

## F/A-18E/F Super Hornet and EA-18G Growler

### Executive Summary

- While System Configuration Sets (SCSs) H8E and 23X demonstrate acceptable suitability, the Active Electronically Scanned Array (AESA) radar's reliability continues to suffer from software instability. The radar's failure to meet reliability requirements remains a shortfall from previous test and evaluation periods.
- Although the F/A-18E/F Super Hornet weapon system continues to be operationally effective and suitable for many threat environments, it has critical shortfalls. The details are addressed in DOT&E's classified report issued following the SCS H6E, SCS 23X, and AESA FOT&E.
- The EA-18G Growler weapon system is operationally effective and operationally suitable with the same radar limitations as the E/F.
- The Navy is conducting the F/A-18E/F and EA-18G SCS H8E System Qualification Test (SQT) in two phases. Phase I was completed in 4QFY13. The Navy expects to conduct Phase II testing from 4QFY13 through 2QFY14. DOT&E will issue a single report covering both H8E phases after the completion of Phase II.



### System

#### F/A-18E/F Super Hornet

- The Super Hornet is the Navy's premier strike-fighter aircraft that replaces earlier F/A-18 variants in carrier air wings. The F/A-18E is a single-seat aircraft while the F model has two seats.
- F/A-18E/F Lot 26+ aircraft provide functionality essential for integrating all Super Hornet Block 2 hardware upgrades, which include:
  - Single pass multiple targeting for GPS-guided weapons
  - Use of off-board target designation
  - Improved datalink target coordination precision
  - Implementation of air-to-ground target points
- Additional systems include:
  - APG-73 or APG-79 radar
  - Advanced Targeting and Designation Forward-Looking Infrared System
  - AIM-9 infrared-guided missiles and AIM-120 and AIM-7 radar-guided missiles
  - Shared Reconnaissance Pod
  - Multifunctional Information Distribution System for Link 16 tactical datalink connectivity
  - Joint Helmet-Mounted Cueing System
  - Integrated Defensive Electronic Countermeasures

#### EA-18G Growler

- The Growler is the Navy's land- and carrier-based, radar and communication jamming aircraft.
- The two-seat EA-18G replaces the four-seat EA-6B. The new ALQ-218 receiver, improved connectivity, and linked

displays are the primary design features implemented to reduce the operator workload in support of the EA-18G's two-person crew.

- The Airborne Electronic Attack system includes:
  - Modified EA-6B Improved Capability III ALQ-218 receiver system
  - Advanced crew station
  - Legacy ALQ-99 jamming pods
  - Communication Countermeasures Set System
  - Expanded digital Link 16 communications network
  - Electronic Attack Unit
  - Interference Cancellation System that supports communications while jamming
  - Satellite receive capability via the Multi-mission Advanced Tactical Terminal
- Additional systems include:
  - APG-79 AESA radar
  - Joint Helmet-Mounted Cueing System
  - High-speed Anti-Radiation Missile
  - AIM-120 radar-guided missiles

#### System Configuration Set (SCS) Software

- Growler and Super Hornet aircraft employ SCS operational software to enable major combat capabilities. All EA-18Gs and Block 2 F/A-18s (production Lot 26 and beyond) use high-order language or "H-series" software, while F/A-18E/F prior to Lot 26 and all legacy F/A-18 A/B/C/D aircraft use "X-series" software.
  - The current fleet-release software versions are H8E Phase I (H-series) and 23X (X-series).
  - Software versions currently under test are H8E Phase II (H-series) and 25X (X-series).

# NAVY PROGRAMS

## Mission

- Combatant Commanders use the F/A-18E/F to:
  - Conduct offensive and defensive air combat missions
  - Attack ground targets with most of the U.S. inventory of precision and non-precision weapon stores
  - Provide in-flight refueling for other tactical aircraft
  - Provide the fleet with an organic tactical reconnaissance capability
- Combatant Commanders use the EA-18G to:
  - Support friendly air, ground, and sea operations by countering enemy radar and communications
  - Jam integrated air defense systems
  - Support non-integrated air defense missions and emerging non-lethal target sets
  - Enhance crew situational awareness and mission management
  - Enhance connectivity to national, theater, and tactical strike assets
  - Provide enhanced lethal suppression through accurate High-speed Anti-Radiation Missile targeting
  - Provide the EA-18G crew air-to-air self-protection with the AIM-120

## Major Contractor

The Boeing Company, Integrated Defense Systems – St. Louis, Missouri

## Activity

- The Navy is conducting F/A-18E/F and EA-18G SCS H8E SQT in two phases. Phase I was completed in 4QFY13. The Navy expects to conduct Phase II testing from 4QFY13 through 2QFY14. DOT&E will issue a single report covering both H8E phases after the completion of Phase II.
  - The Navy conducted Phase I of F/A-18E/F and EA-18G SCS H8E SQT from July 2012 through May 2013 in accordance with a DOT&E-approved Test and Evaluation Master Plan and operational test plan. Developmental delays caused an approximately six-month slip in the schedule. H8E Phase I was released to the fleet in September 2013.
  - The Navy began H8E Phase II SCS operational testing in September 2013 and plans to complete testing in March 2014.
- F/A-18A/C/D/E/F SCS 25X SQT was scheduled to begin in 1QFY13. Developmental delays have pushed back the start of SCS 25X SQT to 1QFY14.
- The Navy has continued to defer development of the AESA's electronic warfare capability to later software builds.
- The Navy deferred several enhancements that it intended to deliver with SCS H8E to later software builds. These enhancements included integrated electronic support, integrated high-gain electronic support measures, specific emitter identification, single-ship geolocation, integration of the ALQ-214(V)4 jammer, and RNAV (Area Navigation).
- Though aircraft software has demonstrated acceptable suitability, the continued poor reliability of the AESA radar appears to be a result of software instability. The radar's reliability and poor built-in test (BIT) performance remain deficient.
- The Navy did not attempt to address long-standing deficiencies in air warfare or AESA radar reliability with SCS H8E. Overall, the F/A-18E/F/G is not operationally effective for use in certain threat environments, the details of which are addressed in DOT&E's classified report issued following SCS H6E, SCS 23X, and AESA FOT&E.
- SCS H8E testing does not include an end-to-end multi-AIM-120 missile shot. This capability has not been successfully operationally tested. The Navy has tentatively planned to conduct a multi-missile test with SCS H12 testing in FY16 or FY17.
- DOT&E will report on the Super Hornet and Growler SCS H8E capability improvements after both Phase I and Phase II operational testing are complete in FY14.
- Preliminary results from the H8E testing indicate the EA-18G is likely to continue to be operationally effective; however, analysis is ongoing. Preliminary H8E results also indicate that the EA-18G has met all suitability thresholds except Mean Flight Hours Between BIT False Alarm.

## Recommendations

- Status of Previous Recommendations. The Navy has made minimal progress in addressing FY07 recommendations to continue to improve APG-79 AESA reliability and BIT functionality, to conduct an operationally representative end-to-end missile shot to demonstrate APG-79 radar and current SCS ability to support multi-AIM-120 engagement, and to develop and characterize the APG-79 AESA's full electronic warfare capability. DOT&E made no new recommendations in FY12.

## Assessment

- The Navy has not yet addressed long-standing deficiencies with the APG-79 AESA radar. As stated in the FY12 Annual Report, the AESA demonstrated marginal improvements during FOT&E from prior testing and provides improved performance relative to the legacy APG-73 radar. However, operational testing has yet to demonstrate a statistically significant difference in mission accomplishment between F/A-18E/F aircraft equipped with AESA and those equipped with the legacy radar.

# NAVY PROGRAMS

- FY13 Recommendations. The Navy should:
  1. Address the F/A-18E/F/G radar deficiencies.
  2. Continue to improve maintainability and BIT software maturity by reporting key suitability parameters during future FOT&E, such as Mean Flight Hours Between Operational Mission Failure and Mean Corrective Maintenance Time for Operational Mission Failure.

# NAVY PROGRAMS