Landing Craft, Air Cushion (LCAC)

The Landing Craft, Air Cushion (LCAC) Transport weapons systems, equipment, cargo and personnel of the assault elements of the Marine Air/Ground Task Force both from ship to shore and across the beach. The landing craft air cushion (LCAC) is a high-speed, over-the-beach fully amphibious landing craft capable of carrying a 60-75 ton payload. Capable of operating from existing and planned well deck ships, it is used to transport weapons systems, equipment, cargo and personnel from ship to shore and across the beach. The advantages of air-cushion landing craft are numerous. They can carry heavy payloads, such as an M-1 tank, at high speeds. Their payload and speed mean more forces reach the shore in a shorter time, with shorter intervals between trips.

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. The LCAC uses an average of 1000 gallons per hour. Maneuvering considerations include requiring 500 yards or more to stop and 2000 yards or more turning radius. The LCAC, like all "hovercraft," rides on a cushion of air. The air is supplied to the cushion by four centrifugal fans driven by the craft's gas turbine engines. The air is enclosed by a flexible skirt system manufactured of rubberized canvas. Unlike the Surface Effect Ship (SES), no portion of the LCAC hull structure penetrates the water surface; the entire hull rides approximately four feet above the surface.

LCAC operates in waters regardless of depth, underwater obstacles, shallows or adverse tides. It can proceed inland on its air cushion, clearing obstacles up to four feet, regardless of terrain or topography), including mud flats, sand dunes, ditches, marshlands, riverbanks, wet snow, or slippery and icy shorelines. Equipment, such as trucks and track vehicles, can disembark via ramps located both forward and aft, there by shortening critical off load time.

LCAC is a dramatic innovation in modern amphibious warfare technology. It provides the capability to launch amphibious assaults from points over the horizon, thereby decreasing risk to ships and personnel and generating greater uncertainty in the enemy's mind as to the location and timing of an assault, thereby maximizing its prospects of success. It is also important to point out the LCAC propulsion system makes it less susceptible to mines than other assault craft or vehicles. Previously, landing craft had a top speed of approximately eight knots and could cross only 17% of the world's beach area. Assaults were made From one to two miles off-shore. Due to its tremendous over-the-beach capability, LCAC is accessible to more than 80% of the world's coastlines. It can make an undisclosed, over the horizon (OTH) assault from up to 50 miles offshore. Its high speed complements a joint assault with helicopters, so personnel and equipment can be unloaded beyond the beach in secure landing areas. For 20 years, helicopters have provided the partial capability to launch OTH amphibious assaults. Now, with LCAC, landing craft complement helos in speed, tactical surprise and without exposing ships to enemy fire.

With LCACs in the fleet, an amphibious assault force could be nearly 500 miles away at H-hour minus 24 and still make pre-dawn attack launched from beyond an enemy's horizon. The LCAC's air-cushion capability also allows it to proceed inland beyond an enemy's horizon to discharge cargo on dry, trafficable beaches, thus reducing build-ups of troops, equipment and other material in the surf zone.

LCAC was developed to satisfy the need for an air cushion landing craft capable of carrying troops, artillery, tanks, combat vehicles, and other major items of combat and combat support equipment across the beach. LCAC is the production follow-on to earlier advanced development craft which were tested by the Navy between 1977 and 1981. On June 29, 1987, LCAC was granted approval for full production. Forty-eight air-cushion landing craft were authorized and appropriated through FY 89. Lockheed Shipbuilding Company was competitively selected as a second source.

The FY 1990 budget request included $219.3 million for nine craft. The FY 1991 request included full funding for 12 LCACs and advance procurement in support of the FY 1992 program (which was intended to be nine craft). The remaining 24 were funded in FY92. As of December 1995, 82 LCACs had been delivered to the Navy.

Initially, all testing had been conducted in Panama City, FL. Subsequently, the LCAC was tested in California, Australia, and in Arctic waters. Rough weather conditions forced cancellation of Exercise Valiant Usher 89-4, a joint U.S.-Australian amphibious assault exercise to be conducted off the northern Australian coastline. Objectives for tests in Alaska in March 1992 included evaluating all operational effectiveness and suitability concerns of multiple LCAC in an arctic environment. LCAC was neither operationally effective or suitable for arctic operations, and merely correcting the cold weather kit design would not be sufficient to conclude that LCAC was operationally effective and suitable in an arctic environment. Performance in opposed scenarios and in severe cold weather conditions would be necessary to fully evaluate LCAC performance. DOT&E recommended further operational testing. Developmental tests indicated that at colder temperatures engine power increases until gearbox torque limits capability, but icing and sea state would reduce that capability. Since then, LCAC has been used in two arctic exercises, one of which included operations in weather down to 15^{o}F and realistic sortie rates. Based on this exercise, DOT&E concluded that further operational testing would not be necessary. LCAC demonstrated the ability to travel over light ice and open water, in fairly calm seas. The distance traveled per sortie ranged from 3-10 miles each way. Icing, which occurred in some conditions, also requires periodic interruption of missions to remove ice. JP-5 fuel was used, which alleviated problems with filters clogging. Also, LCAC has been involved in several minesweeping exercises, it has shown itself to be a potentially effective minesweeper in very shallow water. While this was not the original intent of the program, the system offers significant potential for enhancing force readiness.

The first deployment of LCAC occurred in 1987 with LCAC 02/03/04 embarked in USS GERMANTOWN (LSD 42). In July 1987 LCAC 04 transited Buckner Bay, Okinawa and conducted the first LCAC landing on foreign soil. The largest deployment of LCAC took place in January 1991 with four (4) detachments consisting of eleven (11) craft reporting for duty in the Persian Gulf in support of Operation Desert Storm.

The similarities between a Navy LCAC and an airplane are substantial. The craftmaster sits in a "cockpit" or command module with a headset radio on. He talks to air traffic control which for LCAC's is well-deck control located near a ship's sterngate. The ride feels like a plane in high turbulence. The craftmaster steers with a yoke, his feet are on rudder controls -- and he flies a lot like a hockey puck on an air hockey table, The LCAC is similar to a helicopter in that it has six dimensions of motion. Operating the LCAC demands unique perceptual and psychomotor skills. In addition, with a machine as expensive and inherently dangerous as the LCAC, sound judgment and decision-making also play an important role. Concerns over escalating training cost, projections for an increased number of LCAC vehicles and crew, and a high attrition rate in training highlighted the importance of developing a more accurate means of selecting candidates. Attrition of operators and engineers has dropped from an initial high of 40% in 1988 to approximately 10-15% today.

Specifications

Builder	Textron Marine and Land ystems Lockheed Avondale Gulfport Marine
Power Plant	Four Avco-Lycoming gas turbines; 12,280 bhp; two shrouded reversible-pitch propellers; four double-entry fans for lift
Length	88 feet
Beam	47 feet
Displacement	200 tons full load
Capacity	60 tons/75 ton overload
Speed	40 plus knots with payload

Armament	2 - 12.7mm MGs. Gun mounts will support: M-2HB .50 cal machine gun; Mk-19 Mod3 40mm grenade launcher; M-60 machine gun
Crew	5
Range	200 miles at 40 kts with payload 300 miles at 35 kts with payload
Availability	LCACs per Day (from a total of 54) Day One – 52 Day Two – 49 Day Three – 46 Day Four – 43 Day Five - 40
Operating Time	16 hours per day per LCAC
Time per Sortie	Vehicle Load – 6 hours, 8 min Cargo Load – 8 hours, 36 min
Sorties per Day for Vehicles	2.6 sorties per LCAC per day Total = 104 LCAC sorties per day @ 40 LCACs per day
Sorties per Day for Cargo	1.86 sorties per LCAC per day Total = 74 LCAC sorties per day @ 40 LCACs per day
Personnel Capacity	24 Troops 180 w/PTM
Short Tons per Sortie	25 STONS 50 pallets (500 lbs per pallet)
Vehicles per Sortie	12 HMMWVs per sortie 4 LAVs per sortie 2 AAVs per sortie 1 M1A1 per sortie 4 M923 per sortie 2 M923 5-Ton Trucks,2 M198 Howitzers, and 2 HMMWVs per sortie
Time Details	Transit (45 NM @ 25 kts) x 2 = 216 min Well Deck Ops 62 min for vehicles 120 min for cargo Beach Ops 30 min for vehicles 120 min for cargo Friction = 60 min Total = 368 min (for vehicles) or 516 min (for cargo)
Unit LCAC Sortie Requirements	Infantry Regiment 269 HMMWVs = 23 sorties 10 5-Ton Trucks = 3 sorties Tank Battalion 58 M1A1 = 58 sorties 95 HMMWVs = 8 sorties 23 5-Tons = 6 sorties 8 Fuel Trucks = 4 sorties

LAV Battalion
110 LAVs = 28 sorties
29 HMMWVs = 3 sorties
23 5-Tons = 6 sorties
8 Fuel Trucks = 4 sorties

Support Ship Capacity:

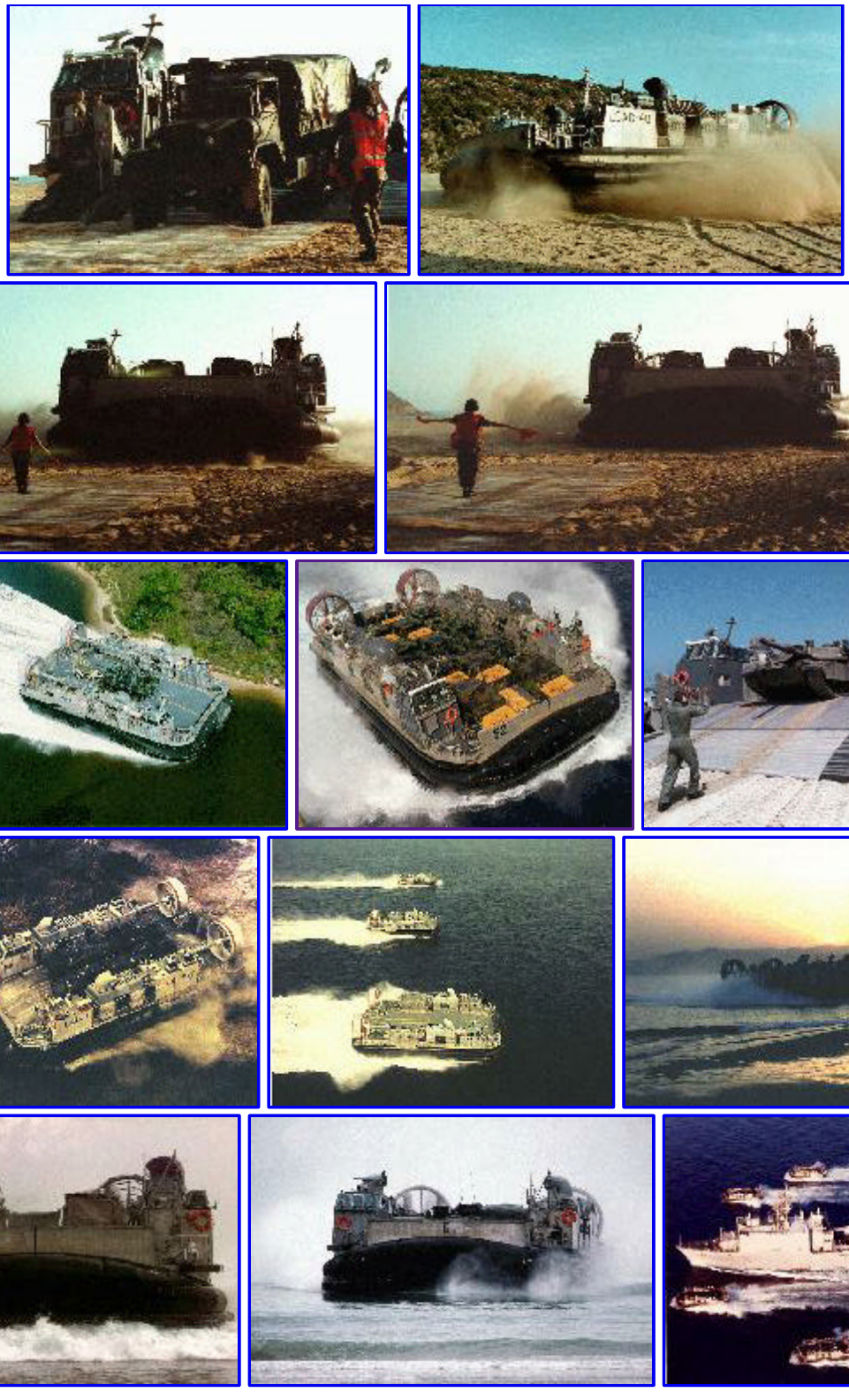
- LSD 41 Class.....4 LCAC
- LSD 36 Class.....3 LCAC
- LPD-4 Class.....1 LCAC
- LPD-17 Class.....1 LCAC
- LHA Class.....1 LCAC
- LHD Class.....3 LCAC





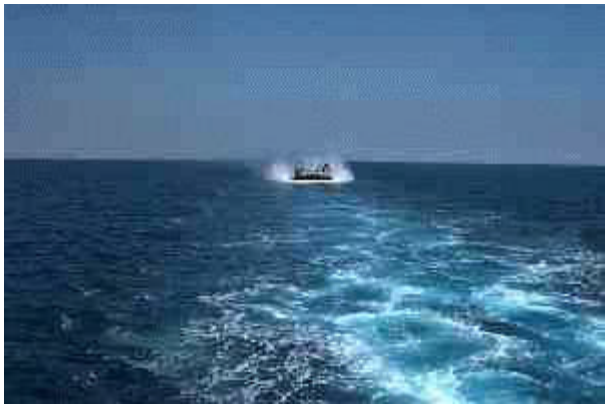




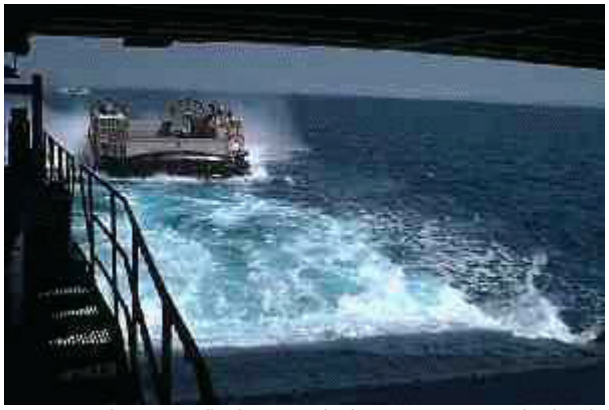



LCAC Operations and Simulated Amphibious Assaults USS COMSTOCK -- 19 - 20 September 1996

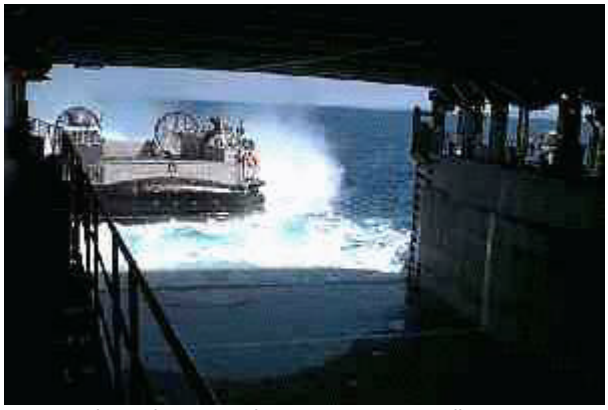
Sterngate lowered, ready to receive LCAC (10 knots speed thru water).



LCAC Number 13 commencing approach to COMSTOCK (approx. 500 yds away)

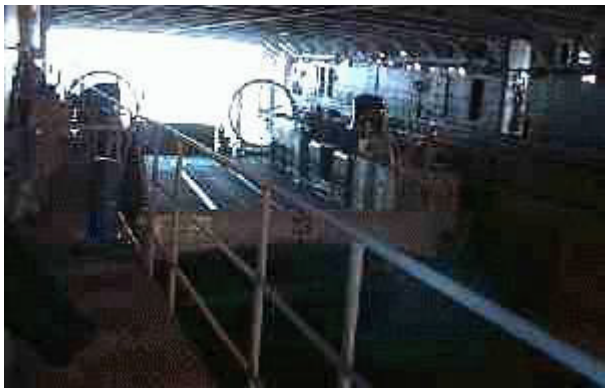


LCAC Number 13 on final approach. (Note LCAC 31 on horizon)



LCAC 13 just prior to entering COMSTOCK's well.

LCAC Number 13 beginning to enter COMSTOCK's well.



LCAC Number 13 in COMSTOCK's well, manuevering to final position.

Sources and Resources

- LANDING CRAFT AIR CUSHION - LCAC

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http://www.fas.org/man/dod-101/sys/ship/lcac.htm
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