

AIM-120 Advanced Medium-Range Air-to-Air Missile (AMRAAM)



DOT&E published a classified AIM-120D System Improvement Program (SIP)-3F FOT&E report in January 2024. The Advanced Medium-Range Air-to-Air Missile (AMRAAM) AIM-120D3 SIP-3F finished integrated testing in May 2023 and fielded in March 2024. Additional reliability testing of AIM-120D3 hardware is ongoing. Planning is underway for SIP-4 and SIP-3 Tape 2 operational testing, which are both planned to begin in 4QFY25.

SYSTEM DESCRIPTION

The AMRAAM is a radar-guided, air-to-air missile, with capabilities in both the beyond-visual-range and within-visual-range arenas.

F-35A/B/C, F-22A, EA-18G, F/A-18C/D/E/F, F-16C/D, and F-15C/D/E/EX aircraft can all employ AMRAAM, including multiple-target engagements with multiple missiles simultaneously.

The AIM-120D3 is the newest variant in the AMRAAM family of

missiles and incorporates a form-fit-function hardware refresh to replace obsolete components and re-hosts the SIP-3 operational flight software as SIP-3F. Multiple follow-on SIPs are planned to provide AIM-120D3 updates to enhance missile performance and resolve deficiencies.

Additional software updates to the legacy AIM-120D variant (now called AIM-120D0) are planned under the “SIP-3 Tape X” designation. These updates will enhance performance and resolve deficiencies for legacy AIM-120D0 hardware.

MISSION

The Air Force, Navy, and several foreign militaries employ various versions of the AIM-120 AMRAAM to conduct air-to-air combat missions. All U.S. fighter aircraft use the AMRAAM as their primary beyond-visual-range, air-to-air weapon.

PROGRAM

AIM-120D upgrades are Air Force-led projects under the Acquisition Category IC AMRAAM program. DOT&E published a classified AIM-120D SIP-3F FOT&E test report in January 2024, and SIP-3F fielded in March of 2024. The Services are now in the process of test planning for the next set of AIM-120D operational tests: SIP-4 for AIM-120D3 and SIP-3 Tape 2 for AIM-120D0 variants. The Air Force expects to submit a TEMP update in 1QFY25. Operational testing is scheduled to begin in 4QFY25 for SIP-4 and SIP-3 Tape 2.

The Air Force Operational Test and Evaluation Center is the Operational Test Agency for SIP-4 FOT&E, while the 53rd Wing is the Operational Test Organization for SIP-3 Tape 2 operational testing.

» MAJOR CONTRACTOR

- Raytheon, a subsidiary of RTX – Tucson, Arizona

TEST ADEQUACY

In May 2023, the Air Force and Navy completed SIP-3F integrated testing in accordance with the DOT&E approved test plan. DOT&E personnel observed the testing. Discoveries during testing led to multiple missile software and firmware changes. As a result of these changes, some of the early tests were not representative of the final production version of the missile. In the SIP-3F report, DOT&E recommended further testing of the AIM-120D3 to characterize the reliability of the new hardware, which is ongoing.

The availability of threat surrogates for test remains a challenge when assessing missile effectiveness and lethality. Upcoming operational testing may include limited or no full-scale targets due to test asset availability limitations. Additionally, surrogates for many other modern threats do not currently exist. These test asset limitations put greater importance on modeling and simulation (M&S) to adequately characterize the performance of the AIM-120D. However, verification, validation, and accreditation of M&S is also negatively affected, due to the lack of relevant flight test data from testing against representative targets. The Services should fund, develop, and produce modern

aerial targets, such as fourth- and fifth-generation fighter aircraft, large bomber and mobility aircraft, helicopters, and others, as discussed in the Test and Evaluation Resources section of this Annual Report.

PERFORMANCE

» EFFECTIVENESS AND SUITABILITY

Details on SIP-3F operational effectiveness and suitability are available in the classified DOT&E test report published in January 2024. The report includes three classified recommendations to improve operational effectiveness and suitability.

» LETHALITY

SIP-3F is lethal, based on previous test results from SIP-3. Details are available in the classified DOT&E SIP-3 test report of November 2022.

» SURVIVABILITY

SIP-3F cyber survivability is based on previous test results from SIP-3. Details are available in the classified DOT&E SIP-3 test report of November 2022.

RECOMMENDATIONS

The Air Force should:

1. Continue additional testing of the new AIM-120D3 hardware to better characterize

the reliability of the new configuration.

2. Fund, develop, and produce modern aerial targets, such as fourth- and fifth-generation fighter aircraft, large bomber and mobility aircraft, helicopters, and others, as discussed in the Test and Evaluation Resources section of this Annual Report. This shortfall is beyond the scope of the AMRAAM program and must be addressed at the Department of the Navy and Department of the Air Force levels.
3. Submit TEMP updates for both SIP-4 and SIP-3 Tape 2 to support the testing scheduled to begin in 4QFY25.