

Center for Countermeasures (CCM)



In FY24, the Center for Countermeasures (CCM) performed 32 test events in support of the following: (1) evaluation of aircraft-based countermeasures (CMs), (2) evaluation of counter-unmanned aircraft systems (C-UASs), (3) development and evaluation of directed energy weapons (DEW) for potential use as CMs and counter-CMs, (4) warfighter pre-deployment training exercises with CMs, (5) data collection for threat characterization to advance the threat CMs' development and testing, (6) a partnership supporting the OUSD(R&E)'s experimentation initiative, and (7) development and fielding of unique instrumentation for CM testing. CCM also partnered with allies on project arrangements to advance the infrared (IR) and radio frequency (RF) threat CMs' development and testing.

PROGRAM

CCM was established and chartered in 1972 by OSD to address the emergence of technologically advanced weapons systems, including rapid development of terminally guided weapons and CMs. In 1999, CCM was transferred to DOT&E from the Deputy Director, Defense Research Engineering Test and Evaluation. Today, CCM operates and deploys mobile testing instrumentation capable of simulating an array of threats to measure and evaluate the operational effectiveness of CMs employed by DoD and foreign weapon systems. The portability of CCM test tools and personnel provide the test agility and efficiency required by DoD to develop and field critical CMs at operationally relevant speeds, minimizing the logistical burden on each program office and preserving schedules and resources.

MISSION

CCM expedites the development and fielding of CMs and counter-CMs employed by U.S. systems by supporting T&E activities with portable instrumentation. CCM supports the T&E community by preparing for future needs in DoD emerging technology areas, such as DEWs, hypersonics, and space CMs. Moreover, CCM leverages allies' support to advance T&E of IR and RF threat CMs. CCM also provides the threat environment for pre-deployment training to ensure warfighters are trained in combat-representative environments.

FY24 KEY ACTIVITIES

In FY24, CCM conducted 32 test events. Each event is detailed in the following sub-sections:

» T&E OF AIRCRAFT PROTECTION SYSTEMS

CCM executed 20 test events in support of aircraft survivability. These efforts enabled the evaluation of hardware and software upgrades of developmental and fielded systems to

protect against IR-guided, RF-guided, and laser threats. Testing included the following:

Common Infrared Countermeasure (CIRCM)

CCM supported the Army with the assessment of the CIRCM's system upgrades and performance on UH-60M aircraft. Testing measured laser energy response to substantiate the system's ability to counter IR-guided threat missiles. Testing also assessed the system's ability to receive a hand-off from the Common Missile Warning System (CMWS).

CCM also supported the Army with a four-phase test of the CIRCM, Limited Interim Missile Warning System, and Advanced Threat Warner (ATW) software upgrades. These tests aimed to improve the survivability of rotary-wing aircraft. Flight testing was conducted with MH-60M aircraft in four different geographic regions to assess the CIRCM's performance when cued by the Limited Interim Missile Warning System or the ATW sensors.

CMWS

CCM supported FOT&E of the Air Force's HH-60W aircraft equipped with the CMWS. CCM provided IR and laser threat-representative opposition forces, enabling aircrews to employ operationally relevant tactics as well as combat search and rescue doctrine.



CMWS with CIRCM

CCM supported an Army free-flight missile test by providing missile simulations to evaluate updated CMWS software and cueing to CIRCM. Also, CCM deployed instrumentation to collect threat signature data of high-priority threats to support modeling and simulation (M&S) efforts.

Large Aircraft Infrared Countermeasure (LAIRCM) Next Generation (NexGen) Missile Warning System (MWS)

CCM supported the Navy with LAIRCM NexGen MWS tests to demonstrate system performance on P-8A aircraft. The tests demonstrated the LAIRCM NexGen system performance was within nominal expectations based on historical test data.

Department of the Navy LAIRCM ATW

CCM supported the evaluation of three Department of the Navy LAIRCM ATW configurations installed on an MV-22B aircraft. The configurations included changes to the software versions as well as hardware. The test demonstration was used to support a decision for the best system suite to protect the platform.



AN/AAR-47B(V)2 MWS

CCM supported the Air Force with evaluating the AN/AAR-47B(V)2's ability to accurately detect and display missile, laser, and hostile fire threats as installed on the MH-139A rotorcraft platform.

Distributed Aperture Infrared Countermeasure (DAIRCM)

CCM supported testing of the DAIRCM software upgrade installed on the MH-6R aircraft. Testing produced data to assist the Army with evaluating the operational suitability of the rotary-wing aircraft's system software enhancements.

Future MWS Development Testing

CCM supported the Army with characterization and data collection for two potential future MWS sensors in a laboratory environment as well as open-air test environments. During the open-air testing, the sensors were carried on UH-60M aircraft. The sensors are under consideration for the Army's Improved Threat Detection System and future Air Force MWS.

NexGen Electro-optical (EO) Distributed Aperture System

CCM supported joint F-35 flight test activities evaluating the NexGen EO Distributed Aperture System's IR tracking capabilities. These activities included simulations of multiple air-to-air missile and surface-to-air missile engagements.

AN/APR-39 Radar Warning Receiver (RWR)

CCM supported testing of the AN/APR-39D(V)2 and AN/APR-39E(V)2 RWR systems. CCM supported the evaluation of the AN/APR-39D(V)2 RWR installed on MV-22B aircraft to determine the system's threat detection capabilities. For the AN/APR-39E(V)2 RWR, which was augmented with a vendor's research and development components, CCM supported a demonstration objective to show the RWR's threat detection and geolocation capabilities while installed on a UH-60L aircraft.

» T&E OF DEW

CCM supported the rapid capabilities development and fielding of prototype DEWs and made significant progress in equipping the DoD with the tools and methods needed to adequately test and evaluate the operational effectiveness of DEWs and directed energy (DE)-based CMs. CCM supported six DE test events for the following programs:

Air Force Prototype

CCM supported the Air Force with evaluating the ability of several contractors' palletized High Energy Laser (HEL) systems to defeat adversary small-UASs. CCM conducted HEL beam

diagnostics at the contractor facility pre-delivery. During the open-air test events, CCM performed UAS flights for beam characterization as well as system performance analyses at ground level and relevant slant ranges during on-the-move laser events at Kirtland AFB, New Mexico.

HEL with Integrated Optical Dazzler and Surveillance

CCM supported the Navy's demonstration on USS *Preble* (DDG 88) to verify and validate the functionality, performance, and capability of the HEL with Integrated Optical Dazzler and Surveillance system against an unmanned aerial vehicle target. CCM collected imagery of the engagements to support the evaluation of system performance.

Indirect Fire Protection Capability (IFPC)-High Power Microwave (HPM)

Testing evaluated the IFPC-HPM's technical performance and its operation as a Forward Area Air Defense weapon element subsystem. CCM supported the IFPC-HPM event with an EO and IR tracking system, which provided positive identification of targets and collected effectiveness data.

Probability of Weapon Effectiveness

CCM supported the OUSD(R&E) with a test series evaluating HEL weapon effectiveness against a series of dynamic targets and comparing the results to M&S predictions. CCM supported multiple tests within this test series.

» WARFIGHTER TRAINING

CCM deployed its unique test assets – such as a missile plume simulator, an instrumented Man-Portable Air Defense System (MANPADS) surrogate system, and an RF-threat simulator – to support three warfighter exercises. CCM provided data to the trainers to assist with their evaluation of tactics, techniques, and procedures employed by participating units to enhance their survivability in a combat environment. CCM also attended exercise planning conferences, specifically with

units assigned to the U.S. Indo-Pacific Command region for future collaboration efforts.

EMERALD WARRIOR FTX1 and FTX2

The EMERALD WARRIOR FTX1 and FTX2 are Air Force Special Operations Command-led exercises that provide large-scale joint training scenarios simulating a build-up of hostilities against a complex near-peer threat. CCM threat support enables aircrews to hone CM tactics, techniques, and procedures in operationally realistic environments, thereby increasing combat effectiveness and mitigating casualties in actual warfare. The FTX1 was performed in various locations across New Mexico, Utah, and Colorado, while the FTX2 was conducted in Nevada.

NEPTUNE FALCON 24

Exercise NEPTUNE FALCON is a joint interoperability combat search and rescue exercise designed to maintain readiness and evaluate employment capabilities in a realistic training environment. CCM supported creation of the threat environment by deploying a RF-threat simulator, a MANPADS surrogate system, and an MWS stimulator to support the training exercise.

» EXPERIMENTATION SUPPORT INITIATIVES

CCM took initial steps in supporting DoD initiatives by merging current CCM capabilities and identifying capability requirements to support current and future experimentation initiatives. In collaboration with the OUSD(R&E) and the Naval Surface Warfare Center, Port Hueneme Division, CCM supported these experimentation initiatives by deploying personnel and instrumentation for two experimentation demonstrations.

VALIANT SHIELD 24 (VS24)

VS24 is a multi-national, joint biennial field training exercise aimed at ensuring the joint force is ready to conduct a wide range of combat operations. CCM supported the VS24 exercise by collaborating with the Naval Surface Warfare Center Port Hueneme

Division, White Sands Detachment at White Sands Missile Range, New Mexico, in providing a central network and communication site as well as two static threat emitter sites. The network provided the necessary capabilities to the VS24 analysis, operations, prototypes, and assessment teams throughout the exercise to monitor and evaluate the demonstrators' performance. The simulated targets provided a combined RF and visual signature for targeting to enable the evaluation of kill chain scenarios. CCM also helped to deploy opposing force assets in support of the OUSD(R&E) Rapid Defense Experimentation Reserve program's experimentation campaign during multiple vignettes.

C-UAS Experimentation

CCM supported the OUSD(R&E) C-UAS experimentation event by providing personnel, instrumentation, and certified UAS pilots. The OUSD(R&E) C-UAS event was a joint Service experimentation and development effort of innovative and realistic prototypes to counter ever-evolving UAS threats faced by combatant commands. CCM leveraged its DE and C-UAS T&E instrumentation to assist with data collection, analysis, and reporting on C-UAS prototype systems participating in the experiment.

» DATA COLLECTION FOR THREAT CHARACTERIZATION

CCM supported one threat data collection event held by the NATO/Aerospace Capability Group 3/Sub-Group 2. The Swedish Air-to-Air Missile Trial was held in Vidsel, Sweden, to enable threat signature data collection of air-to-air and ground-to-air IR-guided missile threats. CCM provided a subject matter expert to determine the health and suitability of each MANPADS threat asset for the planned live-fire event scenarios. CCM also collected radiometric data on the air-to-air and MANPADS threat assets. CCM provided the signature measurements to the M&S community to aid the verification, updating, and creation of new threat missile models that are critical to the testing of current and future MWS systems.

» DEVELOPMENT AND FIELDING OF UNIQUE INSTRUMENTATION FOR CM SYSTEMS

CCM continued to develop and upgrade test instrumentation and capabilities to keep pace with adversary advances and T&E needs to expedite testing, development, and fielding of CMs needed to survive in increasingly complex, multi-domain environments.

Joint Standard Instrumentation Suite (JSIS)

JSIS is used to collect missile plume and hostile fire threat signatures, missile attitude, and time-space-position information data during live-fire events. JSIS's collected data will further develop the Missile Space and Intelligence Center's threat models to support MWS and CM development and evaluation. In FY24, the JSIS Missile Attitude Subsystem for tracking imagery and time-space-position information was accepted and delivered. All remaining instrumentation is scheduled to be delivered by 1QFY25, completing all three phases of the JSIS project and providing full operational capability to the T&E community. JSIS personnel continue to update and improve automated mission-based data collection and reduction features and are investigating the feasibility of using enterprise engineering platforms for artificial intelligence and machine learning to enhance data analysis.

High-Elevation Target Simulator (HETS)

HETS is a new test capability being developed to provide a low-cost, portable IR target simulator and radiometric data collection platform designed to collect missile signature data at high-elevation angles to enhance current threat fly-out models. Existing models were developed from limited static and low-angle-of-attack live missile firings. Once complete, HETS will compliment current capabilities to collect data to update threat models for improving current and future IRCM T&E effectiveness. In FY24, two risk reduction events were held at Dugway Proving Ground, Utah, which revealed the HETS balloon concept was not feasible to collect high-elevation signature data.

In FY25, CCM plans to evaluate alternative courses of action to collect the desired missile signature data.

DoD Space T&E Instrumentation Initiatives

In collaboration with the Test and Evaluation Threat Resource Activity (TETRA), CCM continues to identify gaps in space CM T&E capabilities and actions or investments required to fill those gaps. A draft report identifying gaps in space T&E capabilities was generated in FY24, and a final report will be published in FY25.

DE Instrumentation

CCM assisted in the development and implementation of tools to support DEW testing. CCM supported development or acceptance testing for the following joint DE T&E tools and instrumentation:

- Free-flying UAS-mounted target boards for directly measuring HEL performance on an inflight platform at operationally representative slant ranges.
- HEL irradiance target boards for directly measuring HEL performance against surrogate cruise missiles.
- Instrumentation that captures HEL beam energy and safely dissipates heat to provide a backstop for HEL testing.
- Tethered HPM-hardened UAS with instrumentation for measurement and characterization of HPM beam on target.
- HPM beam evaluation instrumentation for providing visual indication of relative field mapping at source-to-target distances of HPM system beam profiles.
- Class 1 and Class 2 UAS threat targets for DE and C-UAS experimental prototype demonstrations.

» SUPPORTING PROJECT ARRANGEMENT WITH ALLIES TO ADVANCE CM T&E

CCM and TETRA continued to support the execution of the Australia, Canada, United Kingdom, and United States Aircraft Electronic Warfare Cooperative Test

and Evaluation Project Arrangement (Air EW CTE PA) intended to advance and standardize Airborne EW T&E capabilities. Air EW CTE PA project officers and steering committee members from the four nations met in the United Kingdom to review advances made by the four Air EW CTE PA working groups (WGs) and the results of multiple Air EW trials conducted in FY24. Accomplishments in FY24 include the following:

M&S and Threat Environment Representation WG

The WG conducted confidence trials of existing IR, RF, and EO CM models. The WG continued validating a high-fidelity chaff model and improving a double MANPADS M&S tool to allow for the assessment of flares and Directed Infrared Countermeasure systems versus multiple MANPADS.

Air EW T&E Methodology WG

The WG completed the standardized T&E Terminology and Methodology documentation. The WG started drafting an M&S verification and validation process as well as documenting and developing the layout for a data repository to support the Air EW CTE PA efforts.

Integrated Aircraft Survivability Equipment and Air Platform M&S WG

The WG is investigating how to utilize artificial intelligence capabilities in future aircraft survivability equipment M&S tools. The WG, in cooperation with the other Air EW CTE PA WGs, is developing test objectives and plans to manage future M&S activities.

RF Threats and CM WG

The WG completed five trials that incorporated Air EW M&S tools into an overarching battlespace environment simulation hub by using a pre-determined Air EW scenario to evaluate CM effectiveness against an integrated air defense system.