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# U.S. Army Aviation & Missile Research, Development & Engineering Center (AMRDEC) Homeland Security / Homeland Defense Success Stories

- Avenger and Stinger Missile Trainers Used in NORTHCOM Exercise Amalgam Arrow 2007
- AMRDEC Teams with NAVAIR on Presidential Helicopter Cockpit Upgrade
- De-Militarized Javelin Missile Control Launch Unit Night Sight for National Guard Use in Border Patrol Mission
- National Guard Civil Support Team Trailers for Hurricane Katrina Relief
- UH-60 Rescue Hoist A-Kits for Army National Guard Aviation
- Virtual Incident Command
- Warfighter Protection Lab Support to NORTHCOM in Aftermath of Hurricane Katrina



# Avenger and Stinger Missile Trainers Used in NORTHCOM Exercise Amalgam Arrow 2007



Amalgam Arrow 07-06 is a distributed exercise that involved participants working simultaneously throughout the United States. The purpose of the exercise is to simulate various potential threats to Homeland Defense involving unidentified, suspect, or hijacked aircraft and to demonstrate and rehearse the proper response to such threats. In addition to Washington, DC scenarios previously used in 2006, the 2007 exercise included a new west coast scenario at Point Mugu, CA.

Avenger Table Top Trainers (TTT) and Stinger Troop Proficiency Trainers (STPT), developed by the U.S. Army Aviation and Missile

Research, Development, and Engineering Center (AMRDEC) to train warfighters in the use of weapons systems, were used as part of the distributed exercise. In the 2006 exercise the trainers were able to receive and process distributed interactive simulation packets successfully. Additional capabilities were requested and added in 2007 to allow the trainers to use the same radar simulation track data that is displayed by the Forward Area Air Defense Engagement Operations software. This data enhanced the communications process between the command and trainer operators as the track numbers correlated to allow for more accurate and reliable identification of targets.

The AMRDEC deployed an engineer to the 164<sup>th</sup> Air Defense Artillery (ADA) in Orlando, FL in support of the exercise to upgrade the trainers stationed there and to provide general assistance throughout the test and final exercises. This assistance included making hardware and software upgrades to the trainers and ensuring that the trainers and other systems at the 164<sup>th</sup> ADA were properly networked with the other players in the distributed simulation that were scattered throughout the United States. The trainers were specifically used by warfighters in the exercise to identify and shoot down hostile or hijacked targets. At the final exercise, which was held on March 29, 2007, the trainers performed well and were used successfully by warfighters to correctly identify and eliminate each hostile aircraft.

## **TECHNOLOGY DESCRIPTION**

The Table Top Trainer for the Avenger Air Defense System and the Stinger Troop Proficiency Trainer, which includes the Stinger surface-to-air missile, provide training without the need to launch missiles.

## **TECHNOLOGY READINESS LEVEL**

8. Actual system completed and operationally qualified through test and demonstration.

## **DOD APPLICATION(S)**

Small unit training to national-level military exercises.

## **FIRST RESPONDER / PUBLIC SAFETY APPLICATION(S)**

These training devices can be used in training for infrastructure protection and in exercises involving civil aviation.

## **DESCRIPTION OF COLLABORATION / TRANSFER**

These training devices developed by the U.S. Army Aviation and Missile Research, Development, and Engineering Center have been used in Amalgam Arrow national exercises in a Homeland Defense role. Units use the training devices both to train in preparation for the exercises and again in the actual conduct of the exercises.

## **PARTICIPATING ORGANIZATIONS**

### **Labs and Test Facilities**

### **End Users and Technology Producers**

North American Aerospace Defense Command  
164th Air Defense Artillery

# AMRDEC Teams with NAVAIR on Presidential Helicopter Cockpit Upgrade

The Naval Air Systems Command (NAVAIR) VH-60N helicopter Cockpit Upgrade Program (CUP) is designed to improve capabilities of the aircraft, simplify training, and enhance situational awareness. The program includes integration of the Common Avionics Architecture System (CAAS) into the aircraft. Consisting of five multi-function displays, three control display units, two general purpose processing units, and two data concentrator units, CAAS utilizes Ethernet as its primary system interface to facilitate growth and a higher level of redundancy. CAAS also employs common, reusable processing elements in each hardware component and incorporates open systems avionics architecture to enable future upgrades and technology insertions. The new avionics suite also includes upgrades in navigation, communication, and mission equipment.

The U.S. Army Aviation and Missile Research, Development, and Engineering Center (AMRDEC) Prototype Integration Facility (PIF) teamed with NAVAIR to design, fabricate, and integrate the NAVAIR adapted CAAS into the NSH-60F helicopter. The NSH-60F is used for hardware and software testing prior to application to the VH-60N helicopter fleet which is used to transport the U.S. President, Vice-President, and other visiting heads of state. After successful flight testing at Redstone Arsenal Airfield, the aircraft returned home to Patuxent River, MD on 20 May 2007. The completion of the upgrade marks a major accomplishment for the PIF due to the magnitude and technical complexity of the modification. The aircraft's complete Flight Management System was upgraded to CAAS in less than a year.

The PIF and NAVAIR worked concurrently on the upgrade, with NAVAIR personnel stationed at the PIF throughout the duration of the program. NAVAIR is currently working with the PIF on other efforts as well as possible follow-on efforts with this program.



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## **TECHNOLOGY DESCRIPTION**

This program supports the VH-60N helicopter Cockpit Upgrade Program. It includes integration of the Common Avionics Architecture System (CAAS) into the NSH-60F helicopter (for hardware and software testing purposes) and flight testing. The CAAS consists of five multi-function displays, three control display units, two general purpose processing units, and two data concentrator units. It utilizes Ethernet as its primary system interface to facilitate growth and a higher level of redundancy.

## **TECHNOLOGY READINESS LEVEL**

6 – System/subsystem model or prototype demonstration in a relevant environment.

## **DOD APPLICATION(S)**

The CAAS is used on military helicopters because it employs common, reusable processing elements in each hardware component and incorporates open systems avionics architecture to enable future upgrades and technology insertions. The new avionics suite also includes upgrades in navigation, communication, and mission equipment.

## **FIRST RESPONDER / PUBLIC SAFETY APPLICATION(S)**

The VH-60N helicopter Cockpit Upgrade Program is designed to improve capabilities of the aircraft, simplify training, and enhance situational awareness to the VH-60N helicopter fleet, which is used to transport the U.S. President, Vice-President, and other visiting heads of state.

## **DESCRIPTION OF COLLABORATION / TRANSFER**

The U.S. Army Aviation and Missile Research, Development, and Engineering Center Prototype Integration Facility (PIF) has teamed with the Naval Air Systems Command (NAVAIR) on the VH-60N helicopter Cockpit Upgrade Program. The team has worked to design, fabricate, and integrate the NAVAIR adapted CAAS for hardware and software testing.

## **PARTICIPATING ORGANIZATIONS**

### **Labs and Test Facilities**

Redstone Technical Test Center

### **End Users and Technology Producers**

Naval Air Systems Command

## **REFERENCES**

<http://www.redstone.army.mil/amrdec/pif/>

# De-Militarized Javelin Missile Control Launch Unit Night Sight for National Guard Use in Border Patrol Mission

In 2005, the Program Executive Office for Missiles and Space (PEO-M&S) with support from the U.S. Army Aviation and Missile Research, Development, and Engineering Center (AMRDEC) helped to improve our Border Patrol capability to operate at night. Excess Javelin Missile Control Launch Unit night sights, that were about to be sent to disposal, were put to good use improving border security in Tucson, AZ.

The Project Manager for Close Combat Weapon System in PEO-M&S contacted Customs and Border Protection in the Department of Homeland Security to see if they were interested in 238 Javelin Missile Control Launch Units that were declared obsolete. The answer was yes, because they would provide a night vision capability at minimal cost. A plan was developed whereby the contractor, Raytheon, would remove the software and make physical changes to the configuration such as removing the triggers and cutting connectors to make them incapable of firing a missile. The AMRDEC provided technical support in the de-militarization effort.

The transfer was handled by the Law Enforcement Support Office at the Defense Logistics Agency, who delivered the night sights from the Control Launch Units to the Border Patrol in Tucson. They are now in use by National Guard units that are augmenting the Border Patrol. The night sights have been renamed as Infrared Optical Devices (IRODs) and the National Guard units rely on them for their night missions. The IRODs are frequently used to detect illegal aliens and drug traffickers. An IROD was recently used to alert the Border Patrol of a group at the border armed with AK-47 rifles.

POC: John Dillon, U.S. Army Aviation and Missile Research, Development, and Engineering Center; Phone: 256-876-1462; E-Mail: john.dillon@us.army.mil

## **TECHNOLOGY DESCRIPTION**

The Javelin Missile Control Launch Unit night sights were de-militarized to make them incapable of firing a missile and used in night border patrol operations.

## **TECHNOLOGY READINESS LEVEL**

9 – Actual system, proven through successful mission operations.

## **DOD APPLICATION(S)**

The Control Launch Unit night sight is a component of the Javelin Missile System.

## **FIRST RESPONDER / PUBLIC SAFETY APPLICATION(S)**

The de-militarized Javelin Missile Control Launch Unit night sights were used by National Guard units in night border patrol operations.

## **DESCRIPTION OF COLLABORATION / TRANSFER**

The plan to demilitarize the Javelin Missile Control Launch Unit night sight was the result of collaboration among the Project Manager for Close Combat Weapon System from Program Executive Office for Missiles and Space, the U.S. Army Aviation and Missile Research, Development, and Engineering Center, and Raytheon. The transfer was handled by the Law Enforcement Support Office at the Defense Logistics Agency, who delivered the night sights to the Border Patrol in Tucson, AZ.

## **PARTICIPATING ORGANIZATIONS**

### **Labs and Test Facilities**

### **End Users and Technology Producers**

Raytheon

## **REFERENCES**

<http://www.militarynewcomers.com/REDSTONE/resources/systems.htm>

# National Guard Civil Support Team Trailers for Hurricane Katrina Relief

During Hurricane Katrina relief operations, Civil Support Teams from five National Guard units used specially modified trailers to assess biological and chemical data. These trailers were provided by the Program Executive Office for Command, Control, Communications Tactical (PEO-C3T) with support in the modification effort from the U.S. Army Aviation and Missile Research, Development, and Engineering Center (AMRDEC). The Civil Support Teams are designed to augment local and regional terrorism response capabilities in support of local incident commanders. The teams were originally organized for weapons of mass destruction events. During the aftermath of Hurricane Katrina, they supported civilian response organizations and military units.

The Project Manager for Tactical Operation Centers/Air and Missile Defense Command and Control System (PM TOCS/AMDCCS) in PEO-C3T contacted the AMRDEC Tactical Operations Center Product Office for support work at Redstone Arsenal, AL where both organizations are located. The AMRDEC modified forty four commercial trailers with work stations, mass storage devices, generators, and internal local area networks for delivery to National Guard Civil Support Teams. With this installed capability the Civil Support Teams can analyze samples for biological and chemical contamination and quickly disseminate the results from their work stations in the trailers.



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## **TECHNOLOGY DESCRIPTION**

Forty four commercial trailers were modified with work stations, mass storage devices, generators, and internal local area networks.

## **TECHNOLOGY READINESS LEVEL**

9 – Actual system, proven through successful mission operations.

## **DOD APPLICATION(S)**

The command, control, and communications equipment is used in military tactical operations centers.

## **FIRST RESPONDER / PUBLIC SAFETY APPLICATION(S)**

The specially modified trailers are used in assessing biological and chemical data.

## **DESCRIPTION OF COLLABORATION / TRANSFER**

The Program Executive Office for Command, Control, Communications Tactical planned the transfer of forty four specially modified trailers with the National Guard Bureau.

# UH-60 Rescue Hoist A-Kits for Army National Guard Aviation



The UH-60 Rescue Hoist provides rescue and recover capability during emergency situations. With the devastation and many rescue and recovery efforts of Hurricane Katrina, Army National Guard Aviation recognized an urgent need for more UH-60 Black Hawk helicopters with the rescue hoist capability.

The U.S. Army Aviation and Missile Research, Development, and Engineering Center Prototype Integration Facility (PIF) has provided Army National Guard Aviation with 88 critically needed Rescue Hoist A-kits. The A-Kits include the control head, all mounting brackets, and electrical interfaces for the system, which is compatible with currently available Army National Guard rescue hoists. The HH-60 MEDEVAC helicopters and some UH-60 Black Hawk helicopters are outfitted with the

rescue hoist system. The A-Kits that the PIF has installed will alleviate the current deficiency and assist in plans to equip all National Guard Bureau UH-60 aircraft with the hoist capability. The PIF has recently received an order for 180 additional Rescue Hoist A-kits for Army National Guard Aviation.

## **TECHNOLOGY DESCRIPTION**

The U.S. Army Aviation and Missile Research, Development, and Engineering Center Prototype Integration Facility has installed Rescue Hoist A-kits on 88 UH-60 Black Hawk helicopters. The A-Kits include the control head, all mounting brackets, and electrical interfaces for the rescue hoist system.

## **TECHNOLOGY READINESS LEVEL**

9 – Actual system, proven through successful mission operations.

## **DOD APPLICATION(S)**

The Rescue Hoist is currently used by HH-60 MEDEVAC helicopters and UH-60 Black Hawk helicopters to evacuate soldiers from emergency situations.

## **FIRST RESPONDER / PUBLIC SAFETY APPLICATION(S)**

First responders have an urgent need for helicopters with rescue hoists to evacuate people from emergency situations.

## **DESCRIPTION OF COLLABORATION / TRANSFER**

The U.S. Army Aviation and Missile Research, Development, and Engineering Center is working with the National Guard Bureau to equip UH-60 helicopters for a rescue hoist capability.

## **PARTICIPATING ORGANIZATIONS**

### **Labs and Test Facilities**

### **End Users and Technology Producers**

National Guard Bureau

## **REFERENCES**

<http://www.redstone.army.mil/amrdec/pif/>

# Virtual Incident Command

The Virtual Incident Command is a virtual environment and dynamic training tool used by the Department of Homeland Security's Center for Domestic Preparedness in their Weapons of Mass Destruction course on the National Incident Management System. This training tool, the Virtual Incident Command, was selected by the Department of Homeland Security's 1401 Technology Transfer Program as a means to simulate one of the fifteen national planning scenarios for training. This technology is one of the top five selected from 1,700 Department of Defense technologies considered for immediate transfer to the Department of Homeland Security mission. Additionally, it is now augmented with a tactical system that was derived from one used in 911 and emergency operations centers worldwide.

The U.S. Army Aviation and Missile Research, Development, and Engineering Center designed the Virtual Incident Command as an immersive, three-dimensional environment, which allows responders to engage directly with the virtual environment and experience more realistic consequential outcomes as a result of their response decisions. The responders realistically receive event information via simulated radio traffic, television news reports, emergency telephone calls, out-the-window scene displays, and live/virtual central dispatch communications. They do not have to interact directly with a computer or learn a new training system. The responders simply walk into the environment, pick up a radio, and execute their National Incident Management System (NIMS) Incident Command roles in response to the scenario cues.

The Virtual Incident Command is divided into three primary stations. First is the Virtual Mobile Incident Command Station, where responders step into an immersive environment with three video monitors, radios, a television monitor, a laptop with situational awareness and resource information, a telephone, and work space. The second station is the Facilitator Station, which is used by the instructor to monitor scenario progress and responders actions. Here, the exercise facilitator watches the scenario timeline advance and injects optional events that are designed either to help or challenge the responders. The third station is the Dispatcher Station, which is used by the system operator to dispatch and log decisions sent by the responders for after-action review.



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## **TECHNOLOGY DESCRIPTION**

The Virtual Incident Command (VIC) as an immersive, three-dimensional environment for incident command training in a virtual environment where students experience realistic consequential outcomes as a result of their response decisions.

## **TECHNOLOGY READINESS LEVEL**

9 – Actual system, proven through successful mission operations.

## **DOD APPLICATION(S)**

The VIC is currently used by the Redstone Arsenal Garrison for exercises and training.

## **FIRST RESPONDER / PUBLIC SAFETY APPLICATION(S)**

The VIC is used by the Department of Homeland Security's Center for Domestic Preparedness in their Weapons of Mass Destruction course on the National Incident Management System.

## **DESCRIPTION OF COLLABORATION / TRANSFER**

The U.S. Army Aviation and Missile Research, Development, and Engineering Center designed the VIC system for use by the Center for Domestic Preparedness in a capstone exercise simulating the first three hours of a chemical release event. A Department of Defense/Department of Homeland Security Inter-Agency Agreement was signed to accommodate this work.

## **PARTICIPATING ORGANIZATIONS**

### **Labs and Test Facilities**

Garrison, Redstone Arsenal, AL

### **End Users and Technology Producers**

Department of Homeland Security's Center for Domestic Preparedness

## **ISSUES / COMMENTS**

The Virtual Incident Command was selected by the Department of Homeland Security's 1401 Technology Transfer Program as a means to simulate one of the fifteen national planning scenarios for training. This technology is one of the top five selected from 1,700 Department of Defense technologies considered for immediate transfer to the Department of Homeland Security mission.

# Warfighter Protection Lab Support to NORTHCOM in Aftermath of Hurricane Katrina

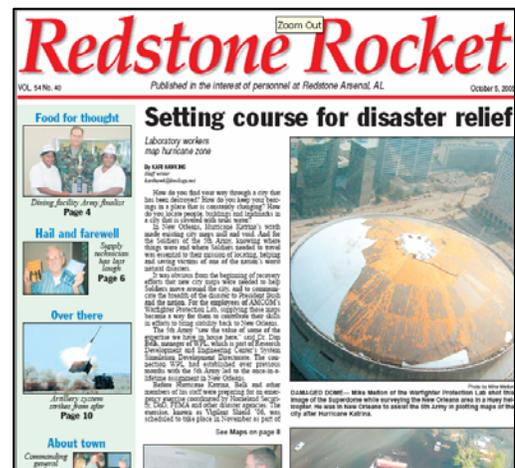


Photo by Kari Hawkins

During the aftermath of Hurricane Katrina, the Warfighter Protection Laboratory sent experts in the use of their Geospatial Information System to New Orleans to provide maps of hurricane damaged terrain. The experts merged data from multiple sources for maps used in the 5th Army Tactical Operations Center to support decision-making and identify routes for relief efforts. Maps were updated frequently with flood data due to constantly changing conditions.

The U.S. Army Aviation and Missile Research, Development, and Engineering Center developed the Warfighter Protection Lab to apply military-proven simulation technologies for Homeland Security and Homeland Defense field training exercises. The Warfighter Protection Lab works with operation center management in live and virtual experiments to optimize situational awareness and support decision making. In the case of Hurricane Katrina, it was successfully applied in actual, tactical situations.

The Warfighter Protection Lab is comprised of a suite of modeling, simulation, and visualization software that is used to create highly realistic training environments. Engineers and Scientists from government, industry, and academia have access to a varied set of tactical hardware and networking equipment that forms an immersive real-time system at Redstone Arsenal, AL.



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## **TECHNOLOGY DESCRIPTION**

The Warfighter Protection Lab (WPL) is a simulation driven immersive environment linking Force Protection assets, technologies, and methods in a cohesive system.

## **TECHNOLOGY READINESS LEVEL**

9 – Actual system, proven through successful mission operations.

## **DOD APPLICATION(S)**

The WPL is currently used by the Redstone Arsenal Garrison for all exercises and serves as a backup for its Installation Operations Center and Emergency 911 center.

## **FIRST RESPONDER / PUBLIC SAFETY APPLICATION(S)**

The WPL provides resident or geographically distributed models of virtual environments, utilizing 3D terrain databases and physics-based models, to assist in the design, deployment, and development of Operation Centers (Installation, Emergency, and Regional).

## **DESCRIPTION OF COLLABORATION / TRANSFER**

The U.S. Army Aviation and Missile Research, Development, and Engineering Center and its partners have worked on the WPL to translate simulation outputs from immersive environments where the soldier, sailor, or airman can concentrate on the “information” and not be burdened with the data. Throughout the life of the WPL, the Redstone Arsenal Garrison emergency personnel have served in a validation role for simulations and tool development.

## **PARTICIPATING ORGANIZATIONS**

### **Labs and Test Facilities**

Garrison, Redstone Arsenal, AL

### **End Users and Technology Producers**

University of Alabama Huntsville, Space and Missile Defense Command, Intergraph, SAIC, Alabama Department of Homeland Security, Alabama A&M University, Alabama Department of Revenue

