

LPD 17 Amphibious Ship (San Antonio Class)



USS San Antonio, LPD 17, is the first of nine ships in the class that is designed as an expeditionary warfare support platform. It serves as an operations base for elements of U.S. Marine expeditionary forces, including troops, helicopters, vertical takeoff and landing aircraft, expeditionary fighting vehicles, air-cushioned landing craft, and support equipment. LPD 17, 18 and 19 are now operational.

Benefits

- Improved habitability, optimized for the sailor and marine
- State-of-the-art weapon, self-defense, countermeasure, sensor and advanced electronic systems
- Adaptability to the latest technological advances
- Fully integrated, commercially-based information infrastructure
- Reduced crew size, resulting in lower operational costs

Raytheon, as the whole-life services provider to NAVSEA PMS 317 and subcontractor to Northrop Grumman Ship Systems, develops systems for this next-generation amphibious warship, providing the U.S. Navy-Marine Corps team with unprecedented expeditionary capability. As Mission Systems Integrator, Raytheon has broken new ground with its innovative approach of Total Ship System Integration.

Raytheon designed a Total Ship System Electronics Architecture that integrates 23 contractor-furnished electronics systems along with 26 government-furnished systems. The shipboard wide area network (SWAN) provides more than 1,000 data drops and is the fiber-optic backbone for 156 system-to-system interfaces.

The increased integration and automation found on LPD 17-class ships results in a significant reduction in the number of sailors required to operate and maintain the ship, lower lifecycle costs and increased payload for the U.S. Marine warfighters.

Advanced Electronic Systems
With LPD 17, Raytheon introduces the first ship that is built with a fully integrated data network system, the SWAN. The SWAN serves as the data backbone for the shipboard electronic systems. The SWAN is composed of commercial hardware and software components to take advantage of the advanced state of the computer systems marketplace. Components are enclosed in Raytheon-designed hardware systems to provide military-standard survivability levels in the face of shock,

vibration and extreme temperatures. The SWAN provides connectivity to a variety of mission-essential systems for shipboard operations and warfighting.

In a first for U.S. Navy shipbuilding, the Raytheon-designed systems are based on commercial products that take advantage of marketplace investment in electronics. The Integrated Ship Electronic System controls the engineering plant, rudder and speed, and it distributes navigation data to sensors and weapons through Raytheon's combat management system — the Ship Self-Defense System (SSDS) — and to the advanced degaussing system. The SWAN is designed to grow and adapt as technology evolves. Raytheon has developed a technology refresh plan to ensure the system maintains viability during the 40-year design-life of LPD 17.



Raytheon integrates communications equipment that is both more modern and more capable than that deployed on any other Navy ship. Voice communication is built around an ISDN-based telephone system designed specifically for the U.S. Navy. LPD 17 is the first U.S. Navy ship to deploy this state-of-the-art system, which provides fully integrated conferencing. The wire-free portable communications system is integrated with the administrative and tactical telephones and allows for voice communications with personnel as they move throughout the ship. This system is based on commercial land-mobile radio equipment similar to that used by police and firefighters, and it includes an antenna system that provides full ship-wide coverage for applications like engineering watch-standers and damage control, as well as for operations in the ship's well deck and on the flight deck.

In addition to these voice systems, LPD 17 has two video communications systems. A cable television network provides 110 channels of entertainment, training and surveillance video to the crew at locations throughout the ship. Also, the ship has a distribution system for command information that routes computer video (SXGA, 1280 x 1024) sourced from a number of key locations to displays located in 39 different locations. In addition to the computer-sourced video information, this system includes capabilities for distributing live briefings as well as any video from the CATV

network, shown on large screens via video projectors with high inherent resolution.

An advanced magnetic signature control system is a critical component of LPD 17 and protects the ship from magnetic-influenced mines. With state-of-the-art technology, more precise compensation is possible by utilizing a larger number of amplifiers and degaussing loops, along with real-time processing, ship navigation, motion and orientation data.

The Raytheon-developed Navigation Data Distribution System (NDDS) converts navigation and timing data into various analog and digital formats and distributes them to multiple end users, such as the ship's weapons, control systems and communication systems. The NDDS converts the data into the format a particular end user requires. The navigation and timing data comes to NDDS from the navigation sensor system interface via the SWAN. The data distributed by NDDS consists of wind direction and speed; ship's heading and speed; position information from GPS satellites; and water depth under the ship's keel, to name a few.

LPD 17 also features a training department that will employ a total ship training system to develop lesson plans, conduct training and document results. Dedicated training spaces include the Learning Resource Center and Electronic Classroom; even the ship's chapel has been designed to convert into a classroom. LPD 17 is designed to support Marine

training needs by providing space for an indoor simulated weapons range, as well as other weapons trainers in the well deck and vehicle stowage spaces.

Countermeasures

LPD 17 is equipped with systems to detect airborne threats and to electronically counter them through jamming or decoying. The ship's primary electronic warfare system is the Raytheon AN/SLQ-32(V)2 system, which provides surveillance, warning and electronic countermeasures against missile or air attacks. The ship is also fitted with the Nulka Decoy Launching System, MK 53 Mod 4, which incorporates four MK 137 Mod 7 and two MK 137 Mod 4 launchers to decoy detected missile threats. These launchers support the launching of a torch to deceive infrared-seeking missiles and super rapid blooming offboard chaff to deceive radio frequency-emitting missile/aircraft radars. This system features a broadband radio frequency emitter mounted atop a hovering rocket that radiates a large radar cross section signal while flying away from the ship, presenting a more attractive target to incoming anti-ship missiles. LPD 17 is further equipped with the Torpedo Countermeasures Transmitting Set, AN/SLQ-25A (NIXIE) decoy, towed behind the ship as a means of deceiving torpedoes.

Sensors

LPD 17 is equipped with the Northrop Grumman Ship Systems-produced Advanced Enclosed Mast/Sensor System

(AEM/S). AEM/S encapsulates sensors and communications antennae and is composed of a composite structure layered with a frequency-selective surface that only allows transmission of RF in the frequency ranges of installed equipment. The structure's shape minimizes radar cross section (RCS) and improves the performance of both sensors and the SSDS — a key advantage over the stick masts traditionally used, whose steel structure increases the ship's RCS signature.

LPD 17's primary radar for long-range detection of aircraft and missiles is the ITT Gilfillan AN/SPS-48E, a three-dimensional, long-range air-search radar. This radar is used for self-defense as well as detecting and tracking tactical aircraft and helicopters. The AN/SPQ-9B radar is primarily used to detect closer-range air threats flying at low altitudes and to target for Raytheon's Rolling Airframe Missile (RAM) Guided Missile Weapon System MK 31, Mod 1. This radar can also serve as a surface search radar for detecting small boat threats or tracking amphibious craft. Raytheon's AN/SPS-73 surface search radar serves as LPD 17's primary navigational radar.

LPD 17 Amphibious Ship Specifications

Length, Overall:	208.4 m	684 ft
Beam, Extreme:	31.9 m	105 ft
Displacement:	24,900 long tons	
Speed, Sustained:	22+ kts	

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