

## AIM-9X Air-to-Air Missile Upgrade

### Executive Summary

- On June 9, 2014, the Program Executive Officer (PEO) recertified AIM-9X Block II to resume IOT&E. The Navy and Air Force executed 18 operational test live missile shots (5 conducted as integrated test events), including 2 repeated shots due to a previous failure, and 21 captive-carry events. Of the 18 live missile shots attempted, 14 met test objectives, one misfired, one experienced a known hardware failure, and 2 resulted in wide misses.
- AIM-9X Block II with Operational Flight Software (OFS) 9.313 has over 950 operating hours with zero recorded failures. Testing results to date are encouraging; however, insufficient data were available to provide statistical confidence in the system reliability. DOT&E will continue to track reliability in the IOT&E.
- The Navy and Air Force originally began AIM-9X Block II IOT&E with OFS 9.311 on April 27, 2012. On July 29, 2013, the PEO formally decertified AIM-9X Block II due to two major deficiencies discovered and documented during IOT&E that affected missile performance. An extensive government and contractor investigation identified hardware reliability deficiencies with the inertial measurement unit. The contractor implemented an improved production process and updated the missile software (OFS 9.313) to address the two primary deficiencies, as well as several other performance issues.

### System

- AIM-9X is the latest generation short-range, heat-seeking, air-to-air missile. The currently fielded version of the missile is AIM-9X Block I, OFS 8.220, which includes limited lock-on-after-launch, full envelope off boresight capability without a helmet-mounted cueing system, and improved flare rejection performance.
- AIM-9X is highly maneuverable, day/night capable, and includes the warhead, fuze, and rocket motor from the previous AIM-9M missile.
- AIM-9X added a new imaging infrared seeker, vector controlled thrust, digital processor, and autopilot.
- F-15C/D, F-16C/D, and F/A-18C/D/E/F aircraft are capable of employing the AIM-9X.



- The AIM-9X Block II is the combination of AIM-9X-2 hardware and OFS 9.3.
  - AIM-9X-2 is the latest hardware version and is designed to prevent parts obsolescence and provide processing capability for the OFS 9.3 upgrade. The AIM 9X-2 missile includes a new processor, a new battery, an electronic ignition safe/arm device, and the DSU-41/B Active Optical Target Detector fuze/datalink assembly.
  - OFS 9.3 is a software upgrade that is intended to add trajectory management to improve range, datalink with the launching aircraft, improved lock-on-after-launch, target re-acquisition, and improved fuzing.

### Mission

Air combat units use the AIM-9X to:

- Conduct short-range offensive and defensive air-to-air combat
- Engage multiple enemy aircraft types with passive infrared guidance in the missile seeker
- Seek and attack enemy aircraft at large angles away from the heading of the launch aircraft

### Major Contractor

Raytheon Missile Systems – Tucson, Arizona

### Activity

- At the beginning of FY14, the Navy and Raytheon Missile Systems were continuing investigations into AIM-9X Block II deficiencies found during IOT&E that had resulted in PEO decertification of the program from testing on July 29, 2013. Between the start of IOT&E on April 27, 2012,

and decertification, the Navy originally completed 18 of 22 planned captive carry events, 5 of 9 planned live missile shots, and 1 repeat test shot. The Air Force originally completed 18 of 22 captive-carry events and 6 of 8 live missile shots. Of the 12 live missile shots conducted during IOT&E

- prior to decertification, 7 terminated within lethal radius of the target.
- The Program Office and Raytheon Missile Systems completed the investigation and implemented hardware and software solutions to address the two primary deficiencies. From March 20 through May 13, 2014, the Navy and Air Force executed 5 successful integrated test live missile shots and 13 captive-carry missions to test missile performance with changes to the inertial measurement unit hardware and the OFS.
- On June 5, 2014, the Navy completed an Operational Test Readiness Review and the PEO certified AIM-9X Block II with OFS 9.313 for IOT&E. DOT&E approved a test plan change reducing the number of captive-carry missions to 28 (14 per Service) and removed one of the 17 live missile tests from the originally approved IOT&E plan.
- The Navy completed 9 of 14 planned captive-carry events and 9 of 9 live missile shots, plus 2 repeated shots. The Air Force completed 12 of 14 planned captive-carry events and 7 of 7 live missile shots. Of the 18 live missile shots, 14 terminated within lethal radius of the target, 2 resulted in wide misses, 1 experienced a known hardware failure, and 1 misfired. These results include the five integrated test live missile shots, which terminated within lethal radius.
- The Program Office conducted the IOT&E in accordance with the DOT&E-approved Test and Evaluation Master Plan.
- The aircrew reported that AIM-9X Block II Helmet-less High Off-Boresight performance with OFS 9.313 is on par with AIM-9X Block I performance. The Capability Production Document requires Block II performance be equal to or better than baseline AIM-9X performance.
- Based upon live missile testing performance with enhanced inertial measurement unit production processes and OFS 9.313, the Navy and Raytheon have resolved the previously identified fly-out deficiency that significantly affected Probability of Kill.
- The results of AIM-9X Block II testing with OFS 9.313 to date are encouraging; however, insufficient data were available to provide statistical confidence in system reliability. The Navy and Air Force accomplished over 950 operating hours with zero recorded failures. When the PEO decertified AIM-9X Block II from IOT&E, the Navy and Air Force had conducted 6,353 total operating hours with 22 failures, resulting in a Mean Time Between Critical Failure of 288.79 hours. This was well below the reliability growth curve to achieve the requirement of 500 hours Mean Time Between Critical Failure at 80,000 hours. DOT&E will continue to track reliability in the IOT&E.

## Assessment

- Prior to decertification from testing, 7 of 12 operational test AIM-9X Block II (OFS 9.311) shots guided to within lethal radius of the drone. The developmental testing record was 9 of 12 shots within lethal radius; however, 1 missile did not receive a fuze pulse.

## Recommendations

- Status of Previous Recommendations. The Navy addressed the previous recommendations.
- FY14 Recommendation.
  - The Navy should work closely with DOT&E and the Service Operational Test Agencies to establish the plan, requirements, and resources for OFS 9.400 testing, including the associated Test and Evaluation Master Plan update.