

P-8A Poseidon Multi-Mission Maritime Aircraft (MMA)

Executive Summary

- The Navy conducted the P-8A Increment 1 FOT&E from October 2013 through March 2014 to evaluate the operational effectiveness and suitability of the integration and employment of the AGM-84D Block 1C Harpoon anti-ship missile system. FOT&E also included evaluation of software improvements intended to correct 17 operationally significant system deficiencies that degraded Anti-Surface Warfare (ASuW); Intelligence, Surveillance, and Reconnaissance (ISR); and Command, Control, and Communication (C3) mission capabilities during IOT&E. Based on FOT&E results, DOT&E concluded that:
 - The P-8A Increment 1 system provides an operationally effective armed ASuW mission capability to detect, classify, and track maritime surface targets and engage them using the AGM-84D Block 1C Harpoon anti-ship missile. System software changes improved overall surface target search, classification, and tracking capabilities as compared to observed IOT&E performance.
 - Based on FOT&E results, the P-8A Increment 1 system does not yet provide an operationally effective ISR mission capability. System software improvements corrected several high-priority sensor integration problems and improved imagery dissemination capabilities. However, persistent synthetic aperture radar (SAR) image quality problems, unresolved electronic intelligence collection deficiencies, and data dissemination limitations continue to degrade P-8A ISR mission capabilities. Additional SAR, electronic intelligence collection, and data dissemination upgrades are scheduled for inclusion in upcoming pre-planned software updates and will be assessed during future FOT&E periods.
 - The P-8A Increment 1 system provides a C3 mission capability to collect and disseminate key elements of a common operational picture (COP) to maritime forces and on-scene commanders via Link 16 and Link 11 datalink systems and through other voice communication and data transfer systems. However, unresolved tactical display, communication system, and data transfer system deficiencies reduce P-8A COP data collection and dissemination capabilities in some operational scenarios. Corrections for these deficiencies will be evaluated in future operational test events.
 - The P-8A is operationally suitable for Anti-Submarine Warfare (ASW), ASuW, ISR, C3, and related maritime patrol missions. During FOT&E, P-8A mission capable rates exceeded those measured during IOT&E. Hardware components continued to demonstrate high reliability during operational testing and system software reliability improved compared to previous IOT&E results. P-8A aircraft flight performance (range, speed, payload, etc.)



meet or exceed specified operational requirements for ASW, ASuW, and ISR missions. The P-8A meets all ASuW mission endurance, weapons carriage, and mission turnaround requirements while carrying the AGM-84D Block 1C anti-ship missile system.

- The P-8A is partially compliant with joint interoperability standards and Net Ready Key Performance Parameter requirements. System improvements corrected several high-priority communication system interoperability and net ready compliance problems identified during IOT&E. The Joint Interoperability Test Command (JITC) follow-up assessments verified compliance with all 39 specified mission critical information exchange requirements, leading to joint use certification in October 2013. The JITC assessment also identified remaining net ready and interoperability shortfalls that require future improvement. The Navy has identified additional system enhancements necessary to deliver a fully net-enabled architecture as principle requirements of the P-8A Increment 3 upgrade program.
- As part of the P-8A Increment 2 program, the Navy is integrating the Multi-static Active Coherent (MAC) system into the P-8A to provide the initial broad-area ASW search capabilities originally included in the P-8A Increment 1 baseline acquisition program and supporting operational requirement documents. DOT&E previously issued a MAC IOT&E report based on testing conducted on the P-3C aircraft. This report concluded that the MAC system provides the P-3C with a broad-area ASW search capability in some operational environments and for select target scenarios, but falls short of fleet-defined capabilities needed to protect high value units. Initial test results indicate that MAC performance varies strongly by ocean environmental characteristics and

target tactics. Further information can be found in DOT&E's July 2014 IOT&E report on the MAC System on P-3C Aircraft. Until a fully-capable broad-area ASW search sensor is successfully integrated, the P-8A will be unable to execute the full range of ASW mission tasks defined by the original P-8A Increment 1 ASW concept of operations.

- The Navy conducted developmental flight testing of the MAC Phase I System broad-area ASW search capability on the P-8A in February through March 2014 and intended to commence operational testing in May 2014. Following the March 2014 developmental test flights, the Navy delayed the start of operational testing to correct integration and performance deficiencies. The contractor delivered a final MAC software update in August 2014. Completion of developmental testing and start of operational testing is scheduled for November 2014.
- The Navy completed the first lifetime of the P-8A full-scale structural fatigue testing in July 2014. This phase of testing identified localized fatigue cracking in non-critical structural components, including replaceable pressure web and aircraft tail section components. The program is currently reviewing these results to identify fleet airframe inspection requirements and depot repair procedures to ensure the airframe meets the intended 25-year design life. The program is planning a second full lifetime of structural fatigue testing in FY15 to complete the airframe durability assessment and to further refine inspection and repair procedures.

System

- The P-8A Poseidon Multi-mission Maritime Aircraft design is based on the Boeing 737-800 aircraft with significant modifications to support Navy maritime patrol mission requirements. It will replace the P-3C Orion.
- The P-8A incorporates an integrated sensor suite that includes radar, electro-optical, and electronic signal detection sensors to detect, identify, locate, and track surface targets. An integrated acoustic sonobuoy launch and monitoring system detects, identifies, locates, and tracks submarine targets. The

P-8A carries Mk 54 torpedoes and the AGM-84D Block 1C Harpoon anti-ship missile system to engage submarine and maritime surface targets. Sensor systems also provide tactical situational awareness information for dissemination to fleet forces and ISR information for exploitation by the joint intelligence community.

- The P-8A aircraft incorporates aircraft survivability enhancement and vulnerability reduction systems. An integrated infrared (IR) missile detection system, flare dispenser, and directed IR countermeasure system is designed to improve survivability against IR missile threats. On and off-board sensors and datalink systems are used to improve tactical situational awareness of expected threat systems. Fuel tank inerting and fire protection systems reduce aircraft vulnerability.
- The Navy is integrating the MAC system into the P-8A to provide a broad-area active ASW search capability.

Mission

- Theater Commanders primarily use units equipped with the P-8A Multi-mission Maritime Aircraft to conduct ASW operations including the detection, identification, tracking, and destruction of submarine targets.
- Additional P-8A maritime patrol missions include:
 - ASuW operations to detect, identify, track, and destroy enemy surface combatants or other maritime targets
 - ISR operations to collect and disseminate imagery and signals information for exploitation by the joint intelligence community
 - C3 operations to collect and disseminate tactical situation information to fleet forces
 - Identification and precise geolocation of targets ashore to support fleet strike warfare missions

Major Contractor

Boeing Defense, Space, and Security – St. Louis, Missouri

Activity

- The Navy conducted the P-8A Increment 1 FOT&E from October 2013 through March 2014 to evaluate the operational effectiveness and suitability of the integration and employment of the AGM-84D Block 1C Harpoon anti-ship missile system. FOT&E also included evaluation of software improvements intended to correct 17 operationally significant system deficiencies that degraded ASuW, ISR, and C3 mission capabilities or system survivability during IOT&E. This FOT&E did not re-evaluate ASW mission capabilities since no ASW-related system improvements were included in the flight software version assessed during this test.
 - FOT&E included 15 flight missions totaling 76.2 hours to evaluate AGM-84D operational employment effectiveness

and verify correction of some previously identified system deficiencies.

- DOT&E evaluated system operational suitability during the course of 42 test and training missions totaling 234.9 flight hours using both test and fleet aircraft.
- The Navy conducted integrated test and dedicated FOT&E events at Naval Air Station (NAS) Patuxent River, Maryland; Naval Base Ventura County, California; and NAS Jacksonville, Florida.
- The Navy completed all testing in accordance with the DOT&E-approved FOT&E plan.
- The Navy completed the first lifetime of the P-8A full-scale fatigue and durability testing in FY14 using the fifth P-8A

FY14 NAVY PROGRAMS

production aircraft (YP-005). Concurrent “off-aircraft” fatigue testing of selected landing gear components completed the equivalent of two design lifetimes of testing. Fatigue test execution and data analysis activities will continue into FY15.

- The Navy continued P-8A Increment 2 software development testing in FY14. The P-8A Increment 2 program integrates the MAC system to provide a limited broad-area ASW search capability for some environments.
 - The Navy conducted developmental flight testing of the MAC Phase I System broad-area ASW search capability on the P-8A from February through March 2014 to support the start of operational testing in May 2014. Following the March 2014 test flight, the Navy delayed the start of operational testing to correct MAC integration and performance deficiencies.
 - The contractor delivered a final P-8A MAC software update in August 2014. Completion of developmental testing and start of operational testing is now scheduled for November 2014. Future Increment 2 program upgrades include new high-altitude ASW capabilities and correction of some P-8A deficiencies identified during previous developmental and operational test events.

Assessment

- The P-8A Increment 1 FOT&E re-evaluated armed ASuW, ISR, and C3 mission operational effectiveness and operational suitability. Based on FOT&E results, DOT&E concluded that:
 - The P-8A Increment 1 system provides an operationally effective armed ASuW mission capability to detect, classify, and track maritime surface targets and engage them using the AGM-84D Block 1C Harpoon anti-ship missile. During FOT&E, operational crews demonstrated the capability to carry and employ up to four AGM-84D missiles in operationally realistic ASuW mission scenarios. System software changes improved surface target search, classification, and tracking capabilities as compared to observed IOT&E performance. However, FOT&E also revealed additional sensor integration and display deficiencies that increase operator workload and/or preclude use of some ASuW mission system capabilities.
 - Based on FOT&E results, the P-8A Increment 1 system does not yet provide an operationally effective ISR mission capability. System software improvements corrected several high-priority sensor integration problems and improved imagery dissemination capabilities. However, persistent SAR image quality problems, unresolved electronic intelligence collection deficiencies, and data dissemination limitations continue to degrade P-8A ISR mission capabilities. Additional SAR, electronic intelligence collection, and data dissemination upgrades are scheduled for inclusion in upcoming pre-planned software updates and will be assessed during future FOT&E periods.
 - The P-8A Increment 1 system provides a C3 mission capability to collect and disseminate key elements of a common operational picture (COP) to maritime forces and on-scene commanders. Operational crews can develop, maintain, and disseminate tactical COP information via Link 16 and Link 11 datalink systems and through voice communication and other data transfer systems. However, P-8A C3 capabilities are reduced by radar and threat display deficiencies that complicate COP data collection in high traffic operating areas. COP data dissemination capabilities are reduced by unreliable voice satellite communications, Link 11 and Link 16 integration problems, Common Data Link interoperability shortfalls, and a limited capability to exchange intelligence information via satellite communication links. Corrections for these deficiencies will be evaluated in future operational test events.
- The P-8A is operationally suitable for ASW, ASuW, ISR, and related maritime patrol missions. During FOT&E, P-8A mission capable rates exceeded those measured during IOT&E. Hardware components continued to demonstrate high reliability during operational testing and system software reliability improved compared to previous IOT&E results. P-8A aircraft flight performance (range, speed, payload, etc.) meets or exceeds specified operational requirements for ASW, ASuW, and ISR missions. The P-8A meets all armed ASuW mission endurance, weapons carriage, and mission turnaround requirements while carrying the AGM-84D Block 1C anti-ship missile system.
- The P-8A is partially compliant with joint interoperability standards and Net Ready Key Performance Parameter requirements. System improvements corrected several high-priority communication system interoperability and net ready compliance problems identified during IOT&E. The JITC follow-up assessments verified compliance with all 39 specified mission critical information exchange requirements, leading to joint use certification in October 2013. The JITC assessment also identified remaining net ready and interoperability shortfalls that require future improvement. The Navy has identified additional system enhancements necessary to deliver a fully net-enabled architecture as principle requirements of the P-8A Increment 3 upgrade program.
- As part of the P-8A Increment 2 program, the Navy is integrating the MAC system into the P-8A to provide the broad-area ASW search capabilities originally included in the P-8A Increment 1 baseline acquisition program and supporting operational requirement documents. DOT&E previously issued a MAC IOT&E report based on testing conducted on the P-3C aircraft. This report concluded that the MAC system provides the P-3C with a broad-area ASW search capability in some operational environments and for select target scenarios, but falls short of fleet-defined capabilities needed to protect high value units. Initial test results indicate that MAC performance varies strongly by ocean environmental characteristics and target tactics. Further information can be found in DOT&E’s July 2014 IOT&E report on the MAC System on P-3C Aircraft. Until a fully-capable broad-area ASW search sensor is successfully integrated, the P-8A will be

unable to execute the full range of ASW mission tasks defined by the original P-8A Increment 1 ASW concept of operations.

- The Navy delayed the start of P-8A MAC OT&E to fix integration and performance deficiencies that were expected to reduce ASW mission performance and system reliability. The Navy's contractor delivered the final software with fixes in August 2014. Integration laboratory testing and flight testing is progressing to support the scheduled start of operational testing in November 2014.
- The Navy completed the first lifetime of the P-8A full-scale structural fatigue testing in July 2014. This phase of testing identified localized fatigue cracking in non-critical structural components, including replaceable pressure web and aircraft tail section components. The program is currently reviewing these results to identify initial fleet airframe inspection requirements and depot repair procedures to ensure the airframe meets the intended 25-year design life. The program is planning a second full lifetime of structural fatigue testing in FY15 to complete the airframe durability assessment and to finalize inspection and repair procedures.

Recommendations

- Status of Previous Recommendations. The Navy made progress on all four FY13 recommendations. The Navy implemented corrective actions and conducted FOT&E for

17 operationally significant system deficiencies related to prioritized ASuW, ISR, and C3 mission capabilities. Future program plans include additional deficiency correction activities in conjunction with P-8A Increment 2 development and testing. DOT&E approved the operational test plans for the P-8A Increment 2 program designed to evaluate previously deferred ASW broad-area search capabilities. The Navy is also reviewing and prioritizing potential future system upgrades, including consideration of options to integrate RF threat warning systems and improve the Dry Bay Fire Protection System, as previously recommended by DOT&E.

- FY14 Recommendations. The Navy should:
 1. Continue to implement corrective actions for significant system deficiencies identified in previous P-8A developmental and operational test reports and conduct additional follow-on operational tests to verify improved mission capabilities.
 2. Complete adequate operational testing of deferred ASW broad-area search capabilities in conjunction with the P-8A Increment 2 program.
 3. Plan and conduct operational testing of new P-8A system improvements intended to provide high-altitude ASW search and attack capabilities in conjunction with the P-8A Increment 2 and Increment 3 programs.