

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

Executive Summary

- The Navy conducted P-8A Increment 2 Engineering Change Proposal (ECP 1) FOT&E with the Multi-Static Acoustic (MAC) Phase 1 sensor system from March 2014 through February 2015. The December 2015 DOT&E P-8A Increment 2 ECP 1 FOT&E report concludes that the MAC Phase 1 sensor system provides an early P-8A wide-area, Anti-Submarine Warfare (ASW) search capability similar to P-3C MAC search capability. DOT&E assessed that the P-8A's detection capability with the MAC Phase 1 sensor system is strongly dependent on the environmental conditions present in the search area and the actions taken by adversaries to avoid detection. Although the MAC Phase 1 sensor system provides an effective capability in some environments and scenarios, it fails to deliver the full capability described by the Navy P-8A ASW concept of operations and MAC operational requirement documents.
- The Navy completed a P-8A Data Storage Architecture Upgrade (DSAU) Verification of Correction of Deficiencies FOT&E event in November 2015. This test includes verification of corrective actions implemented for nine previously identified system deficiencies and includes evaluation of mission performance and cybersecurity after installation of an improved mission data storage architecture.
- The Navy continues to develop and test corrective actions for more than 60 open system deficiencies identified as operationally significant during previous test periods, including the 2012 P-8A Increment 1 IOT&E and 2013 P-8A Increment 1 FOT&E events. The next significant evaluation of deficiency corrections is planned to occur as early as the FY16 P-8A Increment 2 ECP 2 operational test.
- The Navy completed the second lifetime of the P-8A full-scale structural fatigue testing in June 2015. This phase of testing identified localized fatigue cracking in non-critical structural components, including replaceable pressure web and aircraft tail section components. Preliminary results have not identified any significant, near-term structural concerns or fleet operating limitations. 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.

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 is replacing 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. Sensor systems also provide tactical situational awareness information for dissemination to fleet forces and Intelligence, Surveillance, and Reconnaissance (ISR) information for exploitation by the joint intelligence community.

- 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.
- The P-8A aircraft incorporates aircraft survivability enhancement and vulnerability reduction systems. An integrated infrared missile detection system, flare dispenser, and directed infrared countermeasure system is designed to improve survivability against infrared 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 sensor system into the P-8A to provide a wide-area active, ASW search capability.
- Planned future upgrades include the addition of net-enabled ASW and ASW weapons, high-altitude ASW capabilities, MAC wide-area ASW search enhancements, signals intelligence sensors, and advanced mission system architectures and processing upgrades.

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:
 - ASW operations to detect, identify, track, and destroy enemy surface combatants or other maritime targets

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- 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 completed the MAC Phase 1 IOT&E on the P-3C aircraft in 2013, followed by integration of the MAC Phase 1 sensor system into the P-8A aircraft in November 2013.
- From March 2014 through February 2015, the Navy conducted the P-8A Increment 2 ECP 1 FOT&E with the MAC Phase 1 sensor system. During FOT&E, the Navy conducted 10 wide-area, ASW search events to obtain the 8 valid search events required by the DOT&E-approved test plan. Because MAC Phase 1 sensor system performance was similar to P-3C performance, DOT&E utilized both the P-3C MAC IOT&E data and the P-8A MAC FOT&E data to provide a statistically significant assessment of P-8A early wide-area, ASW search performance. DOT&E submitted the P-8A Increment 1 ECP 1 FOT&E classified report for the MAC Phase I capability in December 2015.
- The Navy completed a P-8A DSAU Verification of Correction of Deficiencies FOT&E event in November 2015. This test evaluated improvements in ASW and ISR mission data loading and storage following the DSAU modification. This test event also included testing to verify corrections for nine previously identified weapons bay, electronic signal collection, Information Assurance, and avionics integration deficiencies, as well as a system level cybersecurity assessment.
- The Navy continues to develop and test corrective actions for more than 60 open system deficiencies identified as operationally significant during previous test periods, including the 2012 P-8A Increment 1 IOT&E and 2013 P-8A Increment 1 FOT&E events. Operational testing of these improvements, including a complete re-evaluation of P-8A ISR mission capabilities, and re-evaluation of the P-8A's MAC wide-area, ASW search capability is planned as early as the FY16 P-8A Increment 2 ECP 2 FOT&E.
- The Navy continued P-8A Increment 3 test planning in FY15. This next phase of P-8A capability enhancements includes significant system architecture changes, communication system upgrades, radar and electronic signal sensor upgrades, and the AGM-84 Harpoon 2+ anti-ship missile. Developmental testing will begin in FY16 with operational test events planned for FY18, FY19, and FY22.
- In FY15, the Navy planned a series of limited, quick reaction tests to field P-8A system modifications or additional capabilities requested by fleet units or Combatant Commands. Quick reaction operational testing supported fielding of the UNI-PAC II Search and Rescue Kit and upgraded Directed

Infrared Countermeasure sensors to provide full spherical video coverage around the P-8A aircraft.

- The Navy completed the second lifetime of the P-8A full-scale fatigue and durability testing in FY15 using the fifth P-8A production aircraft. Concurrent “off-aircraft” fatigue testing of the horizontal stabilizer completed the equivalent of two design lifetimes of testing. Residual strength testing on the full-scale test article and horizontal stabilizer will continue into FY16. Main and nose landing gear subassemblies completed the equivalent of three lifetimes of fatigue testing in FY15. Landing gear post-test teardown and data review is in progress. Final fatigue test analysis and results are expected to be available in late FY16.

Assessment

- The 2015 DOT&E P-8A Increment 2 ECP 1 FOT&E classified report concludes that P-8A MAC Phase 1 and P-3C MAC Phase 1 sensor systems provide similar wide-area, ASW search capabilities that are not currently provided by other passive search systems. Test results show that MAC Phase 1 sensor capabilities on both aircraft platforms are strongly dependent on search area environmental conditions and adversary evasive actions. During OT&E, MAC Phase 1 clearly provided an effective capability in some test environments and target evasion profiles, but failed to deliver the full capability required by the Navy's concept of operations and MAC operational requirement documents. Additional information on MAC Phase 1 performance is contained in the DOT&E P-3C MAC Phase 1 IOT&E classified report released in 2014.
- The Navy is making progress toward correcting the more than 60 open system deficiencies identified as operationally significant in previous test periods, including the 2012 P-8A Increment 1 IOT&E and 2013 P-8A Increment 1 FOT&E events. Some of these corrections are required to address the mission capability shortfalls identified in previous P-8A operational test reports, including both the Navy and DOT&E assessments that the fielded P-8A Increment 1 system is not operationally effective for the ISR mission. While the series of P-8A software and hardware improvements released for fleet use since 2012 have addressed some of these problems, the majority remain unresolved. Operational testing of these improvements, including a complete re-evaluation of P-8A ISR mission capabilities, is planned as early as the FY16 P-8A Increment 2 ECP 2 FOT&E event.

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- The Navy completed the P-8A DSAU Verification of Correction of Deficiencies FOT&E event in November 2015. Initial test observations indicate that the DSAU modification provides improved mission data loading and storage capabilities. In addition, this test demonstrated at least partial correction of nine previously documented deficiencies to improve mission capabilities and operator interfaces. Preliminary cybersecurity test observations identified some system vulnerabilities that could potentially be exploited to create significant mission effects. Navy and DOT&E data review and analysis are in progress. Complete test results will be available in 2QFY16.
- The Navy completed the second lifetime of the P-8A full-scale structural fatigue testing in June 2015. This phase of testing identified localized fatigue cracking in non-critical structural components, including replaceable pressure web and aircraft tail section components. Preliminary results have not identified any significant, near-term structural concerns or fleet operating limitations. The program is currently reviewing results to identify initial fleet airframe inspection requirements and depot repair procedures to ensure the airframe meets the intended 25-year design life.
- The Navy conducted a limited user test in June 2015, to certify P-8A carriage of the self-contained UNI-PAC II Search and Rescue Kit. This payload provides delivery of a life raft and survival accessories for up to eight survivors. The Navy also conducted testing to support replacement of current Directed Infrared Countermeasure sensors with upgraded, two-color infrared sensors in July 2015. This test was in response to

a Pacific Fleet Urgent Operational Need request to provide spherical video coverage for Maritime Patrol Reconnaissance Aircraft.

Recommendations

- Status of Previous Recommendations. The Navy made progress on all three FY14 recommendations. An FOT&E event to verify correction of an additional nine operationally significant system deficiencies is currently in progress, with a more significant deficiency correction FOT&E event planned for FY16. The initial phase of P-8A MAC wide-area, ASW search testing was completed in FY15, with additional testing planned for FY16. Test planning for P-8A Increment 2 and Increment 3 high altitude, ASW mission capabilities is also in progress.
- FY15 Recommendations. The Navy should:
 1. Continue to implement corrective actions for all operationally significant system deficiencies identified in previous P-8A operational test reports and conduct additional follow-on operational tests to verify improved mission capabilities.
 2. Continue to conduct planned P-8A Increment 2 MAC operational testing to evaluate ASW mission capability improvements.
 3. Submit a comprehensive P-8A Test and Evaluation Master Plan for DOT&E approval that incorporates a test strategy for previous operational deficiency corrections and the significant mission capability enhancements included in the P-8A Increment 3 program.

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