UNITED STATES MARINE CORPS
Logistics Operations School
Marine Corps Combat Service Support Schools
PSC BOX 20041
Camp Lejeune, North Carolina 28541-0041

CHARACTERISTICS OF AMPHIBIOUS SHIPS, LANDING CRAFT, AMPHIBIOUS VEHICLES AND USMC AIRCRAFT

STUDENT HANDOUT

D207

LEARNING OBJECTIVES:

a. **TERMINAL LEARNING OBJECTIVE**: Given ship loading characteristics pamphlet or stow plan, hydrostatic data, unit embarkation data, landing plan, ensure the equipment to be loaded complies with the characteristics of the ship (s), in accordance with the references. (0431.03.02.03)

b. **ENABLING LEARNING OBJECTIVE**:

1. Given ship loading characteristics pamphlet or stow plan, hydrostatic data, unit embarkation data, landing plan, identify the characteristics of Landing craft, in accordance with the references. (0431.03.02.03a)

2. Given ship loading characteristics pamphlet or stow plan, hydrostatic data, unit embarkation data, landing plan, identify the characteristics of Amphibious vehicles, in accordance with the references. (0431.03.02.03b)

3. Given ship loading characteristics pamphlet or stow plan, hydrostatic data, unit embarkation data, landing plan, identify the characteristics of Amphibious ships, in accordance with the references. (0431.03.02.03c)

4. Given ship loading characteristics pamphlet or stow plan, hydrostatic data, unit embarkation data, landing plan, identify the characteristics of USMC aircraft, without the aid of references. (0431.03.02.03d)

BODY:

1. **LANDING CRAFT**

The surface-borne elements of the landing force conduct the ship-to-shore movement by means of embarked landing craft. The landing craft are provided and operated by the Navy.

a. Landing Craft Mechanized-8 (LCM-8): The LCM-8's mission is to transport heavy loads, tanks and heavy equipment. It is 74 feet long and travels at speeds of 9 knots. The LCM-8 can carry 60 tons of cargo, 150 combat equipped troops. The cargo weight limitation is in place due to the inability of the craft's ramp to hold over 60 tons. The LCM-8 is owned and operated by the assault craft unit (ACU) and embarked in ships with well decks (i.e., LSD, LPD, LHA, and LHD).

b. Landing Craft Utility (LCU): The mission of the LCU is to land very heavy vehicles, equipment, and/or cargo on the beach in an amphibious assault. The LCU is the largest of the landing craft being approximately 135 feet long. It plays an important role in the landing of tanks, artillery and heavy equipment. The LCU is usually preloaded with vehicles and equipment and stowed in the well deck of amphibious ships. The LCU is owned and operated by the ACU like the LCM-8. The LCU is capable of carrying two M1 tanks, 180 tons of cargo or 400 troops at a max speed of 12 knots. Two or more LCUs can be married together to form a causeway by joining their bow ramps and stern gates. The number of LCUs available to the landing force commander may be limited due to their size and well deck space available to transport them. It has a galley, crew berthing, and head facilities.

c. Landing Craft Air Cushioned (LCAC)

(1) Overview: The LCAC is a new generation of amphibious assault landing craft. Combining the heavy lift capability of the surface assault with high speeds of helicopterborne assault, the LCAC adds a new dimension to the capabilities of amphibious forces. Capable of traveling over land and water, the LCAC exposes 70 percent of the world's shoreline to amphibious operations. At over-the-horizon (OTH) distances of 12 to 100 nm, the LCAC offers the military planner another method of attaining surprise when conducting amphibious operations.

(2) Characteristics and Capabilities: The LCAC is capable of carrying a 60-ton payload (up to 75 tons in an overload condition) at speeds over 40 knots. Fuel capacity is 5000 gallons, but the LCAC uses an average of 1000 gallons per hour. The LCAC is primarily designed to carry wheeled or tracked vehicles. Personnel transport is limited to 24 passengers in troop spaces or additional personnel embarked within hard backed vehicles (e.g., buttoned up in

tanks/AAVs). The LCAC will be transported to the objectivearea in amphibious ships.

(3) Deployment: Presently one squadron of LCACs are in service with ACU-5 at Camp Pendleton, CA, and one squadron of LCACs are in service with ACU-4 at NAB, Little Creek, VA. The total plan is for 84 LCACs in the two squadrons.

2. **AMPHIBIOUS VEHICLES**

a. Amphibious Assault Vehicle, Personnel (AAVP7): The AAVP7 is a full-tracked amphibious vehicle providing armor protected transportation for the landing force, their supporting equipment and supplies. This vehicle can operate from offshore ships, through rough water and plunging surf, across difficult beaches and inland. It is capable of extended cross-country travel over rough terrain and of high-speed operation on improved roads and highways.

b. Amphibious Assault Vehicle, Recovery (AAVR7): The AAVR7 is used for recovery of AAVs or similar size craft and vehicles from the open sea, surf, swamp, etc. They provide basic maintenance equipment for performance of 1st through 3d echelon maintenance and repair of the AAVP7 family of vehicles in the field.

c. Amphibious Assault Vehicle, Command (AAVC7): The AAVC7 is a armored, mobile command post. It provides communication with subordinate, adjacent and senior infantry, supporting arms, and logistical support elements during the ship-to-shore movement and subsequent operations ashore.

d. Lighter Amphibious Resupply Cargo 5-Ton (LARC V): The LARC V is employed as a salvage vehicle by beachmaster personnel of the Navy beach party. The LARC V is also employed by Army units as a cargo carrier during amphibious operations, river crossings and limited operations ashore. In addition to transporting cargo, or towing/pushing disabled landing craft, the LARC V can pump 250 gallons of water a minute for fire fighting or flood control. It is constructed of strengthened aluminum and has side panels which can be removed, enabling forklifts to unload palletized cargo.

3. **AMPHIBIOUS SHIPS**

a. Command Ship: The mission of the amphibious command ship (LCC) (Blue Ridge Class) is to serve as flagship and headquarters for the commander amphibious task force (CATF) and commander landing force (CLF). It is designed primarily to fulfill command and

control requirements of surface, subsurface, and air units engaged in amphibious operations.

The LCC can carry a landing force staff of 56 officers and 153 enlisted. This ship has a very limited cargo and vehicle stowage capacity. There is a helicopter platform located aft which can land one helicopter. Among the many sophisticated command and control facilities are two computer systems serviced by five separate computers.

One is used by the joint intelligence center (JIC); three are used for the naval tactical data system (NTDS) located in the supporting arms coordination center (SACC); and one, which is of particular interest to the landing force, is used to service the amphibious support information system (ASIS). ASIS is a generalized information storage and retrieval system developed as a user oriented support system to recover information, especially in targeting and logistics areas, to support an amphibious operation. Two are in service: LCC-19, USS Blue Ridge (Pacific) and LCC-20, USS Mount Whitney (Atlantic).

b. Transport Ships: These ships debark the landing force by means of landing craft, amphibious vehicles and helicopters. There are five types of transport ships. We'll talk about each of these ships in the order listed.

(1) Dock Landing Ship (LSD) (Anchorage and Whidbey Island Classes)

(a) Mission: The dock landing ship (LSD) transports personnel and equipment and lands them in assault areas by means of preloaded landing craft and/or amphibious vehicles carried in the ship's well deck, or by a means of landing craft and helicopters embarked on other ships. This ship also provides limited docking and repair service to small boats and craft, and can act as the primary control ship during the ship-to-shore movement.

(b) Capabilities: The LSD is a transport and not a landing ship as its name might imply. The distinctive feature of this ship is a well deck which extends three-fourths the length of the ship. The well deck can be flooded to enable landing craft and amphibious vehicles to swim out via a stern gate.

The Anchorage class LSD has the capacity to carry three LCUs, three LCACs, nine LCM-8s or 55 AAVs. A mezzanine deck can be installed in the Anchorage class LSD. When installed, it provides a series of ramps which lead from the well deck to the super deck. The ramps are removed when the mezzanine deck is not installed.

The Whidbey Island class (LSD-41) is newer and slightly larger than the Anchorage class. The LSD-41 has an additional landing spot, the capacity to billet 402 men and carry four LCACs or three LCUs. Furthermore it has a turntables to enable vehicles to drive down/up ramps and then be turned around into position. The LSD cargo variant (LSD-49) is now present among the Fleet Amphibious ships.This cargo variant ship has a shorter well deck and cargo storage areas that are similar to that of the LPD.

(2) Amphibious Transport Dock (LPD) (Austin Class)

(a) Mission: The amphibious transport dock (LPD) transports personnel and their equipment for amphibious operations and lands them in assault areas by means of embarked landing craft and amphibious vehicles augmented by helicopters.

(b) Capabilities: The LPD has the facilities to billet approximately 79 officers and 602 enlisted men. The LPD has a helicopter flight deck aft with two landing spots and has the capability to carry and provide limited maintenance for helicopters. On newer LPDs, forward on the flight deck, is a telescoping hangar which provides a covered area for minor repairs on helicopters. Additionally, forward of the flight deck is a 30-ton boat/aircraft (B/A) crane.

The LPD was designed to be a versatile multipurpose amphibious ship capable of not only carrying helicopters and cargo but also the landing force vehicles and a variety of landing craft. In her well deck, she can accommodate one LCAC, or one LCU, and/or four LCM-8s. Like the LSD we examined earlier, the LPD has a floodable well deck. Vehicles and cargo are then loaded and unloaded by means of landing craft and amphibious vehicles that enter the flooded well deck.

(3) Amphibious Assault Ship (General Purpose) (LHA) (Tarawa Class)

(a) Mission: The general purpose assault ship (LHA) transports personnel and their equipment and lands them in assault areas by means of embarked helicopters, landing craft and amphibious vehicles.

(b) Capabilities: The LHA combines the capabilities of several other amphibious ships. It has a full length flight deck, a well deck larger than that of the LPD or the LSD, and has stowage space for up to 4 LCUs or 1 LCAC. In addition, the LHA has personnel berthing space for 172 officers and 1731 enlisted. The LHA is also capable of conducting underway launches, like the LSD or

LPD. It has nine helocopter landing spots and the ability to store up to forty three CH-46 equivanent helocopters. The LHA can also be the command and control ship if a LCC ship is not present.

(4) Amphibious Assault Ship (Multipurpose) (LHD) (Wasp Class)

(a) Mission: The assigned mission of the amphibious assault ship (multipurpose) (LHD) is to embark, deploy, and land elements of the Marine landing force in an amphibious assault by helicopters, landing craft, amphibious vehicles and by combinations of these methods. Additionally, the LHD is assigned a secondary or convertible mission of sea control and power projection in which additional fixed-wing vertical/short takeoff and landing (V/STOL) aircraft and helicopters are deployed.

(b) Capabilities: The LHD combines the capabilities of the LHA and LSD making it a versatile and extremely capable addition to the fleet. With it's full flight deck and extended ACE maintenance abilities, the LHD can accommodate 20 AV-8B Harrier aircraft or up to forty two CH-46 equivalent Helicopters. It has nine helicopter landing spots. Along with this the LHD carries more landing craft with the ability to carry up to three LCACs or two LCUs. It also has the capability to berth 173 Officers and 1720Enlisted.

4. **USMC AIRCRAFT**

a. Transport Helicopters

(1) CH-46 (Sea Knight): The CH-46 is a two engine, dual-piloted, tandem-rotor helicopter. The primary mission of the CH-46 is to rapidly transport combat troops. Additionally, it may be used to transport support equipment, and supplies under all-weather conditions, day or night. The cabin contains provisions for accommodating 21 troops, or 15 litters, and two crew members or medical attendants. The cabin may also be used for cargo. An integral cargo handling and rescue system is provided within the cabin. The cabin floor and loading ramp incorporate parallel track and roller assemblies to facilitate loading and unloading cargo. Cargo may also be carried externally using the external cargo hook. The CH-46 is operated by HMM squadrons.

(2) CH-53D (Sea Stallion): The CH-53D is a single main rotor, twin-powered, assault transport helicopter. The primary mission of the CH-53D is to provide the transport of supplies and equipment for the landing force during the ship-to-shore movement and within the objective area. The CH-53D is configured for rear ramp loading; with cargo winches, roller conveyors, cargo tie down facilities, and an external cargo hook incorporated for the primary

task of movement of cargo. Troop seats and litter attachment facilities are provided for the secondary mission of moving troops. The CH-53D can normally carry from 35 to 55 troops or 24 litter patients. The CH-53D is operated by HMH squadrons.

(3) CH-53E (Super Sea Stallion): The mission of the CH-53E is basically the same as the CH-53D, except the CH-53E is a three engine helicopter that is significantly larger with a much greater lift capacity than the CH-53D.

(4) Helicopter Lift Tables: The lift of a helicopter is dependent on the basic weight of the helicopter (including: crew, armament, fuel, etc.), the temperature, wind and altitude/elevation of the pickup point and landing zone. The following publications provide helicopter lift tables:

(a) FMFM 0-3, Doctrinal Publications Guide (Planning)

(b) FMFM 5-3, Assault Support (Planning)

(c) NATOPS Manuals (Execution)

(d) Helicopter Tech Manuals (Execution)

NOTE: The planning for all helicopter lifts should be conducted jointly by the unit to be lifted and the lifting helicopter squadron.

b. Other USMC Aircraft Embarked on Amphibious Ships

(1) UH-1 (Iroquois) (Huey): The mission of the UH-1 is to provide the necessary utility helicopter support to the landing force in the ship-to-shore movement and within the objective area. The tasks of the UH-1 includes airborne command and control, liaison and courier services, and casualty evacuation. The UH-1 is operated by the HML/A squadron.

(2) AH-1 (Cobra): The mission of the AH-1 is to provide close-in fire support during aerial and ground escort operations within the objective area. The AH-1 is operated by the HML/A squadron.

(3) AV-8 (Harrier): The mission of the AV-8 is to provide offensive air support to the landing force. The AV-8 is unique to all other fixed wing aircraft in that it is capable of vertical takeoff and landing (VTOL) like a helicopter and short takeoff and landing (STOL) like a conventional fixed wing aircraft. An AV-8 detachment is routinely deployed with forward deployed MEUs on LHA/LHD. The AV-8 is operated by the VMA squadron.

(4) MV-22 (Osprey): The advent of the MV-22 (Osprey) replacing the aging CH-46 aircraft in the Marine Corps medium-lift helicopter inventory represents a giant step in assault support. The MV-22 is designed to carry 24 combat troops or cargo. It will have a ferry range of 2,100 nm making it self-deployable worldwide. The MV-22 utilizes a unique tilt-rotor design that enables it to hover like a helicopter for vertical take offs and landing, and yet transition to forward conventional flight and attain an operating speed of 250 knots.

c. Aircraft Stowage Capacities on Amphibious Ships: Estimating the stowage of aircraft on amphibious ships is done based on CH-46 equivalents. For example:

AIRCRAFT	***AIRCRAFT EQUIVALENTS**
CH-46	1.00
CH-53 A/D	1.72
CH-53 E	2.85
UH-1E	.73
UH-1N	.81
AH-1J	.73
AH-1T	.77
AV-8	1.21

***** Aircraft equivalents vary slightly from publication to publication. The source for the above aircraft equivalents is the USS Nassau's (LHA-4) SLCP (Ship Loading Characterisics Pamplet).

WARNING: When planning the actual loading of aircraft on amphibious ships, refer to the specific ship's SLCP and conduct liaison with the ship.

REQUIRED RESOURCES:

FMFM 9-2, Amphibious Vehicles
FMFRP 1-18, Amphibious Ships and Landing Craft Data Book