

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

### Executive Summary

- From FY12 into FY14, the Navy conducted Software Qualification Testing (SQT) of System Configuration Set (SCS) H8E for the F/A-18E/F Super Hornet and EA-18G Growler aircraft. The testing was conducted in two phases. The first phase tested software improvements in SCS H8E, while the second phase tested improvements in the APG-79 Active Electronically Scanned Array (AESA) radar. DOT&E intends to issue a single report covering both phases of SCS H8E testing in FY15.
- Although the reliability of the APG-79 radar improved in both phases of testing, problems with software stability in the AESA radar resulted in failure to meet reliability and built-in test (BIT) performance requirements.
- The F/A-18E/F Super Hornet weapon system continues to demonstrate operational effectiveness and suitability for most threat environments; however, the platform is not operationally effective in specific threat environments, which are detailed in previous DOT&E classified reports.
- The EA-18G Growler weapons system equipped with SCS H8E is operationally suitable and operationally effective with the same radar limitations as the E/F.
- The Navy began SQT of SCS 25X for early-model F/A-18 aircraft in July 2014.



### System

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

- The Super Hornet is the Navy's premier strike-fighter aircraft and is a more capable follow-on replacement to the F/A-18A/B/C/D and the F-14.
- F/A-18E/F Lot 25+ 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 for target coordination precision
  - Implementation of air-to-ground target aim points
- Additional systems include:
  - APG-73 or APG-79 radar
  - Advanced Targeting Forward-Looking Infrared System
  - AIM-9 infrared-guided missiles and AIM-120 and AIM-7 radar-guided missiles
  - Multi-functional 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 (AEA) 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 25 and beyond) use high-order language or "H-series" software, while F/A-18E/F prior to Lot 25 and all legacy F/A-18 A/B/C/D aircraft use "X-series" software.
  - The Navy released H8E Phase I this year and is currently flying 23X in earlier lot aircraft.
  - H8E Phase II (H-series) has recently completed test and 25X (X-series) is currently under test.

# FY14 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 naval 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 conducted F/A-18E/F and EA-18G H8E SQT in two phases. Phase I testing, which focused on system software improvements, occurred between June 2012 and May 2013. Test aircraft equipped with SCS H8E accumulated 1,296.0 flight hours.
- SCS H8E Phase II testing focused on APG-79 improvements. Super Hornet aircraft equipped with the APG-79 radar accumulated 1,884.4 flight hours during Phase II testing, which took place between October 2013 and June 2014.
- The Navy began testing SCS 25X in July 2014, for use on earlier model F/A-18 aircraft, with completion expected in FY15. Developmental delays pushed the start of this test back for a year from the original schedule.
- The Navy has continued to defer development of the AESA's full electronic warfare capability to later software builds and plans to test this capability in SCS H12.
- weapons system is operationally effective and suitable for some threat environments. However, as noted in previous DOT&E classified reports, there are current, more stressing threat environments in which the F/A-18 remains not operationally effective.
- The EA-18G Growler remains operationally effective and suitable subject to the same threat environment limitations as the E/F. SCS H8E testing indicates that geolocation accuracy and timeliness has improved since the H6E testing, but timeliness with the jammers off still has room for improvement.
- SCS H8E testing did not include an end-to-end multi-AIM-120 missile shot. This Navy operational capability has not been demonstrated previously in a successful test. The Navy tentatively plans to conduct a multi-missile shot as part of SCS H12 testing.

## Assessment

- SCS H8E demonstrated incremental improvements in capability in Phase I. APG-79 reliability improved during both Phases I and II testing compared to previous operational tests and provides improved performance compared to the legacy APG-73 radar employed on earlier F/A-18 aircraft. Nonetheless, key deficiencies in operational performance remain to be addressed.
- While the AESA radar demonstrated improved reliability, radar software instability resulted in failure to meet reliability and BIT performance requirements.
- The Navy has begun to address long-standing deficiencies in air warfare during H8E. The F/A-18E/F Super Hornet

## Recommendations

- Status of Previous Recommendations. The Navy has made progress on addressing FY13 recommendations to continue to improve the reliability and BIT functionality of the APG-79 radar, but that recommendation remains valid. Additionally, recommendations to conduct an operationally representative end-to-end missile test to demonstrate APG-79 radar and system software support for a multiple AIM-120 missile engagement and to develop and characterize the full electronic warfare capability of the APG-79 radar remain unchanged.
- FY14 Recommendations. None.