ABERDEEN TEST CENTER
THE POINT POSITION

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Making a Difference in How We Fight

COL Morris L. Bodrick
Commander, U.S. Army Aberdeen Test Center

After more than 15 years of war, the world remains a dangerous place. With the ongoing threat of ISIS in the Middle East, an aggressive Russia, an unpredictable regime in North Korea, and the constant, borderless, happen-anytime threat to our nation's cybersecurity, Aberdeen Test Center has a key role in maintaining the Army's readiness. Last year, the Chief of Staff of the Army, GEN Mark A. Milley, said, "You and I, as an Army, have to maintain the capability and the readiness. We have to sustain that which we have learned over 15 hard years of lessons learned."

Earlier this year, in a speech to the Association of the U.S. Army, GEN Milley reiterated this message, saying, "Readiness was our priority last year, that's our priority this year and by necessity that needs to continue to be our priority."

The mission of ATC, and that of the Army Test and Evaluation Command (ATEC), is unique to the Army, in that we support the full spectrum of its systems. There is not a single piece of Army equipment that doesn't pass through this

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ATC Gets Psyched for Testing

Paul Misiuda

Engineering Psychologist, Signatures and Soldier Performance Division, Warfighter Directorate

Engineering Psychologists work one-on-one with military personnel.

Studying how those in the field interact with technology improves both man and machine.

The warfighter is at the heart of the mission at Aberdeen Test Center. "Excellence in testing" declares this philosophy, and every round fired here is in support of the military personnel who, in turn, support our country. Not every member of Team ATC routinely works one-on-one with our men and women in uniform, but Paul Misiuda and Paula Williams, of the Signatures and Soldier Performance Division, are two personnel for whom the warfighter is core to their daily mission.

Paula Williams ensures that armor within a protective vest covers the sternal notch.

Misiuda and Williams are unique in that they are the only two Engineering Psychologists at ATC. They study the relationship between humans and machines to improve the performance of both. Their duties are similar: designing experiments for human-in-the-loop assessments (evaluating human and equipment interaction); overseeing the handling of human subjects during test efforts; and planning efforts that rely on the psychophysics of humans to assess performance. The latter is particularly important, as it gauges the psychological response of military personnel to environmental stimuli, such as seeing a target through a rifle optic.

Although Misiuda and Williams share similar duties and work in the same division, they reside in separate branches and have objectives specific to their skill sets.

Within the Human Factors and Soldier Performance branch, Williams focuses on aspects true to her group's title: specifically, the human factors engineering integral to fielding a new system, be it clothing, body armor, or combat vehicle, along with the overall performance of military personnel while using or wearing equipment under test. This

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The Nexus of Cruise Control

Cadillac SRX vehicles platooning in CACC mode

David T. Will, P.E.

Mechanical Engineer, Unmanned Ground Vehicle Testing Branch, Automotive Directorate

James R. Adametz

Software Engineer, Analysis Division, Test Technology Directorate

Will we see the end of tailgating?

ATC partners with FHWA to improve driver safety, mobility and fuel efficiency.

Venturing onto our roads and highways has ramped up stress levels in our everyday lives. New automotive technologies, such as intelligent cruise control, are working to shift some of this stress from man to machine.

Aberdeen Test Center and the Department of Transportation's (DOT) Federal Highway Administration (FHWA) are collaborating to test vehicle platooning at ATC's Automotive Test and Evaluation Facility (ATEF). The partnership is assessing the effectiveness of Cooperative Adaptive Cruise Control (CACC) technology, with the ultimate goal of improving driver safety, mobility and fuel efficiency. This state-of-the-art testing involves five FHWA research innovation vehicles (Cadillac SRXs), with one as the lead vehicle and the remaining four following.

The lead vehicle issues commands to the following vehicles by transmitting modified basic safety messages, through a dedicated short-range communications (DSRC) radio, using the DOT-dedicated 5.9-GHz spectrum. For example, the messages transmit information about vehicle velocity and gap separation time, so that the entire platoon maintains safe speeds and following distances. ATC and FHWA engineers have successfully demonstrated vehicle platooning at 60 miles per hour with a 1-second gap separation time - that's an 88-foot gap separation distance - between vehicles.

Each vehicle has custom hardware to enable level one automation longitudinal control. CACC hardware is located within the back seat of the vehicle.

When both back seats are upright, the hardware is completely concealed from sight.

Each vehicle has an emergency override pushbutton between the cup holder and gear selector to optimize driver safety and allow manual override at any time. When the button is activated, CACC is disengaged and control is returned to the driver.

ATC installed an instrumentation package on each Cadillac SRX to capture data transferred over the DSRC radios, on the vehicle Controller Area Network (CAN), and via video stream. The instrumentation package has two 12-volt batteries, an electromagnetic interference filter, Platform for Reconfigurable Instrumentation via Modular Expansion Advanced Distributed Modular Acquisition System (PRIME ADMAS), Fortress radio, camera encoder, Ethernet switch with port mirroring, three-axis motion pack, four video cameras and cabling.

ATC used Aberdeen Proving Ground's high performance computing resources to process the various sources of data into a model for posttest analysis. The model was used to mine relevant products to support CACC analytical goals. Google Earth was used to visualize the vehicle and CACC interacting with the environment, DSRC communication and vehicle CAN data.

The current vehicle configuration permits longitudinal control only, for which automatic throttle and brake inputs are applied. Future developments will enable automated lateral control, or steering inputs, of vehicles within platoons to eliminate the need for driver input. Also, FHWA provided ATC with a semitrailer that will be outfitted with CACC technology. The connected truck will be integrated into the FHWA research fleet to study the interaction between small and large platooning vehicles.

ATC instrumentation

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Soldier Protection System: Best Fit for Survivability

Jennifer Baker

General Engineer, Hard/Soft Armor and Head Protection Branch, Protective Equipment Division, Firepower Directorate

Aberdeen Test Center is in the forefront of testing the newest body armor, Soldier Protection System (SPS), provided by Product Manager, Soldier Protective Equipment. SPS will provide active-duty military personnel with wearable protection that can be tailored to specific wartime missions and is lighter and more versatile than current survivability equipment.

SPS, a major Department of Defense acquisition program, is overseen by The Office of the Director, Operational Test and Evaluation (DOT&E), which ensures that testing and evaluation is sufficiently thorough to confirm the operational effectiveness and suitability of SPS in combat use.

SPS encompasses the Integrated Head Protection System helmet, Vital Torso Protection hard armor plates, Torso and Extremity Protection soft armor, and Transition Combat Eye Protection.

ATC initially performs First Article Tests, which determine whether the proposed product design meets contract requirements before production or in the initial production stages. Once testing shows that a product meets the initial requirements, ATC moves on to Live Fire Tests, which determine whether every aspect of the product meets the criteria for entering full-rate production.

Torso and Extremity Protection testing was completed in ATC's indoor firing ranges in 2016. Vital Torso Protection and Blast testing began in 2016 in the indoor and outdoor firing ranges, respectively, and continues into 2017. Integrated Head Protection System testing will be completed in the indoor firing ranges in 2017. Non-ballistic testing is performed in ATC laboratories.

This mannequin is outfitted with soft armor components and hard armor plates for blast testing.

SPS continues the evolution of personal protective equipment for active-duty military personnel with lighter, less restrictive field protection than what is currently used, further increasing the likelihood for survival in wartime of our military personnel.

SPS components
(courtesy of PEO Soldier)

THENANDNOW

Jon Barrett, assigned to SPS, is a veteran of the Armor Branch. He is pictured here during a stint at Fort Hood, Texas, in 2000. Jon is an ATSS Light Armor Range Technician and has been an ATC employee for 14 years.

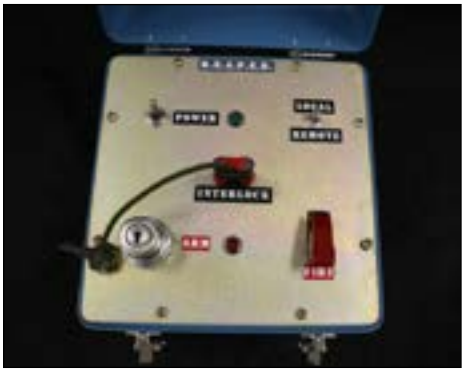
ATC Revolutionizes Small Arms Testing

Scott A. Hill

Chief, Small Arms Field Branch, Firepower Directorate

There is no margin for error in the support of our troops.

A new invention fielded by the Small Arms Systems Division of the U.S. Army Aberdeen Test Center has revolutionized the world of small arms testing. ATC's Andrew Wagner and Jason Brooks created and implemented the Remote Electronic Automated Program Event Resource, known as the REAPER, which has vastly improved the accuracy of small arms test data and reduced testing variances. Now, variables such as firing cadence and firing mechanics can be controlled with a level of precision not previously available.

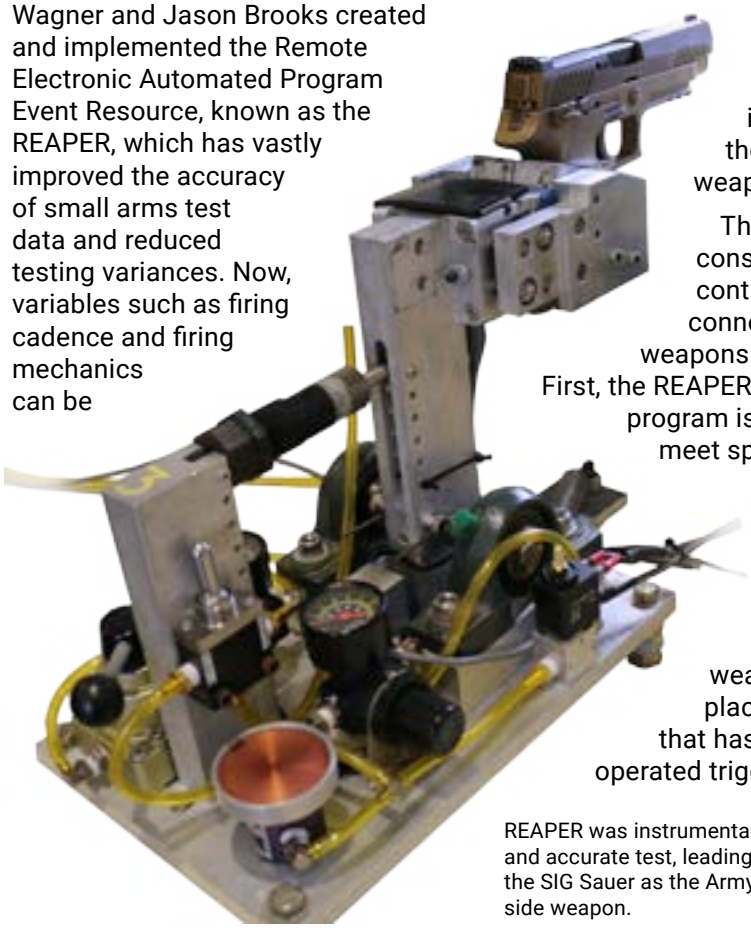


REAPER control interface

The first success story for the REAPER was the XM25 Counter Defilade Target Engagement System testing. Next, the REAPER became a critical component of Phase 1 of the highly publicized XM17 Modular Handgun System competitive test, in which the REAPER was used to ensure that each of the prospective vendors' weapons were fired under conditions identical to those of all other weapons in the test.

Using the REAPER in Modular Handgun System competitive testing, nearly 500,000 rounds were fired simultaneously, by six weapons, in 26 days of testing.

The REAPER consists of a firing control interface that connects multiple test weapons to a computer. First, the REAPER's computer program is set up to meet specific testing parameters, such as firing cadence and number of rounds to be fired. Each weapon is then placed in a mount that has a solenoid-operated trigger actuator custom-fitted to the weapon. Once the test setup is complete and the weapons are loaded, the test officer begins the firing sequence using the REAPER's fire control box. As firing commences, the REAPER's program controls the firing cadence, monitors the test weapons to verify that each weapon functions, and records time-stamped data for the entire firing sequence.



REAPER was instrumental in ensuring a fair and accurate test, leading to the selection of the SIG Sauer as the Army's next generation side weapon.

Close-up of the SIG Sauer in the REAPER mount

Before the REAPER existed, reliability testing of a group of handguns typically consisted of a group of six small arms technicians hand-firing each weapon. In this scenario, the firing cadence was controlled by the lead shooter, which introduced the potential for variability in cadence precision. Other human-induced variabilities in firing mechanics came from differences in the technicians' grip strength, fatigue, trigger pull and hand size. These variabilities could be viewed as a weakness (against protest in a competitive test), because each weapon was handled differently.

Using the REAPER in Modular Handgun System competitive testing, nearly 500,000 rounds were fired simultaneously, by six weapons, in 26 days of testing. The technicians who formerly hand-fired the weapons monitored each weapon to ensure safe and proper weapon function. With the REAPER, human-induced variability in cadence precision and firing mechanics has been eliminated.

ATC's Spent Brass Sorter Is on the Case

Gary M. Grimm, P.E.
General Engineer, Test Officer

Daniel V. Terek
Chief, Ammunition Operations Division

Ammunition Operations Division,
Firepower Directorate

ATC fires approximately 2 million rounds of small arms ammunition per year.

Using the Spent Brass Sorter, ATC can sort and process casings faster and more efficiently than in the past.

Small arms testing at Aberdeen Test Center results in large volumes of spent brass of various calibers. Until now, this spent brass was sorted and processed by hand, and then packed for turn-in to the Ammunition Supply Point (ASP), where it was sorted and inspected, again by hand.

Despite the best efforts of ATC and ASP personnel to keep up with the volume of spent brass, sorting by hand was laborious, time consuming, and inefficient, requiring many personnel hours. It often created a bottleneck and an impediment to the turn-in of spent brass. The process needed to be streamlined to minimize time and cost.

Accordingly, Ammunition Operations Division worked with the Ammunition Peculiar Equipment (APE) Office in Rock Island to obtain the APE 1412 Spent Brass Sorter (SBS) to enhance ongoing small arms ammunition processing.

The SBS is an automated system for rapidly removing live rounds from spent brass while sorting cases by size. It can separate cases by material type (brass, nickel, steel and copper-clad steel) and by color. The SBS is designed to work with cases ranging in size from 9mm to .50-caliber.

Down-draft table at head end of SBS system.

The DOD Explosive Safety Board has approved the SBS as an acceptable method for verifying that spent cases are inert. After the operator loads cases in bulk on the down-draft table, the system feeds the cases into the sorter one at a time, at a high rate (exceeding 10,000 cases per hour). The SBS uses machine vision to visually inspect each case to verify that there is no projectile and that the primer is struck.

ATC's diverse test mission generates a tremendous amount of small arms brass. With this new capability, ATC is able to sort spent brass more efficiently. Because the SBS can distinguish and sort multiple calibers simultaneously, the laborious process of hand sorting is no longer needed, which saves time and, ultimately, minimizes customer cost.

THEN AND NOW

Private Louie Harris is shown in 1978, when he served as an M60 gunner in the 11th Infantry Regiment Bravo.

Harris is now an Engineering Technician with Aberdeen Test Support Services (ATSS), operating the APE 1412 SBS.

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Williams takes baseline anthropometric measurements.

includes analyzing the impact that a new protective system has on an individual's physical performance, the fields of view and fire for new equipment, and overall safety. Equally important to her position is collecting test participants' opinions about the systems under test by using targeted questionnaires or electronic surveys, one-on-one interviews, or group after-action discussions. Williams' recent work with PEO-Soldier and their Soldier Protective System encompassed all of these tasks and skills as she helped to test a new full-body armor protection system.

In the Signatures and Sensors branch, Misiuda undertakes signature and sensor studies using military personnel to assess performance. His recent work includes the Soldier Enhancement Program - Ghillie Phase II, which requires observers to detect individuals wearing variations of concealment kits within natural outdoor terrain. Another example of Misiuda's recent work is the Magnification Study for the Product Manager Crew Served Weapons. The Magnification Study was designed to have Soldier-observers to identify vehicle and squad-sized targets at specific distances to determine the magnification required to identify custom targets for successful engagement by crew served weapons.

While their branches may be separate and their duties varied, Misiuda and Williams both specialize in working with military personnel to produce realistic and meaningful military testing scenarios. Whether that testing is on a new protective system or on a concealment kit, the Engineering Psychologists at ATC keep the warfighter central to their testing.

Misiuda prepares to record scouts' feedback on concealment kits after testing.

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FHWA will also supply DSRC radios for installation around the ATEF for future vehicle-to-infrastructure development and testing. The ATC-FHWA partnership is a great example of collaboration between federal agencies to share resources in support of our troops.

THEN AND NOW

Paul Misiuda (far right), USMC, 4 years served, Iraq, is shown at age 22.

Misiuda photographs a target scene while a Soldier identifies the target down range.

THEN AND NOW

Military Veterans Behind CACC Program Success

Sgt. Kevin Pelletier attending a Marine Corps Ball, Nov 1999

Petty Officer Second Class Tom Robbins, Dec 1975

Cpl. Todd Howard, March 2002, Iwo Jima Reunion Honor detail

Military veterans are integral to the work performed at ATC, where prototype, commercial and military systems are tested to ensure they meet their design requirements. Three of ATC's Unmanned Vehicle Division team members testing CACC technology are veterans who brought skills and values from their military service to the test environment.

Todd Howard, a former Corporal in the U.S. Marine Corps, served from 2001 to 2005 as a small computer systems specialist and tactical data networker. Howard developed and installed ATC's instrumentation package into each of the five test vehicles. In addition to monitoring near real-time data flow and managing test assets, Howard also helped develop startup and shutdown procedures for the instrumentation package and uploaded data onto ATC data harvesters for reduction and analysis.

Kevin Pelletier, a former USMC Sergeant, served from 1995 to 2001 as a Light Armored Vehicle (LAV) mechanic. After his service, Pelletier joined ATC as a Stryker mechanic. He now manages ATC's test courses as the Lead Facility Operations Specialist for the Automotive Operations Division.

Tom Robbins, a former U.S. Navy Petty Officer Second Class, served from 1975 to 1979 as a communications analyst. Robbins was instrumental in the analysis of connected vehicle communications for the CACC program. Robbins established, and currently leads, a DSRC Community of Interest among DSRC stakeholders in federal and state governments.

All three veterans agreed that the military's example of teamwork, communication, training and safety were fundamental to the success of the CACC program. Throughout testing, all personnel communicated and strove for cohesion and forward-thinking. The vehicles traveled up to 60 miles per hour with a 1-second gap separation time, so safety was a daily priority. The experience, attitude and courage of these veterans drove the team to execute the mission and deliver results to ATC's customer.

From left: Kevin Pelletier, Tom Robbins and Todd Howard

DIFFERENCE, *From page 1*

command. Every item a soldier shoots, communicates with, touches or carries was tested here; and if not here, then at one of ATEC's remaining test centers. We are here to make sure that when the time comes for military personnel to deploy, everything they have – from the vehicle they ride in, to the boots on their feet – works right the first time. There's no room for second chances.

Whether it's developmental testing of the next iteration of the self-propelled howitzer, or acceptance testing of body armor that is shipped all around the world to central issuing facilities, the testing we do here is critical to maintaining Army readiness. Through testing, we ensure that the warfighter has the equipment he or she needs to support the fight. Testing is critical not only to the Program Management Offices and developmental centers perfecting their products throughout the Army, but also to the military personnel who rely on their equipment on the front lines of conflict. Undoubtedly, the testing we do is paramount to ensuring the Army's readiness posture is maintained.

Equally important to sustaining Army readiness are the people who make it happen. Our workforce brings together a diverse collection of experiences, from recently graduated engineers having never served, to retired, former or even current military working to support some of the most important testing in the Army and across the services. It is this latter group that we highlight in this edition of The Point Position. Having served, or still serving, they help to ensure that the conditions in which we test are operationally relevant, and representative of those encountered on the battlefield. By making sure the latest Army materiel works in the driest desert or the coldest tundra, they are maintaining the Army's readiness no matter where or when it is needed.

The dedication and selfless service of the people who make up the Aberdeen Test Center Team is outstanding. They are not just testing the latest and greatest equipment, they are ensuring that the equipment performs as it was designed to at its most critical time, on the battlefield. So, to all the professionals testing here at ATC and across ATEC: Continue to work to support the Army's readiness posture, and thank you for your selfless service!

100 Years of Excellence: The ATC Story, Part 5

Excerpted from an article by Lauren Nelson

On August 2, 1948, an entire vehicle convoy departed Development and Proof Services (D&PS) on a 24,000-mile road test. Dubbed "Operation Greaseball," its purpose was to analyze new and improved lubricants. The convoy traversed the country, taking eight months to complete the journey. Each vehicle was tested extensively under various conditions, like the extreme heat of the Mojave Desert and the freezing cold of winter in Alaska.

In June 1950, North Korean forces invaded U.S.-supported South Korea as Cold War tensions caused by the division of Korea at the end of World War II increased. As the United States moved to aid South Korea against the invasion, D&PS raced to pick up the pace of testing. Construction projects and new developments were taken up with renewed vigor from where they had been left off at the end of WWII.

President Harry S. Truman visited APG on February 17, 1951, and emphasized the importance of developmental testing and proof work for the war effort. He witnessed demonstrations of a number of new mortars, jeeps and machineguns that were being tested for the war effort. The high point of the President's visit was the presentation of the new, cutting-edge T41 light tank, which was designated the Walker Bulldog in memory of the late General Walton H. Walker, Eighth Army Commander, who was killed in the Korean conflict. The T41 was the first tank to be built around a gun, instead of an engine. It was built primarily for reconnaissance, and its 76-mm super-velocity gun was automatically stabilized so that it held on the target even when the tank was pitching and rolling. The Walker Bulldog set the standard for new tanks everywhere.

President Harry S. Truman during his vist to APG on February 17, 1951

In 1952, the first atomic artillery piece was brought to D&PS for testing. This project was cloaked in secrecy, and those who worked on the test were not permitted to speak of the project outside of APG. Several events during this test reminded D&PS personnel of the importance of safety while testing. The first time the piece was fired, a part of the recoil system failed: "the gun reared, jerked, almost tore loose from its platform and the gun carriage was left a shambles." Thankfully, proper safety procedures had been followed and no one was hurt, but the test had to be reworked and the gun had to be repaired. Four months after the incident, the gun was fired successfully. The shell that was fired from the gun was highly secret, so each shell had to be recovered after firing. "One day…a shell was fired and lost. For two days the range was closed down while all hands went in search of the erratic missile, finally locating it in marshland." The atomic artillery piece revealed a trend in weapons development during the Cold War. Atomic weapons were a formidable part of many countries' arsenals. The fear and apprehension that surrounded them set a large part of the tone for Cold War conflicts.

The 280mm Atomic Cannon test firing an inert W9 atomic artillery projectile at APG

During the Korean Conflict, new developments were made in test technology as well. A flak tester was constructed at D&PS in 1952 to test weaknesses in aircraft. Various aircraft would be suspended in the air by cables, and charges would detonate nearby. After the explosion, the plane would be inspected meticulously, and any defect would be discovered and prevented in later aircraft.

Personnel at D&PS totaled 1,354 people, a much lower number than during WWII. The ratio of military to civilian personnel was in flux, though the number of civilians remained consistently higher. WWII veterans made up a large part of the populace, and their experience and dedication brought a very special dynamic to testing.

Armistice negotiations in Korea eventually led to a ceasefire in 1953. At that time, APG had tested thousands of vehicles over nearly six million miles, fired over a million weapons using more than a billion rounds of ammunition, and spent over a hundred-million man hours perfecting new weapons and equipment. The impressive amount of work accomplished in this short time reflects the vital importance of APG's mission during the Korean War.

Continued next issue

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