

## F-22A Advanced Tactical Fighter

### Executive Summary

- F-22A Increment 3.2A is a software-only modernization effort integrating Link 16 Receive, enhanced Combat Identification, and enhanced Electronic Protection capabilities. Increment 3.2A developmental testing proceeded throughout FY14. Software stability and radar performance shortfalls discovered late in developmental testing precluded the start of FOT&E planned by the Air Force Operational Test and Evaluation Center (AFOTEC) for FY14. This FOT&E is currently projected to begin in FY15.
- F-22A Modernization Increment 3.2B, a separate Major Defense Acquisition Program, achieved Milestone B in June 2013. Laboratory and flying test bed developmental testing continued throughout FY14. IOT&E is planned for FY17.
- AIM-120D weapons models required for Increment 3.2B IOT&E were not on contract to support planned FY17 IOT&E. Should these models not be available to meet planned IOT&E, operational testing will be delayed, or additional live-fire missile events beyond those already projected may be required during IOT&E.

### System

- The F-22A is an air-superiority fighter that combines low observability to threat radars, sustained high speed, and integrated avionics sensors.
- Low observability reduces threat capability to engage F-22As with current adversary weapons.
- The aircraft maintains supersonic speeds without the use of an afterburner.
- Avionics that fuse information from the Active Electronically Scanned Array radar, other sensors, and datalinked information for the pilot enable employment of medium- and short-range air-to-air missiles, guns, and air-to-ground munitions.
- The Air Force designed the F-22A to be more reliable and easier to maintain than legacy fighter aircraft.
- F-22A air-to-air weapons are the AIM-120C radar-guided missile, the AIM-9M infrared-guided missile, and the M61A1 20 mm gun.
- F-22A air-to-ground precision strike capability consists of the 1,000-pound Joint Direct Attack Munition and the 250-pound Small Diameter Bomb (SDB) Increment One.
- The F-22A program delivers capability in increments. Incremental Enhanced Global Strike modernization efforts include the following current and projected increments:
  - Increment 3.1 provides enhanced air-to-ground mission capability, to include geolocation of selected emitters, electronic attack, air-to-ground synthetic aperture



radar mapping and designation of surface targets, and SDB integration. Increment 3.1 is currently fielding in operational F-22A units.

- Increment 3.2A is a software-only upgrade intended to provide improved electronic protection, Link 16 Receive, and Combat Identification capabilities in FY15. Increment 3.2A is a modernization effort within the scope of the F-22A Advanced Tactical Fighter baseline acquisition program of record.
- Increment 3.2B is a separate Major Defense Acquisition Program modernization effort intended to integrate AIM-120D and AIM-9X missile systems and provide additional electronic protection enhancements and improved emitter geolocation capability. The Increment 3.2B IOT&E is currently planned for FY17.

### Mission

A unit equipped with the F-22A:

- Provides air superiority over friendly and non-permissive, contested enemy territory
- Defends friendly forces against fighter, bomber, or cruise missile attack
- Escorts friendly air forces into enemy territory
- Provides air-to-ground capability for counter-air, strategic-attack, counter-land, and enemy-air defense suppression missions

### Major Contractor

Lockheed Martin Aeronautics Company – Fort Worth, Texas

# FY14 AIR FORCE PROGRAMS

## Activity

- The Air Force conducted F-22A testing in accordance with the DOT&E-approved Test and Evaluation Master Plan.
- F-22A Increment 3.2A developmental testing proceeded throughout FY14. Software stability and radar performance shortfalls discovered late in developmental testing precluded the start of AFOTEC's planned FY14 FOT&E. Additional unanticipated software releases required further developmental testing, and FOT&E is scheduled to begin in 1QFY15.
- F-22A Modernization Increment 3.2B achieved Milestone B in June 2013. Post Milestone B, F-22 Increment 3.2B developmental testing continued throughout FY14. IOT&E is planned for FY17.
- At the conclusion of the FY12 F-22A FOT&E, the Air Force reduced the level of support needed to sustain the Air-to-Air Range Infrastructure (AARI) capability and ensure system readiness for subsequent F-22A OT&E. In FY14, the Air Force undertook efforts to restore the system to support the planned FY14 Increment 3.2A FOT&E.

## Assessment

- F-22 Increment 3.2A realized software stability and radar performance shortfalls late in the developmental flight test schedule. These shortfalls necessitated additional unplanned software releases in order to demonstrate readiness for FOT&E. Accordingly, the FOT&E planned for 3QFY14 was postponed pending resolution of the shortfalls and completion of developmental test and evaluation. FOT&E is now projected to begin in 1QFY15.
- F-22 Increment 3.2B requires upgraded threat and weapons models for IOT&E effectiveness evaluation trials that will be performed in both open-air flight test at the Nevada Test and Training Range and in the Lockheed Martin F-22 Advanced Combat Simulator (ACS) in Marietta, Georgia. At the end of FY14, AIM-120D modeling was not yet on contract to support FY17 IOT&E. Should the models not be available for FY17 ACS trials, IOT&E will be delayed.
- F-22A OT&E requires the use of the AARI instrumentation system for flight test missions at the Nevada Test and Training Range.

- AARI is designed to enable testers to credibly shape air battles and resolve complex operational mission outcomes through real-time instrumented air and surface threat engagements.
- The system aids real-time, open-air threat and friendly force removal assessments, and is required for F-22A OT&E flight test adequacy. AARI mission outcomes further serve as a foundation for ACS accreditation for F-22A OT&E effectiveness evaluations performed at the ACS.
- The Air Force struggled to ensure AARI readiness to support planned FY14 F-22A Increment 3.2A testing. At the conclusion of FY12 F-22A testing, the Air Force began an extensive AARI network upgrade and the implementation of new weapons models to support future F-22A and F-35 operational testing. However, the level of effort the Air Force placed on maintaining AARI functionality was insufficient to ensure readiness for Increment 3.2A FOT&E, and AARI system test readiness experienced unplanned delays. To ensure readiness for FY15 and beyond F-22A operational testing, the Air Force will need to fully support development, modernization, and sustainment of the AARI system.

## Recommendations

- Status of Previous Recommendations. The Air Force continues to address all previous recommendations.
- FY14 Recommendations. The Air Force should:
  1. Continue to resolve F-22 Increment 3.2A software anomalies and radar performance shortfalls in developmental testing before proceeding to formal AFOTEC FOT&E in FY15.
  2. Resolve AARI sustainment, test readiness, and modernization shortfalls in order to support both near-term F-22 Increment 3.2A and future Increment 3.2B IOT&E test adequacy.
  3. Commit sufficient resources necessary to ensure that AIM-120D models are available for F-22 Increment 3.2B FY17 IOT&E.