

AIM-9X Air-to-Air Missile Upgrade

Executive Summary

- In October 2007, the AIM-9X program completed operational testing of a software update to the currently fielded missile with conflicting results.
- Analysis is not complete, but initial review indicates that the test results do not show measurable improvement of missile performance.
- The software upgrade included several new interim capabilities. The program office elected not to operationally test the rudimentary air-to-ground capability until they can complete further development.
- The Services should carefully consider the results of the operational test before committing to fielding the new software and capabilities. The AIM-9X program should add additional shots to future testing that fully evaluate missile performance and accurately determine increased (or decreased) capability.

System

- AIM-9X is the latest generation short-range, heat-seeking, air-to-air missile that reduces the gap in short-range combat capability between U.S. aircraft and primary enemy threat aircraft. The currently fielded version of the missile software is 8.019.
- AIM-9X is highly maneuverable, day/night capable, and includes the warhead, fuse, 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/A-18 C/D, and F/A-18 E/F aircraft can carry the AIM-9X and the missile includes a container for storage and maintenance.



- 8.2XX (the latest software version) includes a rudimentary air-to-ground attack mode; limited lock-on-after-launch; full envelope high off-boresight capability without a helmet-mounted cueing system; and increased flare rejection performance.

Mission

Air combat units use the AIM-9X to:

- Conduct short-range offensive and defensive air-to-air combat
- Engage multiple enemy aircraft types using passive infrared guidance in the missile seeker, using external cues (other than the missile seeker itself) from multiple aircraft systems, including radar and the Joint Helmet Mounted Cueing System
- Seek and attack enemy aircraft at large angles away from the launch aircraft

Activity

- The AIM-9X program completed an operational test evaluating a software upgrade (8.2XX) to the fielded missile. The upgrade addressed a previous deficiency in performance against aircraft employing countermeasures (flares) against heat-seeking missiles, and added new interim capabilities to the baseline missile in order to reduce future development risk.
- The program executed the operational test from May through October 2007, using the DOT&E-approved test plan. The program office did not certify the air-to-ground capability for operational test due to poor performance and a recommendation against further testing from development test agencies. Operational test did not evaluate this feature.
- The test program consisted of multiple captive carriage flights evaluating missile seeker performance in a variety of

- scenarios and conditions, and three live fire shots evaluating end-to-end system performance in three distinct scenarios.
- The program completed 105 captive carry sorties on F-15, F-16, and F/A-18 aircraft, and three end-to-end live fire shots against target drones.

Assessment

- Analysis and evaluation is ongoing. Modeling and simulation analysis indicated the new software should have measureable increases in acquisition and track ranges, and greater capability against aircraft employing flares. Initial feedback from the captive flights is conflicting. Some crews noticed slightly better performance and slightly increased capabilities, while others felt the performance was less than the currently

fielded missile. There may be insufficient information in the limited test program (designed only to confirm the expected strong performance) to answer questions about marginal performance or confirm new capability.

- The three shots were only marginally successful. Of the three shots, only one successfully killed the target drone. One shot acquired and tracked the target but failed to achieve a kill since the pilot launched the missile just beyond the planned range for the test scenario. One shot acquired, tracked, and killed the target drone as planned. One shot acquired and tracked the planned target but lost track accuracy as the missile flew, missing the planned target. In all cases, the missile appeared to function correctly, but did not always achieve the expected performance increase over the current software.
- The AIM-9X operational testing demonstrated the primary problem with a limited test program when evaluating software changes. A limited test program with minimal shots (scoped under the belief that performance would meet modeled expectations) may not provide sufficient information to adequately evaluate missile performance when performance is less than expected or only marginally better than previous capability.
- The next phase of the program (Block II) upgrades a number of hardware components, in some cases due to obsolescence

and in some cases to increase performance and capabilities. The program intends to first test currently fielded software on the new hardware, then conduct more extensive testing after upgrading new software that adds greater capabilities. For the next software verification phase, the AIM-9X program is proposing a test program that plans a minimal number of missile shots, which may lead to the same inconclusive results that occurred during this year's operational test.

Recommendations

- Status of Previous Recommendations. In FY05, DOT&E recommended that the program plan a robust, event-driven test strategy for the next increment in the program. Planning for this increment is not yet complete. Also, all three of the FY06 recommendations are still valid.
- FY07 Recommendations.
 1. The Services should carefully consider the results of the operational test before committing to fielding the new software and capabilities.
 2. The AIM-9X program should add additional shots to fully evaluate missile performance and accurately determine increased (or decreased) capability.