Annex - Congressional Reports

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Congressional Reports Overview

DOT&E prepared eight Beyond Low-Rate Initial Production (BLRIP) reports and one Live Fire report for the Secretary of Defense and Congress between October 1, 2008, and September 30, 2009. Six of the summaries from these reports are included in this section. Three are not included due to classification issues. These are the Surface Electronic Warfare Improvement Program (SEWIP) – Block 1B2, Logistics Vehicle System Replacement (LVSR), and Joint Biological Point Detection System (JBPDS).

DOT&E prepared four Early Fielding Reports. Three of the summary letters are included in this section. One is not included due to classification issues. This is the MC-12W Liberty Project Aircraft (LPA).

Program	Report Type	Date
Battlespace Command and Control Center (BC3) Air Force Central Command (AFCENT) Increment 1 Testing	OT&E Early Fielding Report	October 2008
MH-60S Block 3A Armed Helicopter Weapon System (AHWS)	Combined OT&E / LFT&E BLRIP Report	October 2008
Surface Electronic Warfare Improvement Program (SEWIP) – Block 1B2 *(Summary is not included)*	OT&E BLRIP Report	October 2008
Logistics Vehicle System Replacement (LVSR) *(Summary is not included)*	LFT&E Report	December 2008
Guided Multiple Launch Rocket System (GMLRS) - Unitary (classified Annex)	Combined OT&E / LFT&E BLRIP Report	December 2008
MQ-9 Unmanned Aircraft System (UAS)	OT&E BLRIP Report	March 2009
Joint Biological Point Detection System (JBPDS) *(Summary is not included)*	OT&E BLRIP Report	June 2009
Air Force Mission Planning System (MPS) Increment III (F-16)	OT&E BLRIP Report	July 2009
Battlespace Command and Control Center (BC3) Air Force Central Command (AFCENT) Increment 2 Testing	OT&E Early Fielding Report	September 2009
MC-12W Liberty Project Aircraft (LPA) *(Summary is not included)*	OT&E Early Fielding Report	September 2009
Extended Range Multi-Purpose (ERMP) Unmanned Aircraft System Quick Reaction Capability	OT&E Early Fielding Report	September 2009
EA-18G Airborne Electronic Attack (AEA) Aircraft (classified Live Fire Report)	Combined OT&E / LFT&E BLRIP Report	September 2009
B-2 Radar Modernization Program (RMP) Mode Set One (MS 1)	OT&E BLRIP Report	September 2009

Battlespace Command and Control Center (BC3) Air Force Central Command (AFCENT) Increment 1 Testing

This report provides my assessment of Battlespace Command and Control Center (BC3) Air Force Central Command Increment 1 performance demonstrated in testing, in accordance with the provisions of Section 231 of the 2007 National Defense Authorization Act (modifying Title 10, United States Code, Section 2399). The Air Force's Air Combat Command developed the BC3 system under a warfighter urgent and compelling capability need request for a theater air battle management command and control system. In the report, I conclude the following:

- Test limitations prevented a determination of BC3 Increment 1's operational effectiveness and operational suitability. The short duration of test, lack of a realistic desert environment, and dependence on targets of opportunity did not fully stress BC3 in an operationally representative environment.
- BC3 Increment 1 did not receive Joint Interoperability Testing Command certification due to several information assurance vulnerabilities. Instead, it received a Net Ready-Key Performance Parameter Assessment Letter and Interim Certificate to Operate.
- The suitability of BC3 is unclear because of the lack of adequate reliability, availability, and maintainability testing.

MH-60S Block 3A Armed Helicopter Weapon System (AHWS)

The MH-60S, with the Armed Helicopter Weapon System (AHWS) upgrade, as tested, is operationally effective and suitable for the Combat Search and Rescue (CSAR), Aircraft Carrier Plane Guard/Search and Rescue (CVPG/SAR), Special Warfare Support (SWS) (Overland) missions, and the newly added Maritime Interdiction Operations (MIO) mission. For the Surface Warfare (SUW) mission, the Armed Helicopter is not suitable and operational effectiveness is yet to be determined due to limited testing. Follow-on operational test and evaluation with Hellfire missile employment under operationally realistic conditions against threat representative targets at sea is required before making a definitive SUW effectiveness evaluation. The MH-60S AHWS is operationally survivable in all missions.

The Navy's operational test agency, Operational Test and Evaluation Force (OPTEVFOR), conducted the Initial Operational Test and Evaluation (IOT&E) intermittently over an extended period (February 2006 – June 2007). OPTEVFOR conducted the test and evaluation based on the DOT&E-approved test plan with the exceptions described under the Test Adequacy section.

IOT&E, supplemented by a 2008 Verification of Correction of Deficiencies (VCD) phase and a DOT&E-requested follow-up phase, was adequate to determine operational effectiveness and suitability in all missions except for operational effectiveness in the SUW mission.

During testing, a major change to the Operational Requirements Document (ORD Change 2) was in the final stages of the formal approval process. This change reduced the thresholds for mission radius Key Performance Parameters (KPP), added the MIO mission, and changed the SWS mission from a KPP to a required capability. Although the Navy anticipated approval of the change prior to the completion of OT&E, it was not until OPTEVFOR had issued the final IOT&E report and begun the formal VCD that it received final signature. Results of the VCD, reported on March 20, 2008, enabled OPTEVFOR to reverse their evaluations in three of the five mission areas, making all areas operationally effective and suitable and to recommend fleet introduction of the Armed Helicopter. DOT&E requested an additional follow-up phase to include additional testing, data collection, and confirmation of analyses. The Navy reported those findings in a VCD Addendum Message issued July 7, 2008. DOT&E considered the analysis of results from both the VCD and the follow-up phase in completing this report.

The Navy's execution of the MH-60S Live Fire Test and Evaluation (LFT&E) program was in accordance with the approved Alternative LFT&E Strategy. The available data were adequate to assess the survivability of the MH-60S AHWS as configured for each of its designated missions. The MH-60S AHWS is survivable in the expected threat environments.

System Overview

The MH-60S Multi-Mission Combat Support Helicopter is a ship-based, medium lift, general-purpose helicopter. Designed for all weather, day/night operations, the aircraft is the Navy's primary helicopter for airborne logistics and, with appropriate upgrades, CSAR, CVPG/SAR, SWS, SUW, and Airborne Mine Countermeasures (AMCM) operations. It also provides increased MIO combat capability in the AHWS configuration.

The Navy adopted an evolutionary block development and acquisition strategy to field the aircraft enabling a time-phased fleet introduction of platform capabilities. Blocks 3A and 3B provide Armed Helicopter capability; the difference between Block 3A and Block 3B configurations is the added Link 16 (data link) capability of the latter. Two discrete kits make up the AHWS, known as the "A Kit" and the "B Kit." The A Kit represents permanent modifications to the airframe and the B Kit consists of removable mission equipment and weapons systems.

In order to expedite development and minimize integration costs, the AHWS integrates previously fielded and proven weapons and sensors that, for the most part, can be installed to meet the demands of a specific mission or tactical scenario. Major components of the AHWS include the AGM-114 Hellfire Missile System, the AN/AAS-44C Multi-Spectral Targeting System, and the crew-served weapons consisting of the GAU-21 .50 caliber Machine Gun and the M-240D 7.62 mm Machine Gun System.

The MH-60S AHWS also includes an integrated self-defense countermeasures suite. The suite includes the APR-39A(V)2 Radar Warning Receiver, the AAR-47A(V)2 Missile and Laser Warning System, the ALQ-47 Countermeasure Dispensing System, and the ALQ-144A(V)6 Infrared Countermeasures System.

Test Adequacy
As a result of real-world operational commitments, testing did not include ship-based helicopter operations at sea. However, testing (IOT&E, VCD phase, and follow-up phase) was adequate to determine operational effectiveness and suitability in all missions except for operational effectiveness in the SUW mission. With the notable exception of not operating from an aircraft carrier at sea as well as other exceptions explained further in the report body, fleet personnel operated and maintained the MH-60S in the intended operating environment. The execution of the MH-60S LFT&E program was in accordance with the approved Alternative LFT&E Strategy contained in the Test and Evaluation Master Plan. The available data were adequate to assess the survivability of the MH-60S in its baseline configuration missions.

Operational Effectiveness
The MH-60S AHWS is operationally effective for the CSAR, CVPG/SAR, SWS (Overland), and MIO mission areas. Its operational effectiveness in the SUW mission is undetermined as a result of insufficient Hellfire missile firings, the lack of threat-representative targets at sea, no firings during darkness, and no multiple missile shots at rapid rates of fire. Despite numerous identified deficiencies, the AHWS Mission Planning System (MPS) had sufficient utility to support mission accomplishment based on the mitigating actions outlined in the VCD addendum.

For SUW, the Hellfire testing was inadequate with only three developmental test/operational test missile shots, all against non-evasive targets and fired well short of the 4 nautical mile engagement range (standoff range to avoid manned portable air defense attack from the threat boat). Additionally, there were no nighttime or rapid rate of fire shots and excessive crew workload also affected Hellfire effectiveness.

For CSAR, although ORD Change 2 reduced the requirement for the number of transportable survivors from four to two, there is still only room for one litter in the cabin.

CVPG is a legacy mission executable by other aircraft and by itself does not justify AHWS. The intent of the test was to demonstrate that AHWS does not degrade the capability.

In the MIO mission area, the use of legacy fast-rope equipment negatively impacted effective deployment and crew safety, but does not preclude the AHWS from satisfactorily completing the mission.

Compared to the legacy HH-60H armed helicopter, the MH-60S AHWS provides a second cabin door, significantly improved targeting system, and additional firepower.

Operational Suitability
The MH-60S AHWS is operationally suitable for the CSAR, CVPG/SAR, SWS, and MIO mission areas. It is not operationally suitable for the SUW mission because of significant safety, human factors, and compatibility deficiencies.

The MH-60S AWHS has safety, human factor, and compatibility deficiencies for all missions, most arising from the overcrowded cabin. While configured for SUW, all of the AWHS components are installed and present an even greater challenge for the crew to safely operate the aircraft and complete the mission. Following the IOT&E, multiple Naval Air Systems Command (NAVAIR) Safety Action Records (SAR), used to support Naval Aviation Training and Operating Procedures Standard (NATOPS) changes and warnings, mitigated these deficiencies, but did not correct the material problems. Although these administrative resolutions are acceptable in the Navy to consider the aircraft safe, they really only address the symptoms and not the causes.

Operational Survivability
The MH-60S AHWS is operationally survivable in most threat environments. Its design is a derivative of the Army's Black Hawk helicopter, which has demonstrated survivability in combat. The MH-60S AHWS includes many features designed to avoid threat engagements such as signature reduction of the engine exhaust, an integrated self-defense countermeasures suite, threat suppression weapons, and situational awareness improvements. The aircraft is also ballistically tolerant against expected small arms threats and can continue to fly in spite of damage to many dynamic components.

Recommendations
The Navy should address the following issues and verify correction of deficiencies during follow-on OT&E:

- Determine CV(N) shipboard compatibility of MH-60S AHWS under operationally realistic conditions. Testing should include underway flight operations with a representative complement of all air wing aircraft embarked. It should specifically address armed aircraft handling and servicing, arming and de-arming, alert launches, and aircraft stowage on both the flight and hangar decks.

- Determine operational effectiveness of AHWS in the SUW mission to include sufficient day and night overwater Hellfire missile firings to fully demonstrate the aircraft's ability to conduct attacks against threat-representative, evasively maneuvering, seaborne targets from all weapon stations at tactical ranges.
- Correct the safety and compatibility deficiencies through redesign in addition to procedural efforts where appropriate.
- Correct human factors and mission planning deficiencies.
- Redesign or reposition the gunner's stroking seats to avoid injury during a crash.
- Redesign the gunner's belt system to prevent accidental release of the gunner's belt when operating crew-served weapons.

To further improve the suitability and survivability of the MH-60S AHWS, the Navy should consider the following:

- Integrate the developed Mission Planning System (MPS) workarounds into NATOPS and implement into a training program that is available Fleet-wide to standardize these procedures until the Navy introduces an adequate replacement into the aircraft.
- Development of a wireless internal communication system to mitigate entanglement issues.
- Development of a safety interlock system to prevent the firing of a Hellfire missile unless the GAU-21 is locked in a safe position vice using challenge/reply checklist procedures alone.
- Additional Hellfire missile exhaust testing with regard to potential health hazards to which the aircrew may be exposed.
- Increase the number of ALE-47 Chaff/Flare dispensers.
- Improve the APR-39A(V)2 Radar Warning Receiver.
- Inert the fuel tanks to prevent fires and ullage reactions.
- Reduce the potential for gearbox chip detector screen blockage resulting from ballistic impacts to the main transmission and input gearboxes.
- Make necessary design changes in the main transmission to prevent cascading damage to the tail rotor drive system when impacted by ballistic threats.
- Improve the engine bay fire detection and suppression system and redesign engine nacelle structural components to ensure that the nacelle door remains closed after ballistic impacts.
- Incorporate dry bay fire protection in the tail boom and transition section.
- Improve crashworthiness and emergency egress for situations where the aircraft is forced to land or crash into water.
- Provide aircrew seats that are survivable and allow for sufficient space to provide a means for safe and effective aircraft egress.
- Since the MH-60S AWHS operates at higher gross weights than the legacy UH-60M, the Navy should consider retesting the main transmission without oil for 30 minutes and crashworthiness with different weapons configurations (i.e., full complement of AGM-114 and GAU-21s deployed).

Guided Multiple Launch Rocket System (GMLRS) – Unitary

The M31A1 GMLRS-Unitary rocket is operationally effective, suitable, and lethal. The Initial Operational Test and Evaluation (IOT&E) and live fire testing were adequate and executed in accordance with the Director, Operational Test and Evaluation (DOT&E) approved test plans.

The M31A1 GMLRS-Unitary rocket is operationally effective and lethal. Soldiers and leaders successfully executed 75 of 76 GMLRS-Unitary fire missions during ground phase testing and achieved required effects in 11 of 12 fire missions during the flight phase testing.

The M31A1 GMLRS-Unitary rocket is operationally suitable. During the IOT&E, the rocket achieved reliability and supportability requirements, demonstrating a reliability rate of 94 percent by completing 30 of 32 flights.

System Overview

The M31A1Guided Multiple Launch Rocket System-Unitary (GMLRS-Unitary) is a Global Positioning System (GPS) guided rocket with a 200-pound unitary warhead. The M31A1 GMLRS-Unitary has a multi-mode fuze with point detonate, delay, and proximity capabilities. The rocket is capable of attacking targets out to ranges of 70 kilometers and uses Inertial Measurement Unit guidance along with GPS to enhance accuracy. GMLRS-Unitary is launched from the M270A1 Multiple-Launch Rocket System (MLRS) and the M142 High Mobility Artillery Rocket System (HIMARS).

The M31A1 GMLRS-Unitary rocket is an improved version of the M31 GMLRS-Unitary rocket, replacing the previous dual-mode fuze with a multi-mode fuze with point detonate, delay, and proximity capabilities. The M31A1 GMLRS-Unitary warhead is designed to reduce collateral damage when employed against area and point targets in restrictive terrain.

The M270A1 MLRS and M142 HIMARS launch platforms provide the mobility, command and control interface, communications processing, computation, and Soldier-machine interface to accurately fire a single rocket or a multiple rocket sequence.

GMLRS-Unitary rockets, fired from the M270A1 MLRS or M142 HIMARS launch platforms, are fielded to Fires Battalions within Brigade Combat Teams and Fires Brigades. Artillery units will use GMLRS-Unitary rockets to accurately attack critical point targets, to include those in urban environments or restrictive terrain. Artillery commanders use GMLRS-Unitary to engage targets:

- Where DPICM submunitions are not effective or unexploded ordnance is not desirable
- With increased lethality and accuracy
- While minimizing collateral damage caused by or associated with area weapons or munitions

Test Adequacy

The Initial Operational Test (IOT) and live fire testing were executed in accordance with Director, Operational Test and Evaluation approved test plans. GMLRS-Unitary test plan execution was adequate to assess operational effectiveness, suitability, and lethality. This evaluation is based on the IOT and live fire tests, supplemented by developmental testing and combat reporting of the M31 GMLRS-Unitary rockets in Operation Iraqi Freedom.

The GMLRS-Unitary Live Fire Test & Evaluation program was adequate to assess lethality and focused on target effects throughout the developmental and operational flight testing and static test firings. The live fire testing centered on the rockets warhead's ability to defeat threat targets of interest. The Army used modeling and simulation to augment live testing with estimates of expected lethality performance for conditions and environments not executed during actual testing.

Operational Effectiveness and Lethality

The M31A1 GMLRS-Unitary rocket is operationally effective and lethal. Units equipped with M31A1 GMLRS-Unitary rockets can effectively process and execute GMLRS-Unitary fire missions using current Fire Support command, control, and communications systems. Soldiers and leaders successfully executed 75 of 76 GMLRS-Unitary fire missions during ground phase testing and achieved required effects in 11 of 12 fire missions during the flight phase testing. GMLRS-Unitary tactics, techniques, and procedures support effective system employment. Flight phase testing demonstrated the GMLRS-Unitary rocket can achieve effects on target in a GPS jamming environment. During the flight phase, 29 of 32 GMLRS-Unitary rockets had effects on target. Three of 32 rockets (from two different fire missions) missed their intended aim points by more than 30 meters. One rocket impacted and detonated 760 meters from the target.

Operational Suitability

The M31A1 GMLRS-Unitary rocket is operationally suitable. During the IOT&E, the rocket achieved reliability and supportability requirements demonstrating a reliability rate of 94 percent by completing 30 of 32 flights. The two failures occurred in the same fire mission. During the fifth planned fire mission three rockets were fired at the target. One rocket failed to function on impact (monolithic impact). The second rocket impacted approximately 760 meters from the desired aim point, which is outside the reliability requirement. The third rocket functioned properly.

The M31A1 GMLRS-Unitary rocket warhead and motor are not Insensitive Munition compliant.

Recommendations

The M31A1 GMLRS-Unitary rocket is operationally effective, suitable, and lethal. The M31A1 GMLRS-Unitary program executed the IOT and live fire testing in accordance with the DOT&E approved test plans. I recommend the Army consider the following recommendations:

Operational Effectiveness and Lethality

- Continue investigating and determine the root cause of the 760 meter target miss and detonation deficiency observed in the IOT. Implement and test the hardware manufacturing assembly procedures and software modifications recommended by the Government/contractor failure analysis team to mitigate reoccurrence.
- Implement and test the planned MLRS launcher software modifications to prevent M31A1 GMLRS-Unitary rockets from being launched without Global Positioning System data.
- Complete the planned testing of a design change to prevent further cases where the rocket remains restrained in the launcher after ignition.
- Update the Joint Munitions Effects Manual (JMEM) Weaponeering System (JWS) to include GMLRS-Unitary effects against buildings in the JWS targeting tool.
- Pursue solutions and update the M31A1 GMLRS-Unitary tactics, techniques, and procedures for the reported combat failure modes which precluded completion of fire missions over the last year using M31 GMLRS-Unitary rockets.

Operational Suitability

- Improve M31A1 GMLRS-Unitary Insensitive Munitions compliance of the rocket motor, warhead, and launch pod container.
- Pursue and test a method to improve the reliability of the M31A1 GMLRS-Unitary multi-mode delay fuze function.
- Qualify the M3A1 GMLRS-Unitary for transport on the Army's Palletized Load System (PLS) Trailer.

MQ-9 Unmanned Aircraft System (UAS)

The MQ-9 Reaper is operationally effective in the killer roll and operationally suitable. The Initial Operational Test and Evaluation (IOT&E) was adequate and executed in accordance with the Director, Operational Test and Evaluation (DOT&E) approved test plan.

System Overview

The MQ-9 Reaper is a remotely-piloted unmanned aircraft system (UAS) using optical, infrared, and radar sensors to find, fix, track, target, engage, and assess critical time-sensitive targets (both stationary and moving). It is designed to autonomously provide persistent, all-weather, time-sensitive hunter and killer capabilities with the Hellfire missile and GBU-12 (500-pound laser-guided) bombs. The MQ-9 system includes ground control stations (GCS) used for launch, flight, and recovery as well as mission control of the sensors and weapons. The MQ-9's primary mission is armed reconnaissance with secondary missions of aerial intelligence gathering and combat search and rescue support.

The Air Force designated three Key Performance Parameters (KPPs) for the Increment I system. The Joint Requirements Oversight Council who validated these KPPs in 2005, and considers them essential to meet UAS capability requirements. The three KPPs are the following:

- Net Ready: The system satisfies protocols designated as critical in the joint integrated network architecture.
- Hunter: The system's capability must allow a targeting solution at the weapon's maximum range.
- Killer: The system must be capable of computing a weapon's release point, passing required information at the required accuracy to the weapon, and reliably releasing the weapon upon command.

Test Adequacy

The Air Force Operational Test and Evaluation Center (AFOTEC) conducted the IOT&E in accordance with the DOT&E-approved test plan. The test was adequate to assess the MQ-9 in the killer role, but the hunter role was not assessed due to immature synthetic aperture radar (SAR) integration. SAR integration and hunter capabilities will be assessed during follow-on testing after system upgrades.

The Air Force Program Executive Officer (PEO) for Aircraft informed the AFOTEC Commander of 14 Increment 1 CPD threshold requirements being deferred for Follow-On Test and Evaluation (FOT&E) due to system integration or technical maturity. DOT&E concurs with the PEO recommendation that AFOTEC conduct a formal FOT&E to address the 14 deferred items, system upgrades, and deficiencies noted in the IOT&E.

Operational Effectiveness

The MQ-9 system is operationally effective in the killer role. The hunter role performance remains not assessed due to the SAR limitations previously mentioned. Although the SAR was not integrated per the Increment I CPD, it did demonstrate the capability to provide imagery within the CPD threshold. The MQ-9 system is able to deliver weapons to their targets consistently, supporting the killer KPP. AFOTEC observed 35 releases of the GBU-12 (500-pound laser-guided bomb) at varying slant ranges and altitudes. In 29 cases, the GBU-12 impacted and destroyed the target. AFOTEC observed 27 releases of the Hellfire missile at varying slant ranges and altitudes. In 24 cases, the Hellfire impacted and destroyed the target with the aircrew or ground personnel confirming the target destruction.

AFOTEC documented discrepancy reports on specific subsystems of the MQ-9 system. The discrepancies varied in scope from human system interface in the GCS, pilot sensitivities in the landing environment, and ARC-210 ultra-high frequency (UHF) radio performance. The Program Office is committing resources for the correction of these deficiencies.

Operational Suitability

The MQ-9 as a system is operationally suitable. Of the 22 suitability metrics DOT&E and AFOTEC calculated, four of the metrics did not meet or exceed their derived or CPD established metrics. DOT&E considers three of the four metrics which were not met to be not operationally significant. The third metric not met, Mean Time Between Critical Failure (MTBCF), considerably deviated from the requirement of 500 hours, with 32.8 hours MTBCF demonstrated. DOT&E does not believe this to be an achievable metric and recommends that the Air Force consider a more realistic value commensurate with similar weapons systems. Of note, aircrew surveys indicate the MQ 9's inability to accomplish the MTBCF metric did not adversely affect their ability to accomplish their mission.

The Joint Interoperability Test Command (JITC) conducted the Joint Interoperability Assessment Report during the IOT&E. DOT&E concurs with JITC's assessment that the MQ-9 system complied with the majority of the system requirements, but did not fully meet its Net-Ready KPP. JITC predicts the system will satisfy the Net-Ready KPP in a subsequent evaluation in 2009. DOT&E will monitor and report the results.

Recommendations

In order to fully assess the effectiveness and suitability of the MQ-9 system, the Air Force should complete the following:

- Conduct a formal FOT&E on the 14 deferred Increment 1 capabilities, SAR radar integration, and weapon's upgrades.
- Ensure the integration of the SAR into the GCS allowing effective aircrew use in its intended concept of operations.
- Implement pilot interfaces to minimize the risk of mishaps in the landing environment.
- Verify the correction of deficiencies identified as Category 1 discrepancy reports.
- Reevaluate and consider a more realistic MTBCF metric commensurate with similar weapons systems.
- Conduct operational testing in other than desert-like climates to include maritime, cold weather, and chemical/biological agent conditions.
- Complete successful JITC certification satisfying the Net Ready KPP.

Air Force Mission Planning System (MPS) Increment III (F-16)

The F-16 Mission Planning System (MPS) is operationally effective, but not operationally suitable. The Initial Operational Test and Evaluation (IOT&E) of the F-16 MPS was adequate and executed in accordance with the Director, Operational Test and Evaluation (DOT&E)-approved Test and Evaluation Master Plan and test plan.

System Overview

F-16 MPS is the representative mission planning system for Air Force Mission Planning System (MPS) Increment III. The Increment III MPS provides automated tools that assist in pre-flight and in-flight mission planning, programming platform sensors, creating mission media, and providing required data to the aircraft avionics systems depending on weapon system capabilities.

The basis for the F-16 MPS is the JMPS approach, which uses tailored software packages hosted on commercial Windows® personal computers. JMPS is intended to be a common solution for aircraft mission planning for all military Services. It includes basic framework software, plus automated tools that plan missions, program platform sensors, create mission media, and provide required data to the aircraft avionics systems depending on weapon system capabilities. It may operate in a Local Area Network (LAN) Windows® workgroup environment, in a laptop/desktop configuration from a LAN, or in a standalone configuration.

The Air Force is developing MPS incrementally to meet planning requirements. Increment I MPS includes legacy systems for Air Force aircraft hosted on computer workstations. Increments II through IV include newly-developed systems using the JMPS approach. Other platform mission planning systems are included in Increment III, including B-1, RC-135, F-22, and F-15. Pertinent findings from the operational testing of the B-1 MPS, completed prior to the F-16 IOT&E, are included in this report.

Test Adequacy

The IOT&E of the F-16 MPS was adequate to determine the effectiveness and suitability of the system.

The Air Force Operational Test and Evaluation Center (AFOTEC), Detachment 2 at Eglin AFB, Florida, conducted operational testing on the F-16 MPS from October 20 through November 14, 2008. Test participants included Block 40 and Block 50 F-16 pilots from Air Force bases in the United States, the United Kingdom, and the Republic of Korea; an intelligence specialist; and a system support representative.

Operational Effectiveness

The F-16 MPS is operationally effective. The system satisfied the intent of all four Key Performance Parameters: time to plan a mission, route creation and manipulation, data exchanges, and data transfer operations. However, system effectiveness was limited by deficiencies related to the user-system interface, other minor deficiencies, and the poor suitability performance described in Section Four. The deficiencies prevent the system from providing fully effective mission planning support. The pilots considered the F-16 MPS better than their legacy mission planning system.

Operational Suitability

The F-16 MPS is not operationally suitable. Although the F-16 MPS met the stated requirements for mean time between critical failure and operational availability, it did not meet the majority of suitability standards. Numerous suitability shortfalls adversely affected operations during test execution. Additionally, the F-16 MPS experienced data loss during numerous system crashes, requiring missions to be replanned. These shortcomings likely will impact squadron operations by increasing the overall system workload.

As the pilots gained familiarity and experience with the F-16 MPS during the test, they learned how to avoid some of the system shortfalls as they planned missions. The number of workarounds and the need to use safe paths to navigate through the system hampered mission planning efforts and was not consistent with operational employment of MPS. Although the system support representative attempted to mitigate planning deficiencies, there is a high potential for errors in fielded operations due to the need to avoid system pitfalls.

System suitability was degraded substantially by incomplete installation instructions, which caused system support personnel to resort to trial-and-error troubleshooting. Formal training for system support personnel did not exist at the time of the test. The system support representative on site was very knowledgeable and experienced, and his expertise benefitted the pilots planning missions using F-16 MPS. However, fielded sites may be supported by system support personnel with considerably less knowledge and experience.

Logistics supportability was negatively affected by the lack of response from the hardware warranty support contractor in replacing hardware that failed during the test.

User requirements for operational availability, reliability, transporting the system, and security were satisfied. Training for pilots was satisfactory, as was responsive technical support from the system support facility's Help Desk.

Recommendations

Correction of deficiencies and inadequacies identified during testing that limit system suitability must be corrected and operationally tested before the system can be assessed as satisfactory. The Air Force should review these test results when crafting test strategies and test plans for subsequent testing of later increments, and ensure the system builds on successes and lessons learned. To improve system performance and overall mission planning, the Air Force should address the following:

- Use a larger sample size of aircrew for future testing to gain more confidence in the results, particularly for the survey assessments used to assist in the evaluation of many measures of effectiveness.
- Provide aircrew with more training on the specific type of weapons being planned, especially with advanced air-to-surface weapons like JASSM.
- Host early user reviews and implement good recommendations with the objective of improving the user interfaces.
- Continue development and adequate test of an acceptable in-flight mission planning capability. The Air Force should consider making in-flight replanning capability a Key Performance Parameter for bomber, airlift, and airborne command and control aircraft mission planning environments.
- Require that system support representatives participating in future operational tests be from operational squadrons rather than the MPSSF to more accurately assess the ability of typical users to operate and maintain the system.
- Include software installation instructions with the system installation discs in order to standardize system support representative actions on initial system set-up.
- Provide formal training for system support representatives prior to fielding F-16 MPS.
- Conduct additional IA vulnerability testing when the Air Force MPS is authorized to operate in a wide area computing environment.
- Review the reliability requirements for future MPS to ensure they are sufficient to support squadron operations with a more robust mission planning system.
- Plan and conduct an Air Force MPS Increment III Maintenance Demonstration to collect data on maintainability (including Built-In Test), maintenance training, and maintenance documentation.

Battlespace Command and Control Center (BC3) Air Force Central Command (AFCENT) Increment 2 Testing

This report provides an assessment of Battlespace Command and Control Center-Air Force Central Command (BC3-AFCENT) Increment 2 performance. The Air Force fielded BC3-AFCENT Increment 2 in March 2009. This report meets the intent of Section 231 of the 2007 National Defense Authorization Act. In the report, I conclude the following:

- The Air Force conducted an abbreviated BC3-AFCENT Increment 2 operational test to support initial fielding.
- Basic system performance appears to meet initial AFCENT air surveillance and command and control requirements. However, testing identified serious communications and information assurance deficiencies. Some data link and integrated air defense capabilities were not tested.
- The abbreviated operational test period did not produce sufficient operating hours to assess system reliability, availability, and maintainability performance. Testing did identify numerous suitability deficiencies, including environmental control system failures and shortfalls in supply support, technical data, support equipment, and training.

Extended Range Multi-Purpose (ERMP) Unmanned Aircraft System Quick Reaction Capability

In response to the Secretary of Defense's directive to increase intelligence, surveillance, and reconnaissance support in Iraq and Afghanistan, the Army deployed an early version of the Extended Range Multi-Purpose (ERMP) Unmanned Aircraft System for operational use. The Army conducted testing of this Quick Reaction Capability in conjunction with training for unit deployment to Iraq prior to Initial Operational Test and Evaluation. In this early fielding report, I conclude:

- The testing was an excellent example of combining training and testing to support a rapid fielding initiative.
- The unit effectively employed the system during testing and it will provide an increased reconnaissance, surveillance, target acquisition capability.
- The aircraft and sensor payload met reliability requirements. Use of the redundant Legacy Ground Control Station offsets poor One System Ground Control Station reliability. Overall system availability observed during testing met requirements.

This report does not satisfy the requirement in Section 2399, Title 10, United States Code for a DOT&E Operational Test and Evaluation report prior to the ERMP full-rate production decision. I will submit the required report at the completion of initial operational test.

EA-18G Airborne Electronic Attack (AEA) Aircraft

The EA-18G is operationally effective for all mission areas, except for missions that require a full escort profile against an active air defense system. It is not operationally suitable due to Built-in Test (BIT) failures that resulted in excessive maintenance. The EA-18G is survivable. Testing was adequate to determine operational effectiveness, operational suitability, and survivability within the usual limitations involved with testing Electronic Warfare systems. After operational testing was complete, additional testing in July 2009 using a newer version of aircraft software indicated the BIT problems that kept the EA-18G from being fully suitable have been improved. Additional testing will be required to confirm these preliminary results.

System Description

The EA-18G is the fourth major variant of the F/A-18 family of aircraft and will serve as the Navy's replacement for the aging fleet of EA-6Bs. It provides a capability to detect, identify, locate, and suppress hostile emitters (radars or communications equipment operating on land, sea, or in the air). The EA-18G is an F/A-18 F (Lot 30 and subsequent) aircraft with Airborne Electronic Attack (AEA) equipment and related systems installed. To reduce development risk and cost, the Navy adapted the EA-6B Improved Capability (ICAP) III AEA system for use on the EA-18G. This system includes Electronic Surveillance equipment to identify and locate threat radars and communications systems, and provides an integrated Electronic Attack suite to jam and degrade threats. The AEA system also provides targeting information on threat radar systems for employment of onboard weapons such as the High-Speed Anti-Radiation Missile (HARM). Additional EA-18G modifications include a new communications countermeasures set, a new electronics interface unit, and enhancements designed to improve aircrew communications reception while onboard jamming (transmission of radio signals that intentionally disrupt radar and/or communications receivers) is active.

Test Adequacy

Testing was adequate to assess the EA-18G AEA aircraft radar/communication signal receiving capability and the communications countermeasures capability. However, testing was not adequate to fully evaluate AEA radar jamming against early warning and engagement threat radars due to limited availability of threat systems, Federal Communications Commission (FCC) restrictions against certain frequency bands, and the poor reliability of the legacy tactical jamming pods. A total of five EA-18G production aircraft logged 471.4 hours between September 2008 and March 2009 in support of the Initial Operational Test and Evaluation (IOT&E). Operational testers used both developmental and operational test data to evaluate Key Performance Parameters (KPPs) and Key System Attributes (KSAs). Operational testing was conducted in accordance with the Director, Operational Test and Evaluation (DOT&E)-approved test plans.

Operational Effectiveness

Aircrews utilizing the EA-18G demonstrated the ability to conduct representative missions covering all seven of the mission areas defined for the EA-18G, utilizing all four typical mission profiles. The EA-18G is operationally effective for all missions, except for those requiring a full escort mission profile against an active air defense system. The shortfall in conducting a full escort profile is due to the excessive time required to display situational awareness information and the AEA suite's lengthy response time for making reactive jamming assignments. Supporting this conclusion, the EA-18G did not meet the KPP threshold criteria for selective reactive jamming response (SRJR). While the EA-18G did not meet this KPP, the full escort mission profile is uncommon and is not likely to be used by the EA-18G.

The EA-18G AEA system met KPP threshold criteria that support the standoff and modified escort mission profiles, including radar/communications receive frequency range and radar azimuth coverage. The system did not meet the KSA threshold criteria for geolocation of ground emitters, but demonstrated sufficient capability for aircrew situational awareness and to allow targeting of air-to-ground weapons. The EA-18G met KPP threshold criteria for deck spot factor, aircraft carrier launch and recovery wind limitations, recovery payload, and additional internal fuel capacity.

Operational Suitability

The EA-18G is not operationally suitable. The system met the availability KPP and reliability threshold for Mean Flight Hours Between Operational Mission Failure (MFHBOMF) while falling just below the threshold for maintainability. However, the BIT capability is immature and did not meet any of its thresholds. Poor BIT performance leads to additional maintenance on the aircraft to correctly isolate faults or to conduct unnecessary troubleshooting of false BIT indications.

Additionally, the high rate of false BIT indications can lead to a lack of aircrew confidence in the AEA system health impacting the decision to take the aircraft on a given mission. Additional testing in July of 2009 of software version H5E+ indicates that the newer software may have eliminated many of the BIT problems. The Navy has scheduled a Verification of Correction of Deficiencies for September 2009 and follow-on operational test and evaluation for spring of 2010 to confirm that the majority of suitability problems will have been corrected. The EA-18G system is compatible with the aircraft carrier operating environment.

Survivability

The EA-18G is survivable in the standoff and modified escort missions where the AEA system provides aircrews cues allowing them to avoid known threats. Testers assessed survivability by separately evaluating the EA-18G's susceptibility and vulnerability to threat Integrated Air Defense systems. Large Force Exercises (LFEs) conducted during operational test provided a susceptibility evaluation with multi-Service forces. Although quantitative data was limited, operational crews completed detailed surveys. Previous F/A-18E/F Live Fire Test and Evaluation (LFT&E) analysis provided the basis for assessing vulnerability of the EA-18G aircraft.

The EA-18G retains the vulnerability reduction features of the F/A-18E/F, and the vulnerabilities of the two aircraft are comparable over a wide range of threats. The vulnerability is acceptable and is less than that of the F-16 and EA-6B. The DOT&E EA-18G Live Fire Test and Evaluation Report dated September 2009 provides further details.

Recommendations

In order for the EA-18G to be fully operationally effective and suitable and to increase survivability, the Navy should do the following:

EA-18G Aircraft-specific

- Improve reliability of the current ALQ-99 pods and accelerate development of the Next Generation Jammer.
- Mature maintainability and BIT.
- Improve reactive jamming assignment and display performance.
- Improve INCANS performance reliability.
- Ensure logistics supportability and quality control support system availability.
- Minimize aircrew workload management to include upgrading the pilot Tactical Situation Display comparable to the EA-6B.
- Improve hardware and software diagnostic tools for the ALQ-218 and update the Interactive Electronic Technical Manual System accordingly.
- Conduct survivability studies to assess the benefits of a threat warning system that could provide timely notification of types and locations of targeting threats.
- Assess the safety and performance benefits of adding higher performance engines.

Electronic Warfare Warfighting Improvements

- Support ongoing DoD efforts to investigate, evaluate, and make recommendations to improve Enterprise Electronic Warfare test capabilities associated with open-air ranges, test and evaluation facilities, concepts, processes, and procedures.
- Assess requirements to improve Electronic Warfare modeling and simulation capabilities to support ground testing of future AEA capabilities, to include multi-signal threat environments.
- Assess the need for and benefits of building a more capable threat range at Naval Air Station Whidbey Island, Washington.

B-2 Radar Modernization Program (RMP) Mode Set One (MS 1)

The B-2 Radar Modernization Program (RMP) Mode Set One (MS 1) is operationally effective, suitable, and survivable with some limitations.

System Overview

The B-2 RMP replaces elements of the aircraft's legacy radar hardware and software with an active electronically scanned array radar system operating in a new frequency band of the electromagnetic communications spectrum. The legacy B-2 radar system operates within an electromagnetic communications frequency band where the U.S. Government is designated as a secondary user. Secondary user status means that the B 2 radar system cannot interfere with primary users. There were no other competing users operating within the legacy radar frequency band when the B-2 aircraft was initially developed and fielded. The recent emergence and licensing of primary commercial users within that frequency band required the Air Force to retrofit the B-2 radar system and shift to an operating frequency band for which the the U.S. Government holds a primary user license. The B-2 RMP is intended to provide the same operational capabilities as the legacy radar system without degrading the aircraft's low observable characteristics, avionics, and defensive systems capabilities. B-2 RMP does not provide additional enhancements to existing B-2 radar operating modes or capabilities.

RMP delivers two sets of radar capabilities to the B-2. RMP MS 1 capabilities encompass five radar modes necessary for B-2 conventional weapons mission execution. RMP Mode Set Two (MS 2) capabilities encompass additional radar navigation and targeting modes necessary to support B-2 nuclear weapons missions.

Test Adequacy

The operational testing of the B-2 RMP MS 1 adequately supported an evaluation of the system's operational effectiveness, suitability, and survivability.

Air Force Operational Test and Evaluation Center (AFOTEC) conducted RMP MS 1 Initial Operational Test and Evaluation (IOT&E) from October through December 2008. Operational test aircrews planned and flew operationally representative missions, and operational maintainers performed RMP maintenance actions to accomplish IOT&E. Testing included mission planning, flight test, and associated maintenance activities necessary to support radar operation and sortie generation. IOT&E assessed production representative RMP system hardware, software, publications, and maintenance equipment.

The Director, Operational Test and Evaluation (DOT&E) assessment of operational effectiveness and suitability included supplemental data from production representative RMP developmental test missions during 2008 and additional suitability data from the Air Force Air Combat Command (ACC) post-IOT&E Force Development Evaluation (FDE) of B 2 RMP MS 1 capabilities conducted from April to September 2009.

AFOTEC will assess RMP MS 2 navigation and targeting capabilities in follow-on test and evaluation (FOT&E) of the full-rate production RMP system. RMP MS 2 FOT&E is scheduled to begin in November 2009.

Operational Effectiveness

RMP MS 1 is operationally effective with some limitations in the weather avoidance mode. RMP detection and display of weather phenomena was inconsistent with the actual weather location relative to the aircraft; weather phenomena such as thunderstorms were approximately five miles closer to the aircraft in than cockpit-displayed RMP detections. Operational aircrews must increase desired weather avoidance distances by five miles to compensate for this inconsistency. DOT&E assesses that this limitation will not preclude the B 2 from accomplishing its conventional operational missions.

RMP effectiveness in the other MS 1 radar operating modes was as good as that of the legacy radar. RMP-configured B-2 mapping, targeting, aircraft rendezvous, and weapons accuracy performance was at least as good as the legacy system.

Operational Suitability

RMP is operationally suitable with some limitations. RMP met user needs for reliability, maintainability, supportability, deployability, and availability with some exceptions.

The demonstrated RMP system mean time between failure (MTBF) met the Air Force requirement. DOT&E's assessment included 430.8 hours of RMP flight test data from missions flown through July 31, 2009. The Air Force MTBF requirement is 68.1 hours, and RMP achieved a system MTBF of 71.8 hours in the test period. In comparison with the legacy radar MTBF, DOT&E assesses there is reasonable confidence that RMP MTBF is no worse than that of the legacy radar system.

Incomplete aircrew and maintenance technical publications required work-around actions to ready RMP aircraft for flight missions. Additionally, a modified hand tool was required and procured to facilitate removal and installation of RMP antenna components. These suitability shortfalls did not adversely affect RMP maintainability or supportability.

RMP-configured aircraft availability was slightly higher than that of the legacy radar equipped B-2. The RMP availability requirement is derived from the RMP system MTBF and mean time to repair requirements. During the test period, RMP achieved 95.8 percent availability against the derived requirement of 95.6 percent. In comparison with the legacy radar availability, DOT&E assesses there is reasonable confidence that RMP availability is no worse than that of the legacy system.

The RMP On-Board Test System (OBTS) is designed to provide 100 percent detection of radar system hardware or software faults. There was one hardware failure occurrence where OBTS did not detect the failed radar hardware module. Follow-on operational testing or assessment of OBTS performance in B-2 operational units is required to confirm that OBTS capability meets the user-defined requirements.

Operational Survivability

The RMP-configured B-2 is as survivable as the legacy radar-equipped aircraft. Both a legacy radar equipped B-2 and an RMP-configured B-2 flew side-by-side missions against operationally representative threat scenarios to evaluate and compare RMP vulnerability to threat detection. In direct comparison testing with the legacy radar-equipped B-2, results demonstrated that RMP did not increase B-2 susceptibility to detection by threat system radars. Flight testing demonstrated that the RMP operating frequencies did not interfere with performance of the B-2 Defensive Management System. Furthermore, RMP incorporation did not adversely affect B-2 radar or infrared signatures.

Recommendations

B-2 Radar Modernization Program Mode Set One is effective, suitable, and survivable for combat operations with some limitations. To address these limitations and meet the user's stated needs, the Air Force should accomplish the following:

1. Ensure that B-2 aircrews are fully trained on RMP MS 1 weather avoidance mode limitations, and establish operational procedures that enable mission accomplishment given the weather avoidance mode display discrepancies.
2. Complete, verify, and validate the applicable RMP aircrew and maintenance technical publications to support RMP sortie generation and mission execution.
3. Evaluate RMP On-Board Test System performance through follow-on operational testing or assessment of system performance in B-2 operational units to confirm system capability meets the user-defined requirements.