DDG 51 Program

Surface Navy Association
Washington, DC – 13 January 2015

“Distributed Lethality
Going on the Offense”

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Agenda

• DDG 51 Shipbuilding Profile

• DDG 113-118 Status

• Flight III Major Events

• Flight III Core IAMD Changes

• Flight III Electric Plant Architecture

• Dynamic Modeling Analysis (DMA)

• Summary
DDG 113 (HII)
- Launch scheduled for 17 Apr 15
- ALO scheduled for 10 Aug 15

DDG 114 (HII)
- Lay Keel completed 12 Sep 14
- Launch scheduled for 2 Oct 15

DDG 117 (HII)
- Start Fab completed 30 Sep 14
- Lay Keel scheduled for 10 Aug 15

DDG 115 (BIW)
- Lay Keel completed 19 Oct 14
- Launch scheduled for 19 Jul 15

DDG 116 (BIW)
- Lay Keel scheduled for 30 Aug 15
- Launch scheduled for 17 Jul 16

DDG 118 (BIW)
- Lay Keel scheduled for 12 Feb 17
DDG 113 Deckhouse Lift
Flight III Major Events

- Gate 4 / 5 & CSB conducted 5 Mar 14; approved Core Flight III ECPs
- USD (AT&L) ADM issued 19 Jun 14 to allow release of RFPs for Flight III Detail Design development
- Flight III CDD validated by JROC on 28 Oct 14
- Flight III Preliminary Design completed October 2014
- Flight III Detail Design Initiated December 2014
- Flight III PDR Scheduled for July 2015
Flight III Core Changes

- **Full Load Displacement Enhancement System (FLODES)**
- **AC Plant**
  - 5 x 300 Ton HES-C AC Plants Replacing 5 x 200 Ton AC Plants
- **Electric Plant**
  - 3 x 4MW, 4160 VAC SSGTGs replacing 3 x 3MW, 450 VAC SSGTGs
  - Add transformers, PCM, modified switchgear
  - Modified controls for MCS and MFMs
- **Enclosures**
  - Added starboard enclosures and stacked boats
- **AMDR-S SPY+15dB**
  - 14.1 ft x 13.6 ft x 5 ft Array Structure
  - Replaces AN/SPY-1D(V)
- **Increased Innerbottom Scantlings**
- **Heptafluoropropane (HFP)**
  - HFP in Gas Turbine Modules & Flammable Liquid Storerooms

Habitability Changes and roll-down impacts to incorporate AMDR-S and equipment
Electric Plant Architecture

4160 VAC Power Generation

1000 VDC Power Conversion in PCM for AMDR Arrays

4160/450VAC Step Down Transformer for Legacy ZEDS Distribution

DISTRIBUTION STATEMENT A:
Approved for public release, distribution is unlimited.
Electric Plant Dynamic Modeling Analysis (DMA)  
Study Objectives

✓ Transient Analysis  
– Deliberate and unplanned electrical events simulated which lead to transient disturbances of the power system  
– Verified continued operation of the power system within the required ranges during and after such events

✓ Power Quality Analysis– Harmonic issues  
– Simulation of the operation of AMDR power conversion modules (PCMs) related to harmonic content  
– Verified the harmonic content of the AMDR does not detrimentally impact other ship loads connected to the power system

• Continuity Analysis– Fault events  
– Simulated likely fault events seen shipboard  
– Additional runs based on updated data and fault protection incorporation from the transient analysis  
– Objective is to verify that the protection system can isolate faulted portions of the electrical system allowing sustained operation of ship systems during such events.

• Survivability Analysis– Multiple faults simulating battle damage and cascading casualties  
– Simulation of multiple fault event and equipment failures typical of battle damage  
– The objective is to determine whether or not critical ship systems can sustain operation after sustaining combat damage

The Objective of the DMA is to establish initial values for equipment procurement and to buy down integration risk
Turning Point in the War in the Pacific

The Battle of Midway, fought over and near the tiny U.S. mid-Pacific base at Midway atoll, represents the turning point in the war in the Pacific. Prior to this action, Japan possessed general naval superiority over the United States and could usually choose where and when to attack. After Midway, the two opposing fleets were essentially equals, and the United States soon took the offensive.

"AMDR will meet the growing Ballistic Missile threat by improving radar sensitivity and enabling longer range detection. Is on track for installation on the second FY 2016 DDG 51 hull...The Flight III design is on track to have adequate space, weight, power, and cooling service life margins."

Assistant Secretary of the Navy, Research, Development and Acquisition – The Honorable Sean Stackley, HASC Testimony, March 26, 2014
World War II Progression

President Truman declares VJ Day, September 2, 1945
Flight III Design Progression

- USD (AT&L) ADM Issued
- Flight III Detail Design RFPs Released
- Gate 4/5 & Configuration Steering Board
- Flight III ECPs Approved
- Award Contract for AMDR S-Band
- AMDR Vendor Selected
- Flight III, Gate 3 R3B
- DDG 51 Flight III Approved
- Flight Upgrade Study, Year 2
- DDG 51 Flight III Defined
- MAMDJF Gate 2 Review/R3B
- DDG 51 Flight III Selected
- Radar Hull Study
- Evaluate IAMD on DDG 51/DDG 1000

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World War II / Flight III Progression

President Truman declares VJ Day (September 2, 1945)

Detail Design Initiated

ECP Contract Award
FY16

Complete ARDEL Testing
FY17

Commence LBES Testing
FY18

AMDR Ship Set #1 Delivery
FY20

AEGIS Lightoff
FY20

Sea Trials
FY21

Initial Operational Capability
FY23

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Summary

• 14 DDG 51 Restart Ships under Contract (DDG 113-126)
• DDG 113-118 currently in construction
• Flight III Detail Design initiated
• Flight III planned for introduction on one of the FY16 Ships with an IOC in FY23