be deployed quickly to practically any place in the world. It does not require exposure of dismounted troops, and it can operate on the most rugged terrain. It also will provide the deploying forces with the ability to deal effectively with any armor threat by allowing the Army to stop the advancement of armor before it reaches effective range, and then to rapidly destroy the enemy's most resilient weapons at the outset of the conflict.

"As the Advanced Technology Demonstration phase of (the Combat Kinetic Energy Missile) progresses, the Aviation and Missile Research, Development and Engineering Center will continue to develop technologies and solutions that will enable future systems to get smaller, lighter and more lethal to support Army Transformation," Snyder said.

"The (missile) will provide current Light Force and the Objective Force a 'one shot—one kill' capability against tanks and other armored vehicles, as well as bunkers and buildings at extended ranges. It will destroy the target with devastating results and overwhelming lethality."

**"The (Combat Kinetic Energy Missile) will provide current Light Force and the Objective Force a 'one shot – one kill' capability against tanks and other armored vehicles, as well as bunkers and buildings at extended ranges."**

—George Snyder,  
program manager

## Tank-automotive to Set Up Fuel Cell Test Lab

By Kevin Mills

Warren, Mich. – As President George W. Bush emphasized in his 2003 state of the union address, hydrogen fuel cells will play the major role in our nation's energy security. Today, Tank-automotive Research, Development and Engineering Center's National Automotive Center Alternative Fuels and Fuel Cell Team is spearheading hydrogen fuel cell testing by establishing a state-of-the-art test laboratory at TARDEC headquarters in Warren, Mich.

The team is committed to bringing President's Bush's fuel cell vision to a commercial and military reality. The new lab will be used to independently verify and validate new fuel cell products for possible military use as they reach the market. The facility will be equipped to examine various aspects of new fuel cell's performance, including power output, transient responsiveness and fuel consumption. As fuel cell engines become available, the new lab will perform emissions testing and drive simulations.

To make sure an onsite supply of hydrogen fuel is available at all times, the lab will have the ability to generate its own fuel. A Hogen® 40 electrolyzer will create hydrogen gas from deionized water by acting as a reverse fuel cell, using electricity to split water into its component hydrogen and oxygen gases. The hydrogen gas will be stored in a large 650 gallon, low-pressure (250 psi) tank for use in testing fuel cell systems.

To ensure complete safety of all operations in the test cell, redundant safety controls and sensor systems are also being installed. The test cell was originally constructed to handle explosive fuels used in engine testing. The cell is equipped with blast resistant walls, robust ventilation capabilities and explosion resistant doors that make it a safe site for the new test lab. To tailor the facility to fuel cells testing, hydrogen sensors coupled to emergency shutoff valves will stop all fuel flow from the source if a leak is ever detected. Redundant ventilation systems provide added safety. Precision gas control and humidifiers provided from Lynntech,® Inc., will provide the proper fuel and air parameters for fuel cell operation.

With equipment installation in process, the test lab is expected to be operational in late fall of 2003.

**“The National Automotive Center Fuel Cell Team is committed to bringing President's Bush's fuel cell vision to a commercial and military reality.”**



Alternative Fuels and Fuel Cell Team member Heather McKee stands in the future site of the fuel cell integration lab. Directly in front of her is the hydrogen producing electrolyzer that will fuel the lab. To her right is a programmable 10kW load bank that will put fuel cells through military load profiles.



Lead Project Engineer Kevin Mills stands next to the low-pressure hydrogen storage vessel that will be installed near the hydrogen fuel cell lab.

## in the field

RDECOM's primary mission is to get the right technologies in the hands of soldiers faster. "In the field" features technologies and systems developed by RDECOM that have been recently fielded or deployed to soldiers.

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## Armed Robots Provide Glimpse of Future Warfare

By Stephen Trentanelli

Warren, Mich. – The Armament Research, Development and Engineering Center and the Special Operations Command jointly hosted a demonstration of modular payload systems on robotic platforms that was held recently at Avon Park Bombing Range, Fla. The research center's contribution to this demonstration consisted of plug and play modular armament payloads, which include the M202, the 40mm grenade launcher and the Telepresent Rapid Aiming and Pointing system – all of which can be mounted individually on the Talon robot, thus the name “modular.”

Five non-commissioned officers from ARDEC's Explosive Ordnance Disposal Unit participated in the demonstration, which held was to show the operational utility of arming robots and to generate user interest in the concept of armed robots on the battlefield.

The robot platforms demonstrated were the Talon robot developed by Foster-Miller Inc. This robot was a logical choice since it is already in service with joint service Explosive Ordnance Disposal units, and soldiers are experienced with its operation.

Additionally, the Talon robot has an articulating arm that facilitates attaching and aiming weapons. The robots were integrated with one of three armament systems: an M202 Light-Anti-tank Weapon (four 66mm rockets), a 6 barrel 40mm grenade launcher or a small arms weapon mounted on the Tactical Related Applications system produced by Precision Remotes.

The demonstration started with a Talon robot driving over anti-personnel land mines to place an explosive charge on an anti-tank mine. A live fire of all three armament systems engaging targets out to 450 meters in single fire and automatic fire modes followed. Visitors to the demo watched the live fire events and then received detailed briefings on the operation of the systems.

While many people are fearful that armed robots will run amok on the battlefield, this was not an issue for the demonstration. The robots employ a “man in the loop” where the robots are always under the direct control of a soldier. The soldier issues commands to the robot and the small arms weapons through the robot's operator control unit. The soldier also issues commands to the rocket and grenade launchers through a newly developed Remote Firing and Control System. This firing and control system, which was developed by Duke Pro, allows a single soldier to control up to five separate firing systems using a 40 bit encryption security system.

The EOD soldiers learned much about the performance of the system and identified a number of potential improvements to make the system even more lethal.



Staff Sgt. Santiago Tordillos demos armed Talon robots during live fire testing at Picatinny. Photo by Stephen Trentanelli

## Data Access and Retrieval Tool Eases Information Exchange

By Michael J. Statkus

Natick, Mass. – The Army recognizes that many future battles will almost certainly unfold as close combat engagements during military operations in urban terrain, or MOUT. The Natick Soldier Center, whose warrior systems materiel developers use MOUT data for modeling and simulation, developed and fielded a Data Access Retrieval Tool, also called DART. It is hoped that DART will set the pace as the prototype for fostering a renewed era of information and knowledge exchange within the modeling, simulation and analysis community.

DART originated from the Human Science/Modeling and Analysis Data Project, a four-year effort to obtain dismounted warrior performance data (e.g., move, shoot and communicate) through field exercises, simulator tests, data mining and extraction and subject matter expert interviews. The capstone goal to this effort has always been envisioned as a database housing the collected data to provide unprecedented access and usefulness to Department of Defense analysts and beyond.

An initial version of DART was developed and deployed on June 27, 2003. Historically, agencies that generate and collect data are often protective or unwilling to share their data for fear of losing control over its use.

The DART data warehouse possesses these basic features and capabilities:

- Accessible through the Internet
- Intuitive and easy-to-use graphical user interface
- Password-protected user accounts on a secure server
- Categorizes data by primary infantry tasks
- Expandable as more data becomes available
- Flexible as different kinds of data become available
- Data extract, transform and load tools
- Commercial, off-the-shelf software architecture

From the first login, users will immediately find DART easy to use. For efficient retrieval of information, data can be presented and categorized in the pre-defined data classes of Move, Shoot, Communicate, Sense/Perceive, and Decide. In addition to these data classes, a Side Navigation Bar, multiple common links and innovative search tools aid the user in surfing the DART site.



The DART Home Page.



A four-man fire team prepares to enter a building during a close combat engagement. Data that describes their performance are critical to models and simulations.

DART offers a variety of search tools to aid users in locating studies, summarized data, related files, and analytic resources. The user will primarily search for studies via the "Study Search" tool, which provides several parameters for locating desired studies. Parameters to search or sort by include the study's identification number, study name, principal investigator, date, data class and keywords. Results of a study search are hyperlinked to their respective study home pages, making it easy for users to quickly jump to the information. Once they arrive at a study home page, a user can read the study's abstract, see a list of related files or hyperlink to summary data.

**"The Data Access and Retrieval Tool, or DART, will foster a renewed era of information and knowledge exchange within the modeling, simulation and analysis community."**

## Unmanned Solution Crafted for Dangerous Duty

By Dominic Satili

Fort Monmouth, N.J. – When the Communications-electronics Research, Development and Engineering Center's Space and Terrestrial Communications Directorate received a call for help from South Korea, the center proved that help is just a phone call away – even from halfway around the world. Commanders located in South Korea needed to remotely operate a retransmission site located on an isolated hilltop. Ten soldiers manned the site around-the-clock, but harsh climatic conditions and dangerous road access often stranded soldiers and required airlift of food and water.

The center's Space and Terrestrial Communications Directorate utilized the communication system's Internet controller function to network the retransmit radios together via Ethernet LAN connection, and then paired a remote management tool with a user-friendly graphical user interface to ease the dispatch of commands to the top of the retransmission site, thus remotely controlling the retransmit radios. The center's engineers designed and developed the systems engineering, testing, software & interface.

A preliminary design review was conducted via teleconference. The team then visited South Korea to conduct a site survey, test initial remoting capabilities and have a face-to-face critical design review. The commanding general approved the overall design concept and funded purchase of the Phase 1 hardware.

Specifically, the team recommended a risk reduction full up systems test before attempting installation in Korea. Soldiers from the 122<sup>nd</sup> Signal Battalion traveled with the team to the Electronic Proving Grounds in Ft. Huachuca, Ariz. A full radio installation was tested with the Beta software. Hands-on, direct user involvement and feedback proved to be extremely valuable in fine-tuning the design.

With the changes incorporated from the successful design verification test, the team traveled to Korea to install Phase I of the project. The center's radio racks and antenna brackets were fabricated locally in Korea and installed during the team's visit. All hardware and software were installed and then a full systems verification test was conducted. Phase 1 provides the unit with the Initial Operational Capability of radio remote control. The total remote control system was verified to be completely operational and then turned over to the troops.

The CERDEC team stands ready to initiate the Phase 2 and 3 efforts, which are envisioned to provide additional redundancy and robustness in the control link by the addition of a microwave radio and video surveillance monitoring capability.

**“The commanding general wanted to find a way to operate the retransmission site without the need for on-site personnel, and CERDEC committed to accomplishing the mission for front line soldiers patrolling Korea’s demilitarized zone.”**

## Marines Field Lightweight Helmet

*Natick Soldier Center*

Natick, Mass. – It may not look much different from the current Personnel Armor System, Ground Troops helmet, but the new Marine Corps Lightweight Helmet is improved in almost every way. Fielding of more than 200,000 of the lightweight helmets to Marines will start this summer, replacing the old “Kevlar” as it’s commonly called, which has been around since the early 1980s.

A project that began in 1999, the helmet is part of the redesign of all individual equipment for Marines, according to Jim Mackiewicz, Marine Corps customer team leader at the Soldier Systems Center. The team provides technical and contract support for Product Manager-Individual Combat Equipment at the Marine Corps Systems Command in Quantico, Va.

Helmet prototypes went through operational testing at the Marine Corps Air Ground Combat Center in Twentynine Palms, Calif., in 2000 and 2002 during combined arms field exercises. In addition, the helmets were field-evaluated by Marines at Camp Lejeune, N.C.

“It was one of the highest rated pieces of equipment in the (Marine Corps Operational Test and Evaluation Activity),” Mackiewicz said, who was project officer for the helmet.

“To get an 85 to 90 percent approval rating is almost unheard of.”

Testing lasted an extra year to work out glitches and allow time to compare the Army’s new Modular Integrated Communication Helmet, or MICH, he said.

“Both the lightweight helmet and the MICH were comfortable and higher rated than the (Marine’s previous helmet), but the lightweight helmet was higher rated than the (older version),” said Maj. Stuart Muladore, Product Manager-Individual Combat Equipment team leader. “As it boiled down, it was still the helmet of choice for us.”

The helmet’s shell is shaped like the older version, but new materials bring a 6 percent improvement in fragmentation protection, as well as the ability to stop a direct hit from a 9mm round. Lab testing showed a 40 percent improvement in impact protection, which also means better durability. The manufacturer, Gentex Corp. in Carbondale, Penn., warrants the helmet for 15 years.

As the helmet’s name suggests, the extra capability was designed with a corresponding weight reduction of about one-half pound. For comparison, a medium-size older version helmet weighs 3.6 pounds versus a medium lightweight helmet’s 3.05 pounds.

“It’s the same weight as the MICH but doesn’t lose the area of coverage,” Mackiewicz said. “We could have made it as light as 2.8 pounds with a MICH-style cut. The MICH feels good, but Marines said they didn’t feel as protected wearing it.”



Fielding of more than 200,000 of the lightweight helmets to Marines will start this summer, replacing the old “Kevlar,” as it’s commonly called, which has been around since the early 1980s.



Marines can look forward to improved comfort with the new lightweight helmet, which features soft black leather for the X-shaped nape pad, headband and border around a new breathable nylon mesh suspension pad, and black suede-lined chinstrap. Two buckles on each side of the helmet provide tensioning and centering of the nylon retention webbing.

Complaints have been voiced about the Kevlar interfering with the Interceptor Body Armor, but the solution was more a matter of improving stability, not just reducing size, he said. By incorporating a four-point retention strap, similar to the MICH, the lightweight helmet is seven times more stable than the Kevlar, so it won't rock back and forth or fall off. Although most Marines won't be jumping out of airplanes, it's airborne-certified.

Comfort is improved with soft black leather for the X-shaped nape pad, headband and border around a new breathable nylon mesh suspension pad, and black suede-lined chinstrap. Two buckles on each side of the helmet provide tensioning and centering of the nylon retention webbing. The Kevlar helmet's five sizes remain, but Marines can easily adjust headband circumference and height by one-half inch with the lightweight helmet's hook and loop fabric fasteners for a better fit.

"One reason we didn't go with a trimmed version is because you can have it sit too high," he said.

Both adjustments help accommodate Marines when they're wearing masks or hoods, or when any helmet-mounted displays or optics are attached. Heat stress is similar to the Kevlar, according to Mackiewicz, and in anticipation of wear and tear, each helmet is delivered with a replacement kit containing an extra chinstrap and two headbands.

**"It was one of the highest rated pieces of equipment in the (Marine Corps Operational Test and Evaluation Activity). To get an 85 to 90 percent approval rating is almost unheard of."**

**—Jim Mackiewicz,  
project officer**

## XVIII Airborne Receives New Command Assault Vehicle

By Nita Gibson

Fort Monmouth, N.J. – Representatives from the Communications-electronics Research Development and Engineering Center's Space & Terrestrial Communications Directorate and Command and Control Directorate recently attended a ceremony at Fort Bragg, N.C., to officially transition an Upgraded Command Assault Vehicle, which both directorates designed and built. Although the unit already had a CAV as part of their Assault Command Post, they needed something with upgraded communications capabilities that is more suitable to light forces operations. The research center's engineers designed a new vehicle to meet their mission of airborne and forced entry support.

The Upgraded Command Assault Vehicle has a total of 10 radios – three high frequency radios, three FM radios and four Tactical Satellite radios. In addition, there are three antenna mounts on the vehicle, including a Quick Erect Antenna Mast. The antenna mounts are just one reason why it takes only 30 minutes for the communications to be operational. Also, the new intercom provides remote access to all communications networks from the Command Post.

The upgraded CAV was built on a HMMWV with two seats and a canvas back. The removable canvas provides easy access to all cables and equipment located within a modular equipment rack system. The modular rack system was very important to the unit. Now, in the event of vehicle breakdown, the racks and equipment can be removed and quickly installed in another vehicle.

Already tested in several exercises, the upgraded CAV is next scheduled for a "sling test" – where the vehicle is air lifted by a sling underneath a helicopter. Although this uniquely designed vehicle is lightweight and designed to meet Air Drop Standards, Col. Howard Coen, commander of the 35<sup>th</sup> Signal Brigade, believes that the unit "can't afford to ever airdrop this vehicle" since it is so valuable to the unit.

Everyone in attendance, especially the CAV operators, praised the vehicle and the research center's support. While cited by everyone in attendance as "a good piece of equipment" and "a great product," CAV Operator Specialist Nathan Hartsog described it best. When asked how he liked the Upgraded Vehicle, he replied, "The new CAV is like going from a Yugo to a Cadillac."



Col. Howard Coen and Lt. Col. Richard Miles cut the ribbon the new Improved Command Assault Vehicle. Photo by David Brackmann, Symbolic

**"The new Command Assault Vehicle is like going from a Yugo to a Cadillac."**

— CAV Operator Specialist  
Nathan Hartsog

## Airborne HF Radios Forge Link to the Army Tactical Internet

By James Hennig and Debra Siquieros

Fort Monmouth, N.J. – The Communications-electronics Research, Development & Engineering Center has developed a High Frequency Tracker program to provide a ground-based gateway software system as the framework for an interconnected digital and non-digital system.

Taking advantage of the fact that both existing and future aircraft will have onboard High Frequency, or HF, radio communications equipment, the airborne HF radios are integrated into the Army's Tactical Internet communications systems and provide an end user Command and Control capability to non-digital units. This communications link can be used for digital messaging at extended ranges or in Non-Line-Of-Sight conditions. In addition to merging these extended communications with digital messaging on the Tactical Internet, the HF Tracker system can serve as an end user Command and Control system when used in a standalone capacity without connectivity to the rest of the C2 systems.

Using software written entirely by in-house government employees, HF Tracker has grown from basic research products developed under an In House Laboratory Independent Research program called the Command and Control Integration Language, or C2IL. The C2IL products were integrated into a system called the Tactical Internet Test and Analysis system, or TITAN. TITAN was used extensively to build and test the Army's Tactical Internet, providing network loading, message completion rate and speed of service.

The HF Tracker program was born when the Communications-electronics Command applied the TITAN products to HF radio communications. During fiscal year 2003, HF Tracker gateway functions were implemented to forward digital messages to existing C2 systems and was also integrated with an existing mission planning and mapping system. The system was used in field exercises throughout the United States and Europe. Further development will include automated Tactical Internet integration.

After system deployment, the HF Tracker engineers received numerous change requests from both users in the field and the program manager. Changes varied from simple graphical user interface enhancements to interfacing with complex communications systems. HF Tracker used the original C2IL framework and extreme programming methods to enable rapid response to those continuously changing requirements and met the user's needs.

**“Airborne HF radios are integrated into the Army’s Tactical Internet communications systems to provide Command and Control capability to non-digital units.”**

## partnership

RDECOM partners with industry and academia to capitalize upon advancing technologies and to develop the next generation of scientists and engineers. RDECOM Magazine's "partnership" news department highlights the command's successful collaborations with industry and academia.

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- [Communications Center Assesses Navy's Digital Modular Radio](#)
- [United States, Germany Partner on C2 Experiments](#)

## ARL, Northrop Grumman Demo Radar Target Detection

*Army Research Laboratory*

Aberdeen Proving Ground, Md. – In tests sponsored by the U.S. Army Tank-automotive Research, Development and Engineering, Army Research Laboratory and Northrop Grumman Corporation successfully demonstrated the capability of a new advanced radar system that will help protect future Army ground vehicles from hostile missiles and artillery projectiles.

The radar tests, held at Aberdeen Proving Ground, Md., were intended to demonstrate consistent Ka-band radar detection of a series of kinetic energy tank-fired projectiles traveling at near-Mach 5 velocities. The Ka-band microwave system, known as KAMS, features an active electronically scanned array radar antenna developed by Northrop Grumman, coupled with radio frequency and digital signal processors from ARL. KAMS is intended to provide an active protection system for military ground vehicles, as well as perform battlefield tactical identification functions, moving target area surveillance and high-bandwidth communications between vehicles—all critical elements of the Army's Future Combat System.

Unlike a mechanically steered radar antenna, which is unable to move from one position to another instantaneously, the new electronically scanned antenna can steer its radar beam anywhere within a plus-or-minus 45-degree angle in azimuth and elevation in less than a millisecond. Four of these apertures affixed to the front, sides and back of a vehicle can provide complete hemispherical coverage to detect and track incoming threats while developing targeting solutions to destroy the specific threats.

Because it has no moving parts that might require maintenance, the new antenna also offers greater reliability than a conventional mechanically scanned array. The KAMS is easier to install on a vehicle because it is only a few inches thick and only 6 to 8 inches wide.

**“Ka-band microwave system, known as KAMS, will provide an active protection system for military ground vehicles and perform battlefield tactical identification functions, moving target area surveillance and high-band width communications between vehicles.”**

## Communications Center Assesses Navy's Digital Modular Radio

By *Dominic Satili*

Fort Monmouth, N.J. —The Communications-electronics Research, Development and Engineering Center's Space and Terrestrial Communications Directorate recently conducted a systems engineering evaluation of the Navy's Digital Modular Radio program. The Navy commissioned the research center to make an assessment of their approach to modifying the digital radio to comply with the Joint Tactical Radio System's Joint Project Office Software Communications Architecture Version 2.2.

The center reacted quickly to the Navy's need by establishing a Red Team of government experts, supplemented by Mitre, to evaluate the Navy's approach. The team visited the radio's developer, General Dynamics Decision Systems, in Phoenix, Ariz., and focused the evaluation on the hardware, software and waveform aspects of compliance. A rigorous systems engineering analysis was conducted of the existing architecture, migration plan for conversion to software compliance, contractual requirements and the Project Manager's Office schedules and oversight. Separate teams for software, High Frequency Waveform and Hardware were established to analyze General Dynamics' capabilities and design approach.

The team discovered that General Dynamics was taking a high-risk approach with a great potential for schedule slippage and a high degree of technical complexity. The contractor's software compliance implementation only addressed waveform portability and not full compliance. In addition, the contractor was not focused on the High Frequency waveform, which the evaluation team quickly discerned was a pacing item for planned Shipboard Construction Virginia class deliveries in November 2004. As a result of the team's evaluation, the Navy has placed a higher priority on meeting shipboard (user needs) deliveries.

**“The Communications-electronics Research, Development and Engineering Center assessed a Navy contractor's approach to modifying its the digital modular radio to comply with a new version of joint tactical radio system software.”**

## United States, Germany Partner on C2 Experiments

By Dr. Dirk Klose and Dr. Israel Mayk

Fort Monmouth, N.J. – The joint U.S. and German Simulation and Command and Control Information Systems Connectivity Experiments, or SINCE, program is implementing a reusable experimentation environment specifically tailored to support integrated C2 processes. Under the U.S. SINCE effort, evolving C2 systems and modeling and simulation systems are being networked and integrated into a flexible testing environment that can support the conduct of Coalition and Joint Warfighter experimentation across the full spectrum of technical and operational needs.

The SINCE Program aims to support Army transformation into a more collaborative and interoperable component of a Joint, National and Coalition Force. Specifically, a series of experiments will be conducted to examine and test conceptual approaches that support peer-to-peer military user collaboration and near real-time Common Operational Picture and information exchange interoperability under various possible force configurations and coalition /joint C2 operation environments. The experiments will cover the full spectrum of military operations from support and stability operations to peace keeping and traditional warfare.

The fundamental motivating experimentation hypothesis is that C2 is facilitated by a high degree of collaboration during military decision-making process and that these processes require the highest level of interoperability during execution. The decision process must run concurrently with the active and evolving battle management, execution monitoring and situation assessment processes that are stimulated by the external operational environment. Other subjects include determining optimum points for collaboration within the decision-making process; and achieving interoperability within the battle management, execution monitoring and situation assessment processes.

Joint U.S. and German working groups composed of subject matter experts from both nation's technical and operational communities are actively collaborating to establish a distributed, trans-Atlantic, SINCE experimentation environment and schedule of experiments. The first experiment, evaluating technical feasibility at the Army level, is scheduled to take place in November 2003, followed by operational feasibility experiment planned for April 2004. Experimentation in planning for third quarter 2005 and 2006 will expand both to other coalition partner nations and other joint service participants.

**“The joint U.S. and German Simulation and C2 Information Systems Connectivity Experiments, or SINCE, program is implementing a reusable experimentation environment specifically tailored to support integrated C2 processes.”**

## people

RDECOM's talented scientists, researchers and engineers are among the top in their field. The "people" section includes news and feature articles about the command's diverse staff, including profiles, awards and other accomplishments.

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- [ECBC Personnel Part of Award-Winning Team](#)
- [ECBC Mentoring Program Helps Maintain Edge](#)
- [Pro-Bono Exercise Earns Expertise and a Brush with Celebrity](#)
- [Martin Takes Over as CERDEC's Associate Technical Director](#)

## Engineer Bikes Across Michigan for MS Research

By Rae Higgins

Warren, Mich. – Move over Lance Armstrong. Dan Nguyen is making a name for himself in certain cycling circles. Nguyen, a software engineer from the Tank-automotive Research, Development and Engineering Center, recently participated in the Michigan Multiple Sclerosis bike-a-thon and pedaled 150 miles to help raise research funds to combat the disease. He may not be readying himself for the tres grueling Tour de France or breaking any Olympic cycling records, but what he is doing is admirable, charitable and from the heart.

Nguyen said he enjoys biking and participated in a similar event while attending college. However, this year, he rode in tribute to an installation cafeteria worker battling the disease.

“The last time I talked to her co-workers, they said she had to go to the hospital due to MS,” he explained. “

Nguyen’s trek began July 12 in Davisburg, Mich., where he and his fellow riders set out for East Lansing, home of Michigan State University. After spending the night at the university, he was back on the road for the return bike ride to Davisburg and a celebration at the finish line.

MS riders typically pay a registration fee and then collect pledges for their efforts. The money helps fund the National MS Society’s mission of stopping multiple sclerosis’ devastating effects.

According to the Multiple Sclerosis Society, MS is a chronic unpredictable neurological disease. It can cause blurred vision, loss of balance, poor coordination, slurred speech, tremors, numbness, extreme fatigue, problems with memory and concentration, paralysis and blindness. These problems may be permanent, or they may come and go.

The MS Society asserts that most patients are diagnosed between the ages of 20 and 50. The progress, severity and specific symptoms of MS in any one person are not predictable, but new treatments and advances in research offer patients hope.

If Nguyen has anything to do with it, he’ll be there again next year with his trusty bike, crisscrossing Michigan to raise money for MS research. At present, he has enlisted two friends for a three-rider team in 2004.



Software Engineer Dan Nguyen biked 150 miles across Michigan July 12-13 to raise money for the Multiple Sclerosis Society. He plans to ride again in the 2004 event.

**“Dan Nguyen, TARDEC software engineering, may not be readying himself for the Tour de France or breaking any Olympic cycling records, but what he is doing for multiple sclerosis is admirable, charitable and from the heart.”**

## ECBC Personnel Part of Award-Winning Team

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Aberdeen Proving Ground, Md. - The Edgewood Chemical Biological Center announced that the Joint Service Family of Decontamination Systems Team was recognized with the David Packard Award for Excellence in Department of Defense Acquisition. Several ECBC personnel are critical members of the team.

The Packard award evaluates nominated programs for reductions in product life cycle costs; responsiveness, efficiency and timeliness of acquisition; integration of Department of Defense personnel and practices with equivalents in the commercial sector; continuous improvement of the acquisition process; and accomplishment of goals relative to acquisition reform.

The team was nominated for "exceptional performance, innovation and application of best acquisition practices and outstanding program management practices." The team is made up of members of each service, with each service leading at least one of the six main focus areas of decontamination work.

## ECBC Mentoring Program Helps Maintain Edge

*Edgewood Chemical Biological Center*

Aberdeen Proving Ground, Md. – As part of the Edgewood Chemical Biological Center's ongoing efforts to ensure retention of its extraordinary body of knowledge, Technical Director Jim Zarzycki and the center's directorate leaders recently announced the initiation of an ECBC Mentoring Program. With an influx of new, younger employees and a number of senior-level personnel planning to retire in the near future, the mentoring program serves several key purposes.

The program is geared to provide growth and development opportunities to employees through access to the experience and knowledge of more senior employees. According to organizers, volunteering to become a mentor is an opportunity to steer the growth and development of the center's young professionals and hone leadership skills.

"Becoming a mentor is also a way for you to 'give back' to the organization," said Chemical Biological Services Director George Collins. "We are very excited to launch this pilot program and hope its success will lead to broader program participation."

In addition to guiding junior colleagues, the mentoring program provides an avenue for retaining the knowledge gathered by senior employees over decades of scientific and engineering work. By advising and counseling, senior personnel will transfer their collective expertise to the new generation of ECBC scientists and engineers.

The program will begin in October 2003 with an initial six-month pilot test involving 12 mentor/mentee pairs. If the pilot program is a success, it is anticipated that the mentoring program will be expanded.

**"We are very excited to launch this pilot program and hope its success will lead to broader program participation."**

**—George Collins, Chemical Biological Services director**

## Pro-Bono Exercise Earns Expertise and a Brush with Celebrity

### *Edgewood Chemical Biological Center*

Aberdeen Proving Ground, Md. – When the Edgewood Chemical Biological Center's Advanced Design and Manufacturing Team was approached by Cooperative Research and Development Agreement partner Direct Dimensions to assist with a pro-bono project benefiting underprivileged children, they jumped at the opportunity. Whenever there is a lull in priority military client work, the team welcomes opportunities to sharpen current capabilities and add new skills to their portfolio by working with commercial customers. However, at the start of this effort, little did the team know that while busy honing skills they also would rub elbows with NFL football superstar Ray Lewis of the Baltimore Ravens.

The task at hand was to co-create a one-of-a-kind life-size marble bust of the football player that would then be auctioned at the Second Annual Ray Lewis Foundation Auction. Proceeds were to go to the Ray Lewis Foundation, a non-profit charity organization dedicated to providing assistance to disadvantaged youth.

Upon receiving an electronic 3D model of the star's head and shoulders, the ADM team got started fabricating the model into ABS plastic. Because Center policy dictates that charity work be performed after hours, project leads Rick Moore and Lester Hitch spent time on the weekends and in the evenings tackling the job.

"In the business of rapid response, we're used to tough deadlines," said Hitch, a student contractor. Once their contribution was completed, the team sent the prototype pattern to a third partner, a noted plastic surgeon and sculptor who cast the pattern in marble resin.

The finished piece was auctioned at the gala and sold at a winning bid of \$7,000, the highest bid made amongst hundreds of autographed sport's memorabilia. Present at the benefit, Moore and Hitch were able to meet Lewis and share in the excitement of the sizeable charity contribution they played a role in realizing.

Commenting on the challenges the team faced in crafting the bust prototype, Moore explains the lessons learned were invaluable to their client work.

"Our CRADA partner is an expert in reverse engineering," says Moore. "Through this initiative, we collaborated on the laser scanning of a human being. As we fine-tune our ability to manipulate unique geometric files, imagine what we can do with this knowledge...for example, we could investigate the feasibility of scanning soldiers and developing custom fitted protective equipment."



ECBC's Lester Hitch (left) and Rick Moore (right) with Ray Lewis (center) at the Ray Lewis Foundation auction.

**"As part of a probono project, ECBC's Lester Hitch and Rick Moore developed a life-size marble bust of NFL star Ray Lewis, which was sold for \$7,000 to benefit the Ravens linebacker's charitable foundation."**

## Martin Takes Over as CERDEC's Associate Technical Director

*By Karen Ryder*

Fort Monmouth, NJ – The Communications-electronics Research, Development and Engineering Center recently honored one of its own when Gary P. Martin was elevated to the Senior Executive Service. As the center's Associate Technical Director, Martin is responsible for science and technology programs involving the development of advanced Command, Control, Communications, Computers, Intelligence and Information Warfare, and Night Vision and Electronics Sensors technology.

Martin previously served as the deputy project manager for tactical radio communications systems and as the acting project manager. He was responsible for the development, production and fielding of the Army's tactical radio communications programs, to include the Joint Tactical Radio System ground and rotary wing aviation development program.

From August 1988 to April 2000, Martin held a variety of technical management positions within the office of the project manager MILSTAR, project manager military satellite communications and project manager tactical radio communications.

Martin served on active duty as a signal corps officer from May 1984 through May 1988. During this time, he served as the chief of the field team for the Ground Mobile Forces Tactical Satellite Communications program. His military awards include the Army Achievement Medal, the Army Commendation Medal and the Meritorious Service Medal.

Martin holds a bachelor's degree in electrical engineering from Norwich University and a master's degree in engineering management from the University of Pennsylvania. He is also a graduate of Harvard Business School's program for Management Development. His military education includes the Program Manager's Course at the Defense Systems Management College, the Signal Officer's Basic Course and the Radio Systems Officer Course.

## monthly features

Each month, RDECOM Magazine features articles on specific aspects of the command's mission. The "monthly features" section enables readers to learn more about the command's diverse mission and activities.

The September edition of RDECOM Magazine features the Communications-electronics Research, Development and Engineering Center's recent technology initiatives. Also called CERDEC, this center focuses on developing advanced communications systems and capabilities for soldiers. The articles listed below are this edition's monthly features, and span the in the field, partnership, and people news departments.

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- [Communications Center Assesses Navy's Digital Modular Radio](#)
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- [CERDEC Chosen as DoD Teleport Testbed Site](#)
- [Martin Takes Over as CERDEC's Associate Technical Director](#)

## Unmanned Solution Crafted for Dangerous Duty

By Dominic Satili

Fort Monmouth, N.J. – When the Communications-electronics Research, Development and Engineering Center's Space and Terrestrial Communications Directorate received a call for help from South Korea, the center proved that help is just a phone call away – even from halfway around the world. Commanders located in South Korea needed to remotely operate a retransmission site located on an isolated hilltop. Ten soldiers manned the site around-the-clock, but harsh climatic conditions and dangerous road access often stranded soldiers and required airlift of food and water.

The center's Space and Terrestrial Communications Directorate utilized the communication system's Internet controller function to network the retransmit radios together via Ethernet LAN connection, and then paired a remote management tool with a user-friendly graphical user interface to ease the dispatch of commands to the top of the retransmission site, thus remotely controlling the retransmit radios. The center's engineers designed and developed the systems engineering, testing, software & interface.

A preliminary design review was conducted via teleconference. The team then visited South Korea to conduct a site survey, test initial remoting capabilities and have a face-to-face critical design review. The commanding general approved the overall design concept and funded purchase of the Phase 1 hardware.

Specifically, the team recommended a risk reduction full up systems test before attempting installation in Korea. Soldiers from the 122<sup>nd</sup> Signal Battalion traveled with the team to the Electronic Proving Grounds in Ft. Huachuca, Ariz. A full radio installation was tested with the Beta software. Hands-on, direct user involvement and feedback proved to be extremely valuable in fine-tuning the design.

With the changes incorporated from the successful design verification test, the team traveled to Korea to install Phase I of the project. The center's radio racks and antenna brackets were fabricated locally in Korea and installed during the team's visit. All hardware and software were installed and then a full systems verification test was conducted. Phase 1 provides the unit with the Initial Operational Capability of radio remote control. The total remote control system was verified to be completely operational and then turned over to the troops.

The CERDEC team stands ready to initiate the Phase 2 and 3 efforts, which are envisioned to provide additional redundancy and robustness in the control link by the addition of a microwave radio and video surveillance monitoring capability.

**“The commanding general wanted to find a way to operate the retransmission site without the need for on-site personnel, and CERDEC committed to accomplishing the mission for front line soldiers patrolling Korea’s demilitarized zone.”**

## XVIII Airborne Receives New Command Assault Vehicle

By Nita Gibson

Fort Monmouth, N.J. – Representatives from the Communications-electronics Research Development and Engineering Center's Space & Terrestrial Communications Directorate and Command and Control Directorate recently attended a ceremony at Fort Bragg, N.C., to officially transition an Upgraded Command Assault Vehicle, which both directorates designed and built. Although the unit already had a CAV as part of their Assault Command Post, they needed something with upgraded communications capabilities that is more suitable to light forces operations. The research center's engineers designed a new vehicle to meet their mission of airborne and forced entry support.

The Upgraded Command Assault Vehicle has a total of 10 radios – three high frequency radios, three FM radios and four Tactical Satellite radios. In addition, there are three antenna mounts on the vehicle, including a Quick Erect Antenna Mast. The antenna mounts are just one reason why it takes only 30 minutes for the communications to be operational. Also, the new intercom provides remote access to all communications networks from the Command Post.

The upgraded CAV was built on a HMMWV with two seats and a canvas back. The removable canvas provides easy access to all cables and equipment located within a modular equipment rack system. The modular rack system was very important to the unit. Now, in the event of vehicle breakdown, the racks and equipment can be removed and quickly installed in another vehicle.

Already tested in several exercises, the upgraded CAV is next scheduled for a "sling test" – where the vehicle is air lifted by a sling underneath a helicopter. Although this uniquely designed vehicle is lightweight and designed to meet Air Drop Standards, Col. Howard Coen, commander of the 35<sup>th</sup> Signal Brigade, believes that the unit "can't afford to ever airdrop this vehicle" since it is so valuable to the unit.

Everyone in attendance, especially the CAV operators, praised the vehicle and the research center's support. While cited by everyone in attendance as "a good piece of equipment" and "a great product," CAV Operator Specialist Nathan Hartsog described it best. When asked how he liked the Upgraded Vehicle, he replied, "The new CAV is like going from a Yugo to a Cadillac."



Col. Howard Coen and Lt. Col. Richard Miles cut the ribbon the new Improved Command Assault Vehicle. Photo by David Brackmann, Symbolic

**"The new Command Assault Vehicle is like going from a Yugo to a Cadillac."**

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The team discovered that General Dynamics was taking a high-risk approach with a great potential for schedule slippage and a high degree of technical complexity. The contractor's software compliance implementation only addressed waveform portability and not full compliance. In addition, the contractor was not focused on the High Frequency waveform, which the evaluation team quickly discerned was a pacing item for planned Shipboard Construction Virginia class deliveries in November 2004. As a result of the team's evaluation, the Navy has placed a higher priority on meeting shipboard (user needs) deliveries.

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## United States, Germany Partner on C2 Experiments

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Fort Monmouth, N.J. – The joint U.S. and German Simulation and Command and Control Information Systems Connectivity Experiments, or SINCE, program is implementing a reusable experimentation environment specifically tailored to support integrated C2 processes. Under the U.S. SINCE effort, evolving C2 systems and modeling and simulation systems are being networked and integrated into a flexible testing environment that can support the conduct of Coalition and Joint Warfighter experimentation across the full spectrum of technical and operational needs.

The SINCE Program aims to support Army transformation into a more collaborative and interoperable component of a Joint, National and Coalition Force. Specifically, a series of experiments will be conducted to examine and test conceptual approaches that support peer-to-peer military user collaboration and near real-time Common Operational Picture and information exchange interoperability under various possible force configurations and coalition /joint C2 operation environments. The experiments will cover the full spectrum of military operations from support and stability operations to peace keeping and traditional warfare.

The fundamental motivating experimentation hypothesis is that C2 is facilitated by a high degree of collaboration during military decision-making process and that these processes require the highest level of interoperability during execution. The decision process must run concurrently with the active and evolving battle management, execution monitoring and situation assessment processes that are stimulated by the external operational environment. Other subjects include determining optimum points for collaboration within the decision-making process; and achieving interoperability within the battle management, execution monitoring and situation assessment processes.

Joint U.S. and German working groups composed of subject matter experts from both nation's technical and operational communities are actively collaborating to establish a distributed, trans-Atlantic, SINCE experimentation environment and schedule of experiments. The first experiment, evaluating technical feasibility at the Army level, is scheduled to take place in November 2003, followed by operational feasibility experiment planned for April 2004. Experimentation in planning for third quarter 2005 and 2006 will expand both to other coalition partner nations and other joint service participants.

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## CERDEC Chosen as DoD Teleport Testbed Site

*By Nita Gibson*

Fort Monmouth, NJ. – Construction has begun on the Department of Defense Teleport testbed, which will be used to test new concepts and technologies and to develop upgrades to currently deployed satellite systems. The Teleport will also allow software vendors to test software integration before distribution to the warfighters and further enable the Army's participation in joint exercises and demonstrations.

The testbed will be operational by the end of the fiscal year. The Defense Information Systems Agency selected the Communications-electronics Research, Development and Engineering Center's Space and Terrestrial Communications Directorate as the testbed site because of the directorate's satellite communication lab, which is a one-of-a-kind, state-of-the-art facility that is unsurpassed anywhere within DoD.



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## news briefs

The "news briefs" section provides quick summaries of various news and events from throughout RDECOM.

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## Army Classifies New Aircraft Countermeasure Flares

The Army recently type classified two new infrared countermeasure flares to enhance aircraft survivability against the most sophisticated infrared guided missiles. Most recently, the flares were utilized during combat operations in Afghanistan and Iraq. The Armament Research, Development and Engineering Center's program manager, Close Combat Systems manages the flare program, with technical support from the Pyrotechnic Systems Team. Contractual management is performed at the Picatinny Center for Contracting and Commerce.



Members of the Aircraft Countermeasure Team for the M211 and M212 Aircraft Countermeasure Flare Program, which was recently type classified, include (back row left to right) Arnold Larson, Anthony Kendrell, Doug Kukla, Richard Ames, David Dreifus, Robert Ritchie and Christian Rush; and (front row left to right) Rene Medina, Chau Nguyen, Robert Phung, Kendra Archbald, Lori Dearra, Frank Fong and Amanda Shue. Jim Wejsa, David Decandia, Larry Visconti, Harvey Studen and Dan Gutierrez are absent from the photo. *Photo by Mark Kuperus*

## TACOM Renames its Commodity Business Operations Office

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The Tank-automotive and Armaments Command's Commodity Business Operations office has been renamed the Integrated Logistics Support Center. In addition, the Commodity Business Units under the old CBO will be renamed Product Support Integration Directorates. These developments will not involve any personnel changes.

These changes are being made to better reflect and define TACOM's role in life cycle integrated logistics support and product support integration. These changes are not new concepts, philosophies or ways of providing support to our soldiers, but rather are more focused on the type of support TACOM provided the Army for a long time and will continue to provide in the future.

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## ECBC Demos Novel Chem Bio Regenerative Air Filtration System

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The Edgewood Chemical Biological Center recently unveiled a new air filtration system promising improved protection for warfighters and civilians alike. The system, the first of its kind designed to protect against biological and chemical agents as well as toxic industrial chemicals, uses regenerative filters that do not require renewal like conventional filters. Low-maintenance and adaptable to a wide range of environments, this technology is extremely promising and has many possible military and homeland defense applications.

Developed by ECBC under a Cooperative Research and Development Agreement with domnick hunter, Inc., the Chemical Biological Regenerative Air Filtration System can be installed in shelters, buildings, vehicles, ships or anywhere protection is needed against chemical or biological warfare agents.

Currently in the testing phase, the CB Regenerative Air Filtration System is completely modular, scalable and multi-purpose. Equipped with two filter beds, the self-cleaning system absorbs chemical and biological agents and toxic industrial chemicals with one filter bed while simultaneously cleaning the other filter bed with high-pressure, high-temperature air. The self-contained cleansing process and automatic rotation of filters eliminates the need for regular filter changes and associated system shutdown, and minimizes the logistical footprint for operators. The CB Regenerative Air Filtration system will be able to operate maintenance-free for extended periods.