DDG-51 Destroyer Including AN/SPY-1D Radar and AN/SQQ-89 Integrated Surface Ship Anti-Submarine Warfare Combat System

SUMMARY

- DDG 51 Flight I, II, and IIA are operationally effective in the open ocean, blue water environment – their designed operating environment.
- Flight I and II are operationally suitable. Navy operational testers found Flight IIA degraded in maintainability, compatibility, interoperability, and safety.
- DDG 51 is less effective and at greater risk in littoral areas, where it may encounter asymmetric threats.
- DDG 51 has not had an effective mine detection capability. However, DDGs 91-96 will receive the Remote Minehunting System (RMS). RMS formal operational test will occur in FY05.

The DDG 51 Destroyer uses the AEGIS Weapon System and can conduct simultaneous offensive and defensive operations.

SYSTEM DESCRIPTION AND MISSION

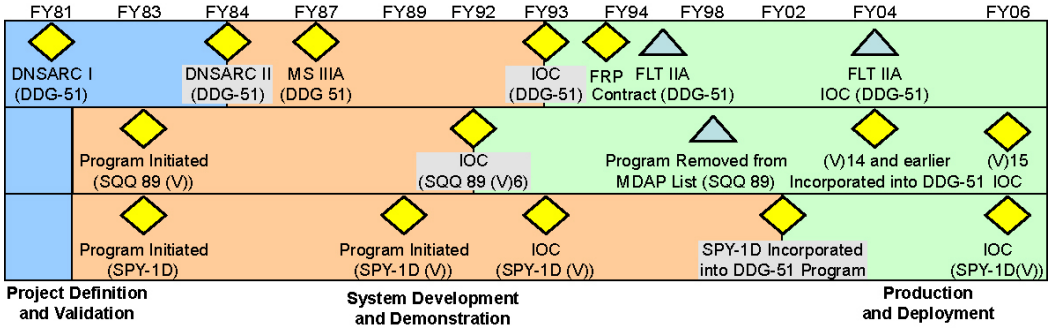
The DDG 51 Destroyer program provides replacement ships for earlier classes of surface combatants at the end of their service life. It is a multi-mission warship designed to conduct simultaneous offensive and defensive warfare operations in a variety of environments. It can operate independently or in support of carrier or expeditionary strike groups, surface action groups, intelligence gathering or Joint/Allied force operations. The Navy is building the destroyers in increments, called flights, in order to incorporate technological advancements and other changes during construction. Prior year reports described Flight I (DDG 51-71) and Flight II (DDG 72-78) configurations. Flight IIA ships (DDG 79-112) are currently undergoing operational test and evaluation as part of the DDG-51 follow-on test program. Periodic updates to AEGIS software improve system performance. DDGs have one of three software baselines: Baseline 5 (DDG 51-78), Baseline 6 (DDG 79-90), or Baseline 7 (DDG 91-112). All Baseline 5 ships will eventually receive Baseline 5.3.8. A major effort to replace outdated military computing systems with modern commercial hardware and software began with AEGIS Baseline 6 Phase I. Baseline 6 Phase III (DDG 85-90) introduces Cooperative Engagement Capability (CEC) and the Evolved Seasparrow Missile (ESSM). Baseline 7 will complete the planned commercialization of the AEGIS Weapon System (AWS) computing plant.

The AWS, which includes the SPY-1D radar and Standard Missile (SM)-2 surface-to-air missiles, provides the ship's air defense capability. ESSM (and/or the Phalanx close-in weapon system when fitted), SM-2 missiles, countermeasures, and the 5-inch gun provide defense against aircraft and anti-ship missiles. The SPY-1D radar system is a multi-function, phased array, three-dimensional (range, altitude, and azimuth) radar that conducts search, automatic detection, and tracking of air and surface targets. AN/SPY-1D (V), a new variant under development for installation in Baseline 7 Phase I ships, is intended to improve performance against targets in clutter and provide an enhanced capability against electronic attack.

For undersea warfare (USW), DDG 51 uses the AN/SQQ-89 USW combat system, up to two embarked Light Airborne Multi-Purpose System (LAMPS) Mark III helicopters, torpedoes, and vertically launched USW standoff weapons. Surface warfare weapons include the 5-inch gun and the helicopters armed with Hellfire missiles. Tomahawk missiles and the 5-inch gun engage land-based targets. Links 4A, 11, and 16 provide connectivity to other Navy, Joint, and Coalition forces.

The AN/SQQ-89(V) series of USW combat systems links acoustic sensors and weapon control systems with advanced data processing and information displays. The AN/SQQ-89(V) 6 is the baseline system for ships with a towed array. The different DDG Flights have various versions of this system installed. Other combatants also use this system. It integrates the AN/SQS-53 series hull mounted sonar, the AN/SQR-19(V) towed array sonar, and the AN/SQQ-28(V) LAMPS Mark III shipboard electronics with the Mark 116 USW Control System. In Flight IIA ships, the USW suite does not include the towed array sonar.

TEST AND EVALUATION ACTIVITY



DOT&E participated in test and evaluation working groups involved in planning Operational Tests (OT)-IIIG and OT-IIIH. OT-IIIG will test Baseline 6 Phase III ships equipped with SPY-1D radars and the SQQ89 (V)14 undersea warfare system. The test began in mid FY04 and will continue into FY05. OT-IIIH will test Baseline 7 Phase I ships with the SPY-1D (V) radar and the SQQ89 (V)15 system. The test will occur in FY05. DOT&E also participated in Test and Evaluation Master Plan revisions for DDG 51and AN/SPY-1D (V).

Navy testers conducted an operational assessment of the SPY-1D (V) radar in February 2004 at the Navy's Combat System Engineering Development Site in Moorestown, New Jersey. They also conducted a Maintenance Demonstration in May 2004 on USS *Mason* (DDG 87), as part of OT-IIIG. DOT&E staff observed the test activities.

Navy testers conducted an interoperability test on USS *Mason* during a Joint Exercise with the USS *John F. Kennedy* Strike Group. The test was a developmental test, but was observed by the Navy's Operational Test Force. Evaluation of test data is in progress and will be included in the OT-IIIG report.

TEST AND EVALUATION ASSESSMENT

Computer software problems with the AWS Baseline 6 Phase 3 program delayed the OT-IIIG test. As reported, portions of the test are complete and the final phase, a war at sea scenario, is scheduled for November 2004. Results will be in next years report.

The SPY-1D(V) assessment of the February 2004 test indicated that software reliability and maintainability were below threshold and, along with interoperability, are areas of significant risk for this program.

As reported last year, DDG 51 is operationally effective in an open ocean, blue-water environment – its designed operating environment. However, it is less effective and at greater risk in littoral areas, where it may encounter asymmetric threats. Flight I and II ships are operationally suitable, but maintainability, compatibility, interoperability, and safety deficiencies degrade the operational suitability of Flight IIA variants. The anti-submarine warfare testing at the Atlantic Undersea Test and Evaluation Center (AUTEC) highlighted the problems created by the recent closing of the Atlantic Fleet Weapons Training Facility. The restricted size, unusual bathymetry, and limited shipping traffic make AUTEC an unrealistic site for operational testing. As the Navy continues to emphasize shallow water operations, the lack of an appropriate littoral test site will become a serious limitation.