

## LHA 6 New Amphibious Assault Ship (formerly LHA(R))

### Executive Summary

- In FY17, the Navy completed a multi-phased IOT&E focused on LHA 6's ability to support amphibious warfare (AMW) operations, ship self-defense (including cybersecurity), mobility, and supporting characteristics. LHA 6 deployed in July 2017 with a Marine Expeditionary Unit (MEU) Aviation Combat Element (ACE) that includes AV-8B Harrier aircraft. The Navy will not complete the operational evaluation of the ship's ability to support a complement of 20 F-35B Joint Strike Fighter (JSF) aircraft until FY20.
- The Navy and Marine Corps conducted the OT-C4 phase of IOT&E, which focused on the AMW mission, in conjunction with scheduled pre-deployment fleet exercises as a substitute for a dedicated IOT&E period.
- The Navy and Marine Corps demonstrated the ability to land, service, and launch all required aircraft on LHA 6. The ship conducted an F-35B developmental test event that demonstrated the ship's ability to support landings and take-offs. However, the Navy and Marine Corps have not conducted a multi-day amphibious operation sufficient to assess the ship's ability to support all required AMW mission activities.
- The Navy conducted the OT-C3 phase of IOT&E. This phase included tests of the gun weapon systems against small boat raids and low slow flying unmanned aerial vehicles (UAVs) and a demonstration of the chemical warfare detection, protection, and recovery system. The results of the gun system tests are classified. The chemical warfare agent dispersion was not conducted in accordance with the DOT&E-approved test plan.
- In February 2017, the Navy conducted the second part of LHA 6 IOT&E phase OT-C5, the Adversarial Assessment (AA), which evaluated LHA 6 cybersecurity. The results of the testing are classified. This assessment was limited to 7 of 83 networked systems onboard, and excluded the hull, mechanical, and electrical (HM&E) systems and the Navigation Sensor System Interface (NAVSSI). The testing identified deficiencies that could adversely affect operational effectiveness in a cyber-contested environment.
- The Navy completed the Total Ship Survivability Trial (TSST) in April 2017 to assess damage effects and the crew's ability to recover the ship after an operationally representative weapon engagement. The trial was executed with the ship configured for combat, including a standard MEU ACE. While crew recovered the ship following the simulated casualty, significant personnel casualties were expected for the threats evaluated. The TSST also showed that the ability to maintain certain mission capabilities was degraded.
- DOT&E published a classified Early Fielding Report in November 2017 detailing early observations from the IOT&E and LFT&E of LHA 6. DOT&E will provide a full evaluation



of LHA 6's effectiveness, suitability, and survivability after all data are received from the Navy and the ship self-defense testing is completed.

### System

- LHA 6 is the lead ship of this new class of large-deck amphibious assault ships designed to support a notional mix of MEU ACE fixed- and rotary-wing aircraft consisting of 12 MV-22 Ospreys, 6 F-35B JSFs (Short Take-Off/Vertical Landing (STOVL) variant), 4 CH-53Es, 7 AH-1s/UH-1s, and 2 Navy MH-60 Search and Rescue aircraft, or an alternate loadout of 20 F-35Bs and 2 MH-60 Search and Rescue aircraft. Key ship features and systems include the following:
  - A greater aviation storage capacity and an increase in the size of the hangar bay to accommodate the enhanced aviation maintenance requirements for the MEU ACE with embarked F-35B and MV-22. Additionally, two maintenance areas with high-overhead clearance have been incorporated in the hangar bay to accommodate maintenance on MV-22s in the spread configuration (wing spread, nacelles vertical, and rotors spread).
  - The ship does not have a well deck. Aviation assets must be used to transfer personnel and equipment to and from the beach.
  - Shipboard medical spaces were reduced in size by approximately two thirds compared to contemporary LHDs to accommodate the expanded hangar bay.
- The LHA 6 combat system used for defense against air threats and small surface threat craft includes the following major components:
  - The Ship Self-Defense System (SSDS) MK 2 Mod 4B supporting the integration and control of most other combat system elements
  - The AN/SPS-48E and AN/SPS-49A air search radars and the AN/SPQ-9B horizon search radar

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- USG-2 Cooperative Engagement Capability real-time sensor netting system
- The Rolling Airframe Missile and the Evolved Seasparrow Missile (ESSM), with the NATO Seasparrow MK 9 Track Illuminators
- The AN/SLQ-32B(V)2 electronic warfare system with the Nulka electronic decoy-equipped MK 53 Decoy Launching System
- The Phalanx Close-In Weapon System Block 1B and the MK 38 Mod 2 Gun Weapon System
- Two marine gas turbine engines, two electric auxiliary propulsion motors, and two controllable pitch propellers provide propulsion. Six ship service diesel generators provide electric power.
- Command, control, communications, computers, and intelligence (C4I) facilities and equipment support Marine Corps Landing Force operations. The Navy will not install the Consolidated Afloat Networks and Enterprise Services (CANES) on the LHA 6 before FY22, but the LHA 7 design and beyond will deploy with CANES incorporated.
- To reduce vulnerability and enhance recoverability following threat impact, the ship has the following survivability features:
  - Improved ballistic protection for magazines and other vital spaces as well as the inclusion of some shock hardened systems/components
  - Various installed and portable damage control, firefighting, and dewatering systems
- The Navy will introduce a Flight 1 variant of the LHA(R) program with the third ship, LHA 8. It will gain a well deck for deploying surface connectors to move troops and equipment ashore, a modified flight deck, and smaller island intended to enable an aviation support capability similar to LHA 6.

## Mission

The Joint Maritime Component Commander will employ LHA 6 to:

- Serve as the primary aviation platform within an Amphibious Ready Group providing space and accommodations for Marine Corps vehicles, cargo, ammunition, and more than 1,600 troops
- Serve as an afloat headquarters for an MEU, Amphibious Squadron, or other Joint Force commands using its C4I facilities and equipment to provide mission support
- Accommodate elements of a Marine Expeditionary Brigade when part of a larger amphibious task force
- Carry and discharge combat service support elements and cargo to sustain the landing force

## Major Contractor

Huntington Ingalls Industries, Ingalls Shipbuilding Division – Pascagoula, Mississippi

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## Activity

- DOT&E published a classified Early Fielding Report in November 2017 detailing early observations from the IOT&E and LFT&E of LHA 6. DOT&E will provide a full evaluation of LHA 6's effectiveness, suitability, and survivability after all data are received from the Navy and the ship self-defense testing is completed.
- The Navy conducted LHA 6 IOT&E phase OT-C3 in January 2017. This phase included tests of the gun systems against small boat raids and low slow flying UAVs, and a demonstration of the chemical warfare detection, protection, and recovery system. The results of the gun system tests are classified.
- The Navy and Marine Corps Operational Test Agencies (OTAs) completed LHA 6 IOT&E phase OT-C4 – the AMW phase – in conjunction with three separate fleet training/certification exercises: Amphibious Squadron/MEU Integration Training (PMINT), Composite Training Unit Exercise, and Certification Exercise. These tests were conducted from April 3-14, May 1-17, and June 1-14, 2017, respectively.
- The Navy executed the TSST from March 29 to April 2, 2017, prior to the start of PMINT. The trial was executed with the ship configured for combat, including an MEU ACE. This event provided data to assess the ship's ability to recover and evacuate personnel from affected areas of the ship following damage from a threat weapon.
- To support the self-defense evaluation, the Navy's Operational Test and Evaluation Force (OPTEVFOR) began the Probability of Raid Annihilation (PRA) Modeling and Simulation (M&S) test bed phase of IOT&E in March 2017. Completion of this test phase is expected in December 2017.
- The Navy conducted the LHA 6 cybersecurity testing AA from February 20-24, 2017. The results of these tests are classified. OPTEVFOR conducted testing on 7 of 83 networked systems due to limited tester availability and did not perform testing on HM&E systems due to equipment safety concerns. The Navy did not permit any hands-on manipulation of HM&E or NAVSSI systems; instead, they intend to develop a stand-alone high-fidelity testing environment to allow evaluation of similar systems in a representative environment without the risk of corrupting installed shipboard systems.
- The Navy conducted all testing in accordance with the DOT&E-approved test plan, with the following exceptions:
  - In the OT-C3 phase of IOT&E, the Navy did not conduct the simulated chemical agent deployment in accordance with the DOT&E-approved test plan, as it was unable to certify a helicopter-borne sprayer in time for the testing. The method of agent dispersion was inadequate to meet

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several goals of the test, and the test should be conducted in FOT&E in accordance with the approved test plan to obtain the required information.

- Because the OTAs were not in charge of executing the pre-deployment exercises, the AMW phase of the LHA 6 IOT&E did not result in the movements of personnel, vehicle, and cargo outlined in the DOT&E-approved test plan.
- The Navy is developing an LHA(R) Test and Evaluation Master Plan (TEMP) Revision B to address design modifications to LHA 8, including the addition of the well deck and changes to the flight deck, the island configuration, the combat system, medical spaces, fuel tanks, and supporting spaces. The impacts of evolutionary changes of Marine Corps aircraft, surface connectors, and vehicles will also be considered.
- The Navy does not intend to conduct the Advanced Mine Simulation System (AMISS) trial, which would be used to characterize the mine susceptibility of the LHA 6, as agreed to in the DOT&E-approved TEMP Revision A. To date, the Navy has not presented a valid alternative to conducting the AMISS trial.

## Assessment

- LHA 6 demonstrated the ability to support AMW mission tasks: load and unload cargo and vehicles from aircraft, launch and recover aircraft, and muster and load marines. However, the movement of marines, cargo, and vehicles during testing failed to generate the operational tempo (OPTEMPO) required by the OTAs for an adequate operational test. Early analysis indicates limited aircraft availability may have been a factor in the OPTEMPO during pre-deployment exercises, but analysis is still ongoing. If the Navy and Marine Corps desire to combine pre-deployment exercises with IOT&E for future amphibious ship programs, this shortcoming must be mitigated.
- The Navy and Marine Corps demonstrated the ability to land, service, and launch all required aircraft on LHA 6, including MV-22, AV-8B, CH-53E, AH-1, UH-1, and H-60.
- Developmental testing of the F-35B, executed from October to November 2016, shows that LHA 6 supports the conduct of

take-offs and landings of STOVL aircraft. Operational testing of the F-35B onboard LHA 6 is currently scheduled for FY20.

- LHA 6 cybersecurity testing identified deficiencies that could adversely affect operational mission effectiveness in a cyber-contested environment.
- The Navy has proposed an M&S-based approach to characterizing the mine susceptibility of LHA 6 in lieu of executing the AMISS trial. DOT&E does not agree that this approach is adequate.
- The TSST demonstrated that ship recoverability design features would likely enable the ship crew to mitigate the damage spread and adequately recover the ship if hit by the threat weapons assessed as part of this trial. In some trial scenarios, numerous personnel casualties were expected because of the challenges associated with moving large numbers of people through restricted internal egress points. Some of the ship's vital systems were degraded or lost because of predicted damage to support systems including chilled water, electrical power, potable water, and compressed air. The Navy is assessing the resulting degradation of mission capability, and will provide these results in a future TSST and survivability assessment report.

## Recommendations

- Status of Previous Recommendations. While the Navy addressed some of the previous recommendations, it has:
  1. Neither planned nor resourced the mine susceptibility trial for the LHA 6 using the AMISS.
  2. Not yet conducted cybersecurity testing of HM&E and navigation systems in a laboratory.
- FY17 Recommendations. The Navy should:
  1. Plan to conduct adequate chemical detection testing in FOT&E.
  2. Not repeat the LHA 6 AMW IOT&E execution. For future amphibious ship test programs in which the Navy desires to combine IOT&E with fleet pre-deployment exercises, organize a subset of days in which OTAs have control over mission planning, mission execution, and data collection to ensure execution of an adequate AMW IOT&E.

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