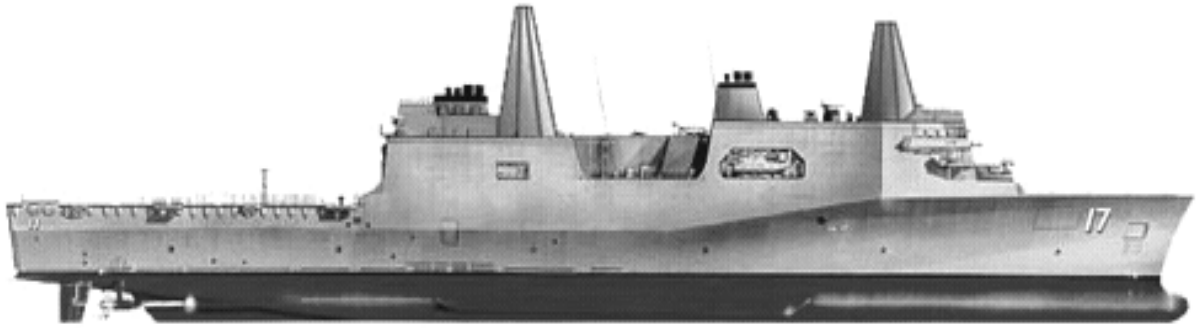
LPD 17 AMPHIBIOUS TRANSPORT DOCK SHIP



Navy ACAT ID Program

Total Number of Systems:	11
Total Program Cost (TY$):	$9.936B
Average Unit Cost (TY$):	$836M
Full-rate production:	3QFY08

Prime Contractor

Litton-Avondale Industries Corp

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

The USS San Antonio (LPD 17) class will be diesel-powered amphibious assault ships capable of transiting through the Panama Canal. It will transport and deploy the combat and support elements of Marine Expeditionary Units and Brigades as a key component of amphibious task forces. LPD 17 will be capable of transporting and debarking forces by surface assault craft, including current and Advanced Assault Amphibious Vehicles, air-cushioned landing craft (LCAC), conventional landing craft, as well as helicopters and MV-22s, contributing to ***dominant maneuver, precision engagement***, and ***focused logistics***. A large flight deck will enable the aerial transport of troops and equipment, and a floodable well deck will permit operation of LCAC, conventional landing craft, and amphibious assault vehicles. Storage and offload capabilities will be incorporated for all classes of supplies, including fuel, ammunition, and food for amphibious forces ashore. Ship spaces will be configured for amphibious craft logistic support and limited aviation maintenance and refuel/rearm servicing on the flight deck.

Self-defense capabilities of the LPD 17 will include a Cooperative Engagement Capability (CEC) with other task force vessels, plus the Mk 2 variant of the Ship Self-Defense System (SSDS) (under development), Rolling Airframe Missile (RAM), and the Nulka decoy system to provide own-ship defense against Anti-Ship Cruise Missiles (ASCMs). Two Mk 46 gun systems that are currently being developed separately by the Marine Corps for use on their AAAV will provide defense against surface threats. Installed command, control, communications, computer and intelligence (C4I) systems will interoperate through a modern Ship Wide Area Network (SWAN).

With the exception of the flag capability provided in LPDs, the over-the-side heavy lift capability of the LKAs, and Amphibious Assault Bulk Fuel System and over-the beach/deployment of causeways (current LST capabilities), LPD 17 is being designed to replace several classes of aging amphibious ships, including the LKA, LPD 4, LSD 36, and LST 1179-class ships. Furthermore, with minor exceptions, the LPD 17 will be required to perform the functions of the four classes it will replace, with special emphasis on the capabilities of the LPD 4 Class including the aviation requirements, enhanced

communications, and simultaneous or sequential, combined and coordinated, air and surface launched amphibious assaults from over-the-horizon.

BACKGROUND INFORMATION

As the first major ship design program initiated under the revised DoD acquisition regulations, LPD 17 completed a Milestone II review in June 1996. The Commander, Operational Test and Evaluation Force (COMOPTEVFOR) conducted Early Operational Assessments (EOAs) (OT-IA and OT-IB) in FY95 and FY96, respectively. Design deficiencies identified during these EOAs included compatibility with night vision devices, self-defense systems performance, joint planning capability, design and equipment shortfalls in electronic warfare and intelligence facilities, and chemical biological, radiation (CBR) defense capabilities.

OSD approved the Test and Evaluation Master Plan (TEMP) in May 1996. An updated TEMP was approved by OSD in February 2000. The TEMP is currently being revised to describe better the OT-IIB and to address how the ship's self-defense capabilities will be tested and evaluated; this update is expected in February 2001.

The LPD17 Test Team received an award for Outstanding Contributions in Support of Success of Acquisition Reform in the Department of the Navy from ASN RD&A and Department of the Navy Acquisition Reform Office.

TEST & EVALUATION ACTIVITY

A third operational assessment, OT-IIA, began in June 1999 and was completed in November 2000. The OT-IIA was conducted as a series of evaluations of the ship's detail design. The assessment report is in final stages of preparation. Issues identified during those evaluations are reflected below. Like the preceding OT-IB, OT-IIA was performed by a large group of fleet experts in various disciplines associated with amphibious warfare, organized under the leadership of COMOPTEVFOR.

As part of the TEMP approval process, the Navy was required to develop a strategy to evaluate the LPD 17's required Probability of Raid Annihilation (P_{RA}) against Anti-Ship Cruise Missiles (ASCMs). DOT&E participated as a member of the P_{RA} Strategy Senior Leadership Team, providing oversight for the development of the strategy; and will oversee the execution of the strategy. While details for the strategy, including execution, continue to be developed, the technical approach provided by this group appears sound and technically achievable. At this time, funding to execute this strategy has been requested but not received by the service.

The current LFT&E Strategy was approved by OSD in the February 2000 TEMP Update. A waiver from Full-Up, System-Level (FUSL) testing was granted and an alternative LFT&E plan, submitted in lieu of full-up, system-level testing, was approved by OSD in June 1996. The LPD 17 LFT&E program consists of a combination of surrogate tests, component and system tests, a Shock Trial, a Total Ship Survivability Trial, and analyses and modeling. Results of these tests and analyses are being reported in a series of Vulnerability Assessment Reports (VARs) at the end of various stages of ship design and construction. The VAR, based on the Detail Design, is now in early stages of development. The Navy plans to conduct a Full Ship Shock Trial (FSST) on the lead ship in FY05. Subsequent FSST may occur on a follow ship as the objective version of LPD 17 put to sea later in the production cycle. DOT&E has concern about funding for the FSST. PMS 317, the Acquisition Program Manager,

requested $25.3 million in additional RDT&E funding in the FY02 POM to cover increased costs estimates for FSST. The request was denied. DOT&E perceives a pattern within the Navy to eliminate funding for FSST. Such action occurred on SSN 21, DDG 51 Flight IIA, and now on LPD 17. The Navy Comptroller restored funding to DDG 51 Flight IIA after DOT&E took action and after the USS COLE terrorist attack. DOT&E believes that the FSST is absolutely essential to understand the vulnerability issues for United States Ships that go into harm's way. The FSST is the only controlled test event against a full ship that approximates a realistic attack.

The overall ship design and construction schedule has been delayed 10 months due to the shipbuilder's lack of readiness to begin construction. This delay will permit missile/mine/torpedo encounter susceptibility studies to provide more credible hit distributions for LFT&E and missile encounter data for P_{RA} analysis, but potentially at the expense of the Detail Design vulnerability assessment effort.

TEST & EVALUATION ASSESSMENT

For the LPD 17, the most significant T&E challenge will be assessing the ship's self-defense capability against ASCMs. Cost, target availability, and safety concerns limit what can be realistically accomplished on the ship. In addition, concerns still remain about the ship's lack of a layered hard-kill system and its capability to detect/track/engage effectively some classes of ASCMs.

Although results from concurrent SSDS Mk 1/RAM tests aboard the Navy's current Self-Defense Test Ship (SDTS) against representative targets have alleviated some prior concerns about RAM performance, this testing exposed previously unknown problems in overall, end-to-end combat system performance. Importantly, major deficiencies with the SSDS Mk 1 combat system were not uncovered until testing aboard the SDTS against realistic targets/engagement geometries. We expect that this will also be the case with the LPD 17's SSDS Mk 2-based combat system. The LPD 17's combat system is fundamentally different from the combat system tested aboard the current SDTS, including different sensors and weapon systems. It has been the integration of these systems that has been both challenging and difficult to test/evaluate without the use of the SDTS. Consequently, the Navy must resource the installation of the LPD 17 combat system aboard an SDTS-comparable platform to validate the modeling, which will evaluate the ship's P_{RA} capability. The SSDS testing on the SDTS will be key to proving out the overall effectiveness of Combat System Performance.

The required test and evaluation for other warfare areas (for example, defense against surface threats) also need to be described in the next TEMP update; the approach is expected to be developed through the T&E-IPT process. While the LPD 17 is equipped with the SLQ-25A NIXIE system for torpedo defense, which is the only system available for use on ships, DOT&E is concerned with the adequacy of this system to provide defense against torpedo attack. Structural enhancements have been incorporated into LPD 17's hull design to improve its resistance to the effects of hull whipping from underwater weapons.

The OT-IIA provided examples of key insights into design deficiencies, which affect operational effectiveness and suitability. Some had been identified in previously conducted EOAs and operational assessments, including compatibility with night vision devices, self-defense systems performance, joint planning capability, design and equipment shortfalls in electronic warfare and intelligence facilities, and chemical biological, radiation (CBR) defense capabilities. The following design deficiencies will affect operational effectiveness and suitability and still need to be resolved:

1. The LPD 17 design still does not fully support night operations because of a lack of NVD-compatible lighting and displays. Areas that are affected include the well deck, flight deck, and some control spaces. The LPD 17 ORD requires the ship to have a capability to conduct aviation Night Vision device operations consistent with the Navy's program. As noted in a message sent from the Commander, Second Fleet to the Chief of Naval Operations, the fleet is currently back fitting existing amphibious ships with NVD modifications; new amphibious ships should be NVD-compatible when acquired. The Operational Commanders have since forwarded a Mission Needs Statement (MNS) to OPNAV for approval.

2. Despite growing concerns about vulnerability to weapons of mass destruction, there are no provisions for chemical and biological agent detectors integrated into the ship's information system. In addition, reaching one of the primary decontamination stations requires contaminated personnel to travel within the skin of the ship for a considerable distance (outside the areas protected by the ship's collective protection system), thereby introducing contamination into the ship's passageways. Because of the likely presence of such items as electrical panels and hose reels, completely decontaminating these passageways afterward would be impossible. There appears to be no provisions for decontaminating aircraft, landing craft, and landing force equipment in the well deck or on the flight deck. Finally, there are critical omissions in the ship's CBR requirements. A tenet of chemical and biological warfare defense is to avoid contamination. This requires standoff detectors, but none are required in the Operational Requirement Document (ORD).

3. The LPD 17 has been designed to carry a substantial amount of cargo; however, there are no installed backup systems for the elevators that service two of the ship's three cargo and ammunition magazines (CAMs). CAMs #1 and #2 combined hold approximately 85 percent of the supplies carried aboard the ship. While neither the ORD nor OP-04 require a back-up elevator system, concern exists that CAM elevator systems should have a redundant capability. A failure to the single elevator that services CAM #1 and CAM #2 would make it impossible to unload ammunition and supplies from the CAMs. If the elevators fail in the middle of an amphibious assault, it might prove impossible to supply the landing force. This is particularly worrisome given the Marine Corps' intention to move to an approach called *Sea-Based Logistics*, in which stocks of ammunition and supplies are kept aboard ship and are brought ashore only when needed, instead of stockpiled ashore.

4. Interoperability with Navy and Marine Corps systems is essential and it is clear that the ship designers have given this area considerable attention. The OT-IIA identified some deficiencies, nonetheless.

    - Although the ship is required to support organizational-level maintenance for the MV-22, it might not be possible to replace a MV-22 engine. The only accessible hoist is in the hangar and the only way to put the MV-22 in the hangar is to stow the wings. Subsequent investigation revealed that manufacturer publications indicate that it may be possible for the MV-22 engine to be removed with the wings in a partially spread mode. This issue needs to be resolved.

    - There is uncertainty about the effect of MV-22's rotor wash on adjacent aircraft and personnel operating on or near the LPD 17's flight deck. Analyses continue to determine effects of downwash velocity profiles on ground personnel.

- As currently configured, the ship is unable to receive real-time information from theater/fleet or Navy/Marine Corps Unmanned Aerial Vehicles (UAV). Although not currently specified in the ORD as a requirement, the OT-IIA assessment team concluded that this capability was necessary. Likewise, the ship must be designed to launch, control, and recover Navy/Marine Corps tactical UAVs. The LPD 17 program has performed two R&D studies for the integration of an UAV system aboard LPD 17. At this time, installation of this capability is funded for the out-year ships, but is not completely funded for the entire class.

5. The ship's radio communication system design does not support the Enhanced Position Location Reporting System (EPLRS) Internet Protocol (IP) data connectivity for landing force C4I nor does the ship's C4I baseline include landing force C4I systems, which had been planned. However, the Digital Wideband Transmission System (DWTS), which is in the current LPD 17 design, can support tactical radio IP data connectivity with the forces established ashore. EPLRS data connectivity capability is scheduled to be included in LPD 17's Digital Modular Radio (DMR) by FY03. Although this will provide support of a force moving from ship-to-shore, additional work is required for other tactical communications links, such as UHF SATCOM. Furthermore, as currently designed, the ship's SIGINT configuration provides no capability to support collection and analysis and indications and warnings for force protection.

Detail Design has fallen behind schedule causing delay in vulnerability assessment work. Development of LFT&E modeling and simulation tools is late and the approach for the VV&A of models has not been defined. However, the Navy's approach for preparation of the Detail Design VAR provides confidence that this VAR will meet LFT&E objectives.

CONCLUSIONS AND LESSONS LEARNED

The series of Operational Assessments have been a valuable tool in validating the design approach in a number of key operational and mission related areas. The feedback provided by the assessment teams, which were largely comprised of operational users from the Navy and Marine Corps, resulted in enhancements to the ship prior to formal operational testing. Examples of these improvements included: addition of a portside JP-5 refueling capability, replacement of the 6K forklift with a 10K forklift, enhancements to C4I capability, expanded access to a cargo elevator, and improved crew messing facilities. Issues that the Navy has not addressed include: compatibility with night vision devices, self-defense systems performance, joint planning capability, design and equipment shortfalls in electronic warfare and intelligence facilities, and chemical biological, radiation (CBR) defense capabilities.

Prime T&E concern at this time is the assessment of P_{RA} and the development of a strategy that includes the acquisition and use of a suitable SDTS to aid in the validation of the models. The technical approach for this effort has been completed, but the strategy to integrate these findings into a comprehensive end-to-end air defense combat systems plan is still under development. The program office must schedule a phase of OT&E with the LPD 17 combat suite on the SDTS to collect validation data for the P_{RA} assessment approach. Furthermore, the Navy has recently initiated an effort to develop a service-wide P_{RA} capability.

The Milestone II vulnerability assessment revealed vulnerabilities in vital ship systems (e.g., the zonal electrical distribution system), and needs for improved troop evacuation procedures and well deck firefighting procedures. The Navy is taking corrective actions in these areas that will be evaluated further in the Detail Design vulnerability assessment. Based on lessons learned from LPD 17 LFT&E efforts to date, the Navy is promulgating firefighting lessons learned to the Fleet after review and approval by the Naval Sea Systems Command.