The Center for Countermeasures (CCM)

The Center for Countermeasures (the Center) is a joint activity that directs, coordinates, supports, and conducts independent countermeasure/counter-countermeasure (CM/CCM) T&E activities of U.S. and foreign weapons systems, subsystems, sensors, and related components. The Center accomplishes this work in support of DOT&E, the Deputy Assistant Secretary of Defense for Developmental Test and Evaluation (DASD(DT&E)), weapon systems developers, and the Services. The Center's testing and analyses directly support evaluations of the operational effectiveness and suitability of CM/CCM systems.

Specifically, the Center:

- Determines performance and limitations of missile warning and aircraft survivability equipment (ASE) used on rotary- and fixed-wing aircraft
- Determines performance of precision-guided weapon systems and subsystems when operating in an environment degraded by CMs
- Develops and evaluates CM/CCM techniques and devices
- Operates unique test equipment that supports testing across the DOD
- Provides analyses and recommendations on CM/CCM performance to Service Program Offices, DOT&E, DASD(DT&E), and the Services
- Supports Service member exercises, training, and pre-deployment activities

The Center conducts these activities — from testing and analysis of CM/CCM systems, to support training and pre-deployment activities, and development of CM/CCM tools and techniques — to help enhance the survivability of equipment, aircraft and personnel. The Center's core mission to support T&E of ASE directly leads to a "more lethal force" by enabling increased survivability of aircraft in a threat environment. Survivability enables mission success.

In FY18, the Center completed 43 T&E activities. The majority of these T&E activities focused on meeting Joint Urgent Operational Needs Statements (JUONS) and Urgent Universal Needs Statements (UUNS) for ASE. The Center's predominant involvement in JUONS and UUNS testing helped fill immediate mission needs and resulted in the successful deployment of critical ASE equipment to combat theaters, contributing to a "more lethal force."

The Center supported the field testing of other programs by providing realistic Man-Portable Air Defense System (MANPADS) threat environments for Service member aircrew pre-deployment training. In the course of these activities, the Center conducted the test support, analysis, and reporting of more than 30 DOD systems or subsystems — with special emphasis on rotary-wing survivability. The Center also provided subject matter expert (SME) support to numerous working groups, task forces, and Program Offices. While conducting test activities, the Center continues to improve its T&E capabilities and test methods.

JUONS

Advanced Threat Warner (ATW) Tests

Army: CH-47F Formal Software Release 2.6 Test

- **Sponsor:** Project Management Office Aircraft Survivability Equipment (PMO ASE)
- **Activity/Benefit:** The Center provided one Multi-Spectral Sea and Land Target Simulator (MSALTS) for single threat engagements against the integrated ATW/Common Missile Warning System (CMWS) and Guardian Laser Turret Assembly (GLTA) as installed on the CH-47F. The MSALTS provided simultaneous ultraviolet (UV) and infrared (IR) missile plume simulations; the UV simulations were used to evaluate the CMWS, the IR simulations to evaluate the ATW, and the jam beam radiometers to evaluate the GLTA. Center participation in this test was in direct support of ongoing PMO ASE ATW JUONS efforts. The Center collected data during this test that allowed PMO ASE to assess the ATW system's declaration and threat angle-of-arrival performance. These data also allowed PMO ASE to determine whether ATW Formal Engineering Software Release 2.6 correctly updated prior software releases and whether this software release was ready for fielding to aircraft platforms in theater. The PMO ASE conducted the test from May 7 – 18, 2018, at Decatur, Alabama.

Army: Formal Software Release 3.1 Tests

- **Sponsors:** U.S. Army Technology Applications Program Office (TAPO), the 160th Special Operations Aviation Regiment (SOAR) Systems Integration and Maintenance Office (SIMO), and PMO ASE

- **Tests:**
  - MH-60M Test (October 16 – 20, 2017), Decatur, Alabama
  - UH-60L Integration Test (November 15 – 17, 2017), Redstone Arsenal, Alabama
  - UH-60M Test (January 19 – 25, 2018), Redstone Arsenal, Alabama
  - UH-60M Test (January 29 – 31, 2018), Courtland, Alabama
  - UH-60M Test (February 5 – 9, 2018), Decatur, Alabama
  - CH-47F Spacer Investigation Test (March 19 – April 4, 2018), Redstone Arsenal, Alabama
- **Activity/Benefit:** The Center provided one MSALTS for single threat engagements against the integrated ATW/CMWS and GLTA as installed on the CH-47F, UH-60L, and UH-60M, and the ATW as installed on the MH-60M. The MSALTS provided simultaneous UV and two-color IR missile plume simulations; the UV simulations were used to evaluate the CMWS, the IR simulations to evaluate the ATW, and the jam beam radiometers to evaluate the Directed Infrared Countermeasure (DIRCM) systems. Center participation in these tests was in direct support of ongoing PMO ASE and TAPO ATW JUONS efforts. The Center collected data during these tests that helped PMO ASE and TAPO determine whether ATW Formal Engineering Software Release 3.1 correctly updated prior software releases and whether this software release was ready for fielding to aircraft platforms in theater. PMO ASE also used these data to evaluate new spacers installed on the CH-47F's forward and aft sensors and to assess the performance of the integrated CMWS/ATW and GLTA on the UH-60L. The Center also provided the sponsors a preliminary assessment of the ATW system as installed on each platform.

Air Force: AC-130W JUONS and Combat Mission Need Statement (CMNS) Large Aircraft IR Countermeasures (LAIRCM) Flight Test

- **Sponsor:** U.S. Department of the Air Force, Air Force Special Operations Command (AFSOC)
- **Activity/Benefit:** The Center provided one stationary and one moving MSALTS for single and dual threat engagements against the AC-130W. AFSOC used data from the MSALTS two-color IR missile plume simulations to evaluate the LAIRCM ATW and data from the MSALTS jam beam radiometers to evaluate the DIRCM. Center participation in this test was in direct support of ongoing AFSOC JUONS and CMNS efforts. The Center collected data during the test that helped AFSOC determine whether the ATW as installed on the AC-130W was ready for fielding in theater. AFSOC conducted the test on March 26 – 27, 2018, at Eglin AFB, Florida.

Air Force: CV-22 JUONS LAIRCM Flight Test

- **Sponsor:** U.S. Department of the Air Force, AFSOC
- **Activity/Benefit:** The Center provided two stationary MSALTS missile plume simulators for two-color IR missile plume simulations and jam beam data collection, and threat-representative lasers. The Center collected data from the MSALTS simulations and the laser threat illuminations to assist the AFSOC in its assessment of the LAIRCM ATW as installed on the CV-22. Center participation in this test was in direct support of AFSOC ATW JUONS efforts. AFSOC conducted the test on January 15 – 16, 2018, at Hurlburt Field, Florida.

Distributed Aperture Infrared Countermeasure (DAIRCM) Tests

Navy: Various DAIRCM Tests

- **Sponsor:** Program Executive Officer, Tactical Aircraft Programs (PMA-272) on behalf of the Detachment 1 (Det 1), 413th Flight Test Squadron (FLTS), TAPO, and SOAR SIMO
- **Tests:**
  - Contractor Flight Test (April 16 – 27, 2018), Redstone Arsenal, Alabama
  - MH-6 Risk Reduction Test (May 22 – 24, 2018), Redstone Arsenal, Alabama
  - HH-60G IT-1 Test (June 11 – 29, 2018; July 9 – 20, 2018), Redstone Arsenal, Alabama
  - MH-60 IT-1 Test (June 11 – 29, 2018), Redstone Arsenal, Alabama
  - MH-60 IT-1 Test (July 10 – 13, 2018), Houston, Texas
  - DAIRCM Free Flight Missile Test 1 (September 10 – 28, 2018), Dugway Proving Ground, Utah
- **Activity/Benefit:** The Center provided one Joint Mobile Infrared Countermeasure Test System (JMITS) (with four MANPAD threat seekers) and one MSALTS missile plume simulator for two-color IR missile plume simulations and jam beam data collection. During the free flight missile test, the Center provided the Joint Standard Instrumentation Suite (JSIS) to collect signature data during the missile firings. The Center collected data from the simulators to help PMA-272 assess the performance of the DAIRCM missile warning system (MWS) installed on the MH-6 and HH-60G helicopters in benign and low-clutter environments; the MH-6 was also tested in medium- and high-clutter environments. PMA-272 conducted the contractor flight test for a preliminary assessment of the DAIRCM software and hardware; adjustments to hardware and/or software were made after testing. PMA-272 conducted the risk reduction test to determine if adjustments made to software and hardware were successful and to set the baseline software for formal DAIRCM testing. Center participation in these tests was in direct support of ongoing PMA-272 JUONS efforts. The Center collected data and performed a preliminary assessment that was central in helping DAIRCM developers and stakeholders assess the DAIRCM's missile warning and CM capabilities.

Infrared Countermeasure (IRCM) Expendable Tests

Army: Seeker Bowl XIII IRCM Test

- **Sponsor:** Armament Research, Development and Engineering Center (ARDEC), Pyrotechnics Division, Countermeasure Flare Branch and Program Management Close Combat Systems (PM CCS)
- **Activity/Benefit:** The Center provided SME support during the IRCM effectiveness test for the CH-47F Infrared Suppression System (IRSS), C-12R Transport, Enhanced Medium Altitude Reconnaissance and Surveillance System (MARSS), Enhanced MARSS – Geographical Intelligence, and UH-60M Upturned Exhaust System aircraft. The Center also assisted with the operation of IR seekers in the Missile and Space Intelligence Center (MSIC) seeker test van. These tests evaluated the fielded flare IRCM sequences and variations of the sequence with timing and/or pattern adjustments. The Center provided near real-time data reduction and analysis of flare sequences as well as on-site recommendations on flare sequence timing and/or pattern adjustments. As a result, the ARDEC was able to determine the most effective IRCM flare solution for each platform during the course of the test and prepare its post-test briefing for its higher headquarters, PM CCS, PMO ASE, and each platform's Program Office. The data collected during this effort resulted in a change to the fielded flare sequence for the CH-47F IRSS, thus providing better protection for those aircraft against MANPADS. These fielding decisions are in support of ongoing operations, including Operation Freedom's Sentinel, and in response to a JUONS. After the test, the Center published an independent assessment analysis report. The ARDEC conducted the test from October 28 through November 17, 2017, at Test Area 6, Redstone Arsenal, Huntsville, Alabama.

UUNS

Navy: MV-22B UUNS Department of the Navy (DON) LAIRCM ATW Integrated ASE Quick Reaction Assessment Test

- **Sponsor:** PMA-272 and the Navy Operational Test and Evaluation Force (OPTEVFOR)
- **Activity/Benefit:** The Center provided two MSALTS missile plume simulators for two-color IR missile plume simulations and jam beam data collection and a laser mobile test van with threat lasers. The Center collected data and performed a preliminary assessment to help PMA-272 and OPTEVFOR evaluate the DON LAIRCM ATW system installed on the MV-22B and its readiness for rapid fielding. Center participation in this test was in direct support of ongoing PMA-272 and OPTEVFOR UUNS efforts. PMA-272 and OPTEVFOR conducted the test from October 10 – 17, 2017, at Yuma Proving Ground, Arizona.

Navy: MV-22 UUNS DON LAIRCM ATW Integrated Test

- **Sponsor:** PMA-272 and the Navy OPTEVFOR
- **Activity/Benefit:** The Center provided one MSALTS missile plume simulator for two-color IR missile plume simulations and jam beam data collection. The Center collected data and performed a preliminary assessment to help PMA-272 and OPTEVFOR evaluate the DON LAIRCM ATW system for integration onto the MV-22B aircraft. Center participation in this test was in direct support of ongoing PMA-272 and OPTEVFOR UUNS efforts. PMA-272 and OPTEVFOR conducted the test from February 12 – 23, 2018, at Yuma Proving Ground, Arizona.

ASE ACTIVITIES

Army: Common Infrared Countermeasure (CIRCM) Program of Record

- **Sponsor:** PMO ASE
- **Activity/Benefit:** The Center generated 24,150 UV/IR missile plume signatures for the CIRCM program to use during hardware-in-the-loop and flight testing. The Center provided MSALTS and JMITS simultaneous UV/IR missile plume simulations and jam beam data collection. The Center's simulators conducted single threat engagements (MSALTS) and dual threat engagements (MSALTS/JMITS) against the CMWS and CIRCM as installed on the HH-60M and UH-60M. The Center provided near real-time feedback on missile plume simulation quality and jam beam data. These tests evaluated CIRCM end-to-end functional performance while exposed to own ship motion, vibration, and electromagnetic environments specific to the aircraft. The Center also provided the JSIS to collect signature data during missile firings. The PMO ASE conducted the tests to collect data during free flight missile testing, dynamic clutter, and own ship flares and guns. After the tests, the Center published an independent assessment analysis report. The PMO ASE conducted these tests from May 9 through August 9, 2018, at Test Area 3 (TA-3), Redstone Arsenal, Huntsville, Alabama.

Army: UH-60V Limited User Test
- **Sponsor:** The Aviation Test Directorate (AVTD), U.S. Army Operational Test Command (USAOTC)
- **Activity/Benefit:** The Center provided one MSALTS for single threat engagements against the CMWS as installed on the UH-60V. The Center collected data from the MSALTS UV missile plume simulations and performed a preliminary assessment to help AVTD USAOTC evaluate the integration of the CMWS on the UH-60V helicopter and determine its operational effectiveness, suitability, and survivability as input to the Low-Rate Initial Production decision. The AVTD conducted the test on May 18, 2018, and from July 30 through August 5, 2018, at TA-3, Redstone Arsenal, Huntsville, Alabama.

Army: ATW Pre-deployment Flight Test
- **Sponsor:** U.S. Army TAPO and SOAR SIMO
- **Activity/Benefit:** The Center provided one MSALTS for two-color IR missile plume simulations in support of pre-deployment training activities. The Center collected data that helped SOAR SIMO assess the DIRCM system on the aircraft while conducting training to determine if the system was ready for fielding in theater. SOAR SIMO conducted the test from August 20 – 24, 2018, at China Lake, California.

Navy: DON LAIRCM ATW KC-130J Integration Verification Flight Test
- **Sponsor:** PMA-272
- **Activity/Benefit:** The Center provided one MSALTS missile plume simulator for two-color IR missile plume simulations and jam beam data collection. The Center collected data during this effort that helped PMA-272 evaluate the integration of the DON LAIRCM ATW onto the KC-130J aircraft equipped with the GLTA. PMA-272 conducted the test on February 2, 2018, at the Courtland Airport, Cortland, Alabama.

Navy: CH-53E DON LAIRCM ATW Software Formal Release 3.1a Flight Test
- **Sponsor:** PMA-272 and the Navy OPTEVFOR
- **Activity/Benefit:** The Center provided one MSALTS for two-color IR missile plume simulations and jam beam data collection. The Center collected data during this effort that helped PMA-272 and OPTEVFOR assess the performance of the DON LAIRCM ATW on the CH-53E helicopter equipped with the GLTA. These data also helped PMA-272 and OPTEVFOR determine whether ATW Formal Engineering Software Release 3.1a correctly updated prior software releases and whether this software release was ready for fielding to aircraft platforms in theater. PMA-272 conducted the test on May 23 – 24, 2018, at Ingalls Field, Hot Springs, Virginia.

Navy: Poseidon Multi-mission Maritime Aircraft LAIRCM Next Generation (NexGen) P-8A Flight Tests
- **Sponsor:** Navy Air Test and Evaluation Squadron TWO ZERO (VX-20)
- **Activity/Benefit:** The Center provided missile plume simulators for two-color IR simulations and jam beam data collection during multiple, separately scheduled test events. VX-20 conducted the LAIRCM System Processor Replacement (LSPR) flight test from December 3 – 8, 2017, the (2103) Legacy Processor Software Update Flight Test from December 9 –13, 2017, and the DIRCM Situational Awareness Flight Test from July 23 – 27, 2018. VX-20 conducted all these tests at Eglin AFB, Florida. The Center collected data during these efforts that helped VX-20 assess the LAIRCM NexGen system upgrades as installed on the P-8A aircraft under operationally representative conditions. VX-20 also used these data to verify that the system accomplished missile warning to turret hand-off and delivery of jam energy in a clutter environment.

Air Force: KC-135 LAIRCM NexGen LSPR and Attitude Reference Unit Replacement (ARUR) Flight Test
- **Sponsor:** U.S. Air Force, Air National Guard
- **Activity/Benefit:** The Center provided two MSALTS missile plume simulators (one stationary and one moving) for two-color IR simulations and jam beam data collection. The Center collected data during this effort that helped the Air Force assess the performance of the LAIRCM NexGen system LSPR and ARUR upgrades as installed on the KC-135 aircraft. The Air Force Air National Guard conducted the test from November 28 through December 2, 2017, at Eglin AFB, Florida.

Air Force: KC-46A LAIRCM NexGen Block 30 Flight Test
- **Sponsor:** U.S. Air Force, KC-46A Program Office
- **Activity/Benefit:** The Center provided two moving MSALTS missile plume simulators and one stationary JMITS missile plume simulator for two-color IR simulations and jam beam data collection. The Center collected data and performed a preliminary assessment to help the KC-46A Program Office assess the missile warning and DIRCM capabilities of the LAIRCM NexGen system installed on the KC-46A Block 30 aircraft in a clutter environment. The KC-46A Program Office conducted the test on June 16 – 17, 2018, at Grant County International Airport, Moses Lake, Washington.

Air Force: Joint Strike Fighter (JSF) Test Team Comparison Test
- **Sponsor:** U.S. Air Force, JSF Operational Test Team (JOTT)
- **Activity/Benefit:** The Center participated in the JOTT F-35/A-10 Comparison Test while conducting Close Air Support (CAS)/Strike Coordination and Reconnaissance/

Forward Air Controller Airborne Operations. The Center provided participating units MANPADS threat simulators for basic threat engagements, video of the engagements (after the mission) showing aircraft targeting, and log sheets with information on each engagement. The JOTT conducted the test on July 6 – 11, 2018, at MCAS Yuma, Arizona, and Naval Air Station (NAS) China Lake, California.

Air Force: Light Attack Experiment on an AT-6 Aircraft

- **Sponsor:** U.S. Air Force, 704th Test Group (TG) and the 586th FLTS
- **Activity/Benefit:** The Center provided a Mallina MANPADS MWS stimulator to support testing of the Textron AT-6 aircraft equipped with an AN/AAR-47A(V)2 MWS. The 704th TG/586th FLTS and Textron were required to test the AT-6 MWS to determine if it could correctly detect a MANPADS threat targeting the aircraft. The 704th TG and the 586th FLTS conducted the test on July 25, 2018, at the Textron facility in Wichita, Kansas.

NATO: Surface-to-Air Launch Trial (SALT) III Signature Collection and Countermeasures Test

- **Sponsor:** The Center
- **Activity/Benefit:** The Swedish Defense Research Agency under the NATO Aerospace Capability Group 3 (ACG-3), Sub Group 2 (SG2), Threat Warning Technical Team, conducted this free flight missile test from May 21 through June 1, 2018, at Vidsel Air Base, Sweden. The Center and Arnold Engineering Development Complex field teams collected radiometric signature data for the threat launches. Additionally, the Test and Evaluation Threat Resource Activity (TETRA) led diplomatic transport efforts to deliver U.S. test equipment in support of this NATO exercise. The Center will use the model updates resulting from this effort to improve MSALTS/JMITS simulations.

TRAINING SUPPORT FOR SERVICE MEMBER EXERCISES

- **Exercise and Sponsor:** The Center supported the following seven Service member exercises, focusing primarily on the JSF JOTT Integrated Product Team as it prepares for the JSF IOT&E:
  - 82nd Combat Aviation Brigade (CAB) ASE Training (December 4 – 6, 2017), Fort Bragg, North Carolina
  - 82nd CAB Field Training Exercise (February 5 – 15, 2018), Fort Bragg, North Carolina
  - JSF/Combat Search and Rescue (CSAR) JOTT (February 26 through March 2, 2018), MCAS Yuma, Arizona
  - Emerald Warrior 18 (February 26 through March 9, 2018), Hurlburt Field, Florida
  - JSF/CSAR (April 3 – 5, 2018), NAS China Lake, California
  - JSF/CAS (April 9 – 11, 2018), MCAS Yuma, Arizona
  - JSF/CAS (April 18 – 28, 2018), MCAS Yuma, Arizona
- **Activity/Benefit:** The Center provided personnel and equipment to simulate a specific MANPADS threat environment for participating aircraft, as well as SME support to observe aircraft ASE systems and crew reactions to the threat environment. At the end of each exercise, the Center's SME presented MANPADS capabilities and limitations briefings to the pilots and crews, and at the end of the briefings, allowed them to hold and manipulate the specific MANPADS. The Center provided the Services realistic threat environments used to train pilots and crew and give them a better understanding of ASE equipment and its use. The data the Center collected and provided to the trainers/testers helped the units develop and refine their tactics, techniques, and procedures to enhance survivability.

T&E TOOLS

The Center deploys its personnel and T&E tools, especially the MSALTS and JMITS missile plume simulators, throughout the country. The Center brings its latest T&E tools to the Services, providing them with cost-effective test support to collect critical data needed to assess the performance of their CM/CCM systems. In addition, the Center supports the Service's ASE programs with its unique test equipment, which reduces duplicate T&E capabilities. This benefit, along with the transportability of the Center's unique test equipment, provides the DOD a cost savings that results in "greater performance and affordability."

The Center continues to develop tools for T&E of ASE.

- The JSIS baseline was developed from FY13 – FY18 under sponsorship from the USD(AT&L) Test Resource Management Center's Central T&E Investment Program (CTEIP). JSIS 2.0, which enhances its baseline capability, will be completed in FY20.
- The Center continuously generates threat signatures for specific programs and for use in the open-air missile plume simulators JMITS and MSALTS to test installed MWS and DIRCM systems.
- The Center will upgrade JMITS/MSALTS emitters to increase bandwidth and processing capabilities to meet advanced MWS/DIRCM system requirements.
- The Center continues to upgrade its remote launcher systems.

JSIS

JSIS is a suite of equipment used to collect MANPADS and Hostile Fire threat signature data in support of ASE modeling and simulation (M&S) for T&E. These threat signature and flyout data are then used to create or improve threat models. Intelligence agencies require high fidelity threat data to produce/improve certified threat models (i.e., trajectory and signature), and threat models form the basis of the majority of ASE T&E.

JSIS is a transportable, fully integrated instrumentation suite that collects threat signatures; time, space, position information; and related threat missile and hostile fire munitions metadata. JSIS transportability is intended to allow it to be used both in the United States and abroad to reduce costs and expand the types of threat data available in the United States. The MSIC will use data collected using JSIS to create threat models for use in M&S of ASE. The Navy (PMA-272), Army (PMO ASE), and Air Force (LAIRCM System Program Office) have endorsed JSIS, and it will be an integral support element of each Program Office's aircraft self-protection capability development. Community SMEs formulated the JSIS's need as part of the IRCM Test Resources Roadmap activities. Near-term needs for operational testing with the Navy's ATW drove JSIS Initial Operational Capability (IOC), which was sponsored by the CTEIP Resource Enhancement Project. In FY18, the JSIS IOC acquisition completed. JSIS IOC was deployed to Dugway Proving Ground from June to September 2018 during free flight live events of the CIRCM and DAIRCM programs. The Center will provide MSIC the data from these events for threat model improvements that are projected for release in late 2019.

In FY18, CTEIP sponsored JSIS 2.0, which will add a missile attitude measurement capability to enhance its baseline capability. The contract to develop JSIS 2.0 was awarded in May 2018, with projected completion in FY20. Also, the Test Resource Management Center and DOT&E requested and received funding to fill capability gaps in Threat Missile M&S infrastructure from FY19 – FY23. JSIS full operational capability will address several of these capability gaps and will begin implementation in FY19.

Missile Simulator Emitters Upgrade

The JMITS and the MSALTS systems provide a transportable missile plume simulator capability to test installed MWS/DIRCM systems in an open-air environment. The Center is currently overseeing a project to upgrade the emitters on JMITS/MSALTS to increase bandwidth and processing capabilities to meet requirements of advanced MWS/DIRCM systems. IOC for the first upgraded simulator is expected during 1QFY20.

Threat Signature Generation

The Center continually generates signatures that are used as the input signatures for JMITS and MSALTS in open-air missile simulator testing of MWS/DIRCM systems. The Center has generated over 10,000 signatures for this purpose. The Center also provides signatures to various programs upon request for use in signature model analysis and test activities not involving the Center. The Center has been a key participant in an M&S Working Group that continually evaluates threat signature models with the goal of improving them and creating uniformity in model version use across the programs.

In support of the PMO ASE, the Center generated 24,150 threat signatures for the CIRCM program. The PMO ASE will use these signatures in labs and open-air testing for evaluating CIRCM performance.

Remote Launcher System (RLS)

The Center's RLS allows for the testing of ASE against live threat missiles, giving programs the ability to evaluate system performance against actual threat missiles and giving DOT&E the ability to correlate threat live fire data to prior test venue results. Free flight missile data are also used to develop missile flyout and plume signature models that labs and open-air simulators use to create simulations, develop and improve MWS algorithms, and test CMs against missiles in free flight.

The Center's three RLS test tools provide a transportable, fully-instrumented, remote launch capability for MANPADS and vehicle-launched surface-to-air missiles. Progress is underway to replace one of the current pedestals with a more robust version. IOC is expected during 2QFY19. The Center's RLS also includes a portable version designed to provide a small, portable, fully instrumented remote launch capability for MANPADS that can be used to support testing in rugged or remote locations. IOC was achieved during 3QFY18.

ALLIED T&E EFFORTS

DOT&E organizations (the Center and TETRA) co-led international efforts to partner with allied nations to support several international T&E activities that "strengthen alliances and attract new partners" in pursuit of a shared defense.

The Center and TETRA developed and supported several Allied Air Electronic Warfare (EW) Cooperative Test and Evaluation initiatives. These include:

- Efforts under the Australia, Canada, Great Britain, and U.S. Air EW Cooperative Test and Evaluation Project Arrangement (Air EW CTE PA), which is being conducted under the authority of the Multinational (Australia, Canada, Great Britain, and U.S.) Test and Evaluation Memorandum of Understanding.

- An Air EW CTE PA meeting was held from July 9 – 13, 2018, in Kingston, Canada. It was the annual "face-to-face" meeting for the Steering Committee (SC) and Project Officers (POs) from the four allied nations. The Center is the U.S. SC Chair, and PMO ASE is the U.S. PO. Several general and breakout sessions that enabled the following dedicated technical working groups (WGs) to develop plans of action took place during this meeting:
  - WG1 – M&S Capabilities
  - WG2 – Threat Environment Representation
  - WG3 – T&E Methodologies
  - WG4 – Integrated Aircraft Survivability T&E Methodology
- TETRA is the designated lead for WG2 and the Center provides SME representatives to both WG3 and WG4.
- Additionally, a radio frequency (RF) workshop was established in conjunction with the other breakout sessions for the first time. To ensure a full spectrum of Air EW T&E methodologies were being developed to handle the contested, integrated, congested electromagnetic environment, the need to include RF threats and thus RF SMEs in the group was deemed essential. TETRA organized and led the RF workshop activity.
- Over the course of the next year, all WGs and the RF workshop will continue to meet quarterly and advance their collaborative efforts. These WGs are developing opportunities to test events collaboratively, share M&S capabilities, and develop common T&E methodologies.
- Center-sponsored initiatives for coordination with two allies to develop Reciprocal Use of Test Facility Project Arrangements for collaborative T&E of Air EW systems.

The Center and TETRA continued their support for NATO's ACG-3 (Air Survivability)/SG2 (EW Self-Protection Measures for Joint Services Airborne Assets) [ACG3-SG2] with SME representatives and participation in major ACG3-SG2 trials/tests such as SALT III, Trial EMBOW, and Trial MACE. TETRA attended the two major SG2 meetings in Monterey, California, in December 2017 and London, England, in June 2018 in an effort to align U.S. needs and priorities for the SG2 upcoming trials/tests to include Trial MACE in Slovakia in July 2018.

JOINT COUNTERMEASURES T&E WG

DOT&E and DASD(DT&E) co-chartered the Joint Countermeasures Test and Evaluation Working Group (JCMT&E WG). The Center is co-lead with DASD(DT&E) of the JCMT&E WG to measure, test, and assess:

- Aircraft self-protection, CMs, and supporting tactics
- Live fire threat weapons and open-air T&E
- System performance in operationally relevant aircraft installations and combat environments
- T&E methodologies, instrumentation, analysis, and reporting

The JCMT&E WG also:

- Supported the DOD National Defense Strategy through engagement with U.S. allies and partners in measuring aircraft EW systems' effectiveness and suitability in coalition warfare environments.
- Worked within the DOD International T&E Program, the 24-nation NATO Air Force Armaments Group, SG2, and Partnership for Peace nations to deepen T&E interoperability and build a mutually beneficial international T&E network capable of decisively acting to meet shared challenges in obtaining performance and suitability data on ASE and CMs.
- Coordinated with allies to encourage alliance coalition commitment in T&E, expanded defense cooperation and developed opportunities to obtain and increase operationally relevant information to facilitate rapid fielding of new ASE capabilities.
- Initiated coordination to conduct live weapon firings of shoulder-fired and vehicle-launched missiles, small arms fire, rockets, and anti-tank guided missile firings by active duty air-defense units and test organizations.

The JCMT&E WG continues to work with the DOT&E T&E Subcommittee, National Security Council Pre-Policy Coordinating Committee, and the State Department's Office of Weapons Removal and Abatement to expand the availability of threat weapons for use by T&E programs while reducing the number of weapons that pose a serious threat to international security.