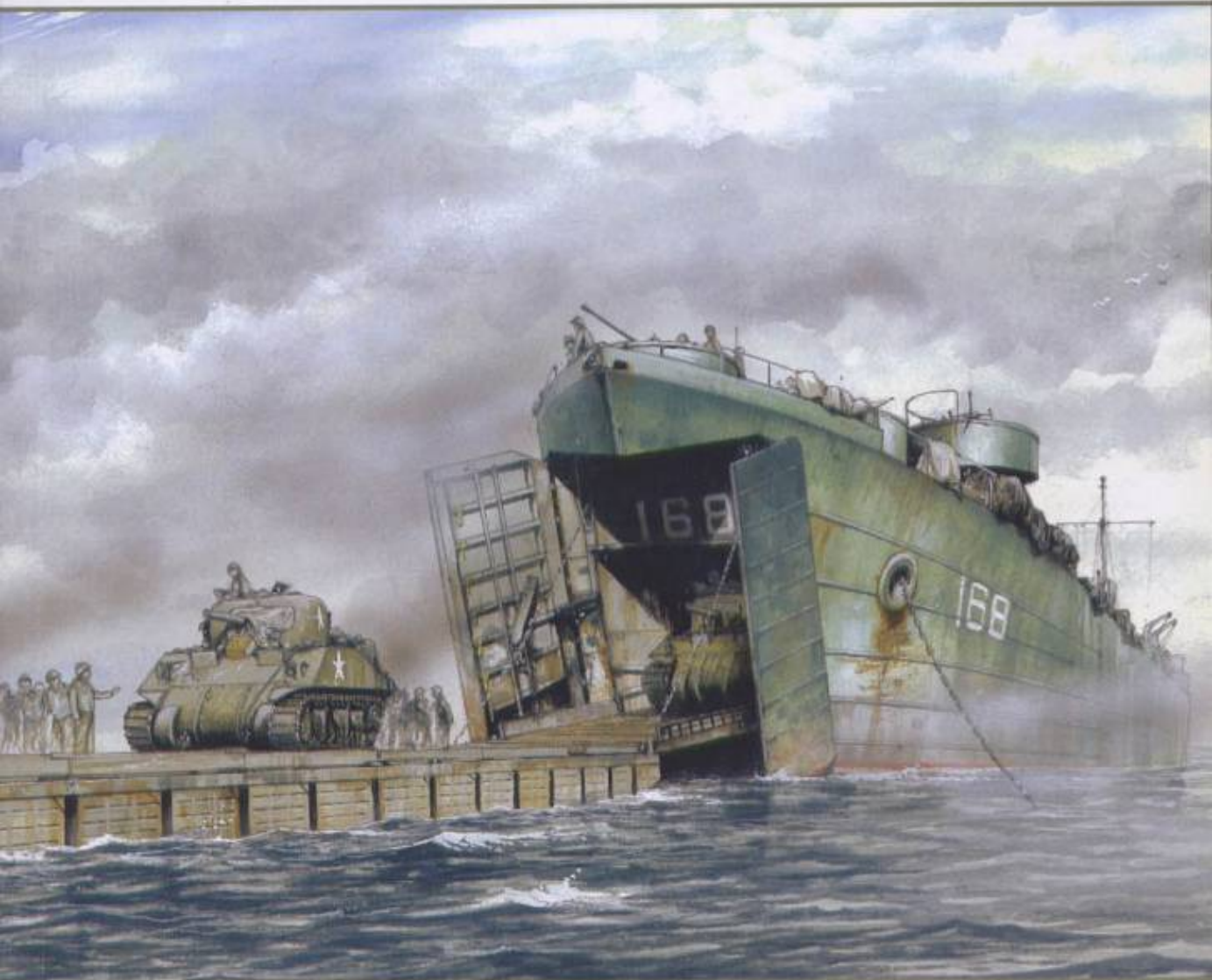


New Vanguard

OSPREY  
PUBLISHING

# Landing Ship, Tank (LST) 1942–2002



Gordon L. Rottman • Illustrated by Tony Bryan

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## Abbreviations

AGP	motor torpedo boat tender
amtrac	amphibious tractor (LVT)
AKS	general stores issues ship
APB	barracks ship (self-propelled)
ARB	battle damage repair ship
ARL	landing craft repair ship
ARS(T)	salvage craft (tender)
ARV	aircraft repair ship
ATL	Atlantic Tank Lander ("Atlantic LCT")
BuShips	Bureau of Ships
DUKW	"Duck" amphibious truck
FDT	Fighter Direction Tender (RN)
HMS	His Majesty's Ship
hp	horsepower
kW	kilowatt
LCA	Landing Craft, Assault (RN)
LCI	Landing Craft, Infantry
LCM	Landing Craft, Mechanized
LCPL	Landing Craft, Personnel (Large)
LCS(S)	Landing Craft, Support (Small)
LCT	Landing Craft, Tank
LCVP	Landing Craft, Vehicle and Personnel
LSD	Landing Ship, Dock
LSE(LC)	Landing Ship, Emergency Repair (Landing Craft) (RN)
LSM	Landing Ship, Medium
LST	Landing Ship, Tank
LSTFlot	Landing Ship, Tank Flotilla
LST(H)	Landing Ship, Tank (Casualty Evacuation)
LSV	Landing Ship, Vehicle
LVT	Landing Vehicle, Tracked (amtrac)
nm	nautical mile
PT	Patrol Torpedo boat
RN	Royal Navy
US	United States
USN	United States Navy

# LANDING SHIP, TANK (LST) 1942-2002

## INTRODUCTION

The Landing Ship, Tank (LST), known alternatively by its users as "large slow target," "long slow target," "large stationary target" (when beached), "green dragon" (when in green tropical camouflage), or "manmade whale," is probably one of the better known World War II amphibious ships. It is the largest beaching vessel capable of discharging cargo directly ashore and extracting itself.

The LST saw service from 1942 until 2002 when the last LST in the US Navy was decommissioned. Production lasted through World War II and small numbers of improved LST classes were built in 1973. Besides exceeding expectations, the LST fulfilled all sorts of unforeseen roles, with a number converted to specialized auxiliaries.

LSTs were designed to disembark large quantities of vehicles, equipment, supplies, and materiel without the necessity of prepared dock facilities or the need for cranes necessary to unload cargo ships. They gave the Allies the ability to conduct amphibious invasions on foreign shores at any location that had a gradually sloped beach and suitable beach exit routes. This ability permitted the Allies to assault poorly defended sectors rather than being forced to seize seaports.

Seagoing amphibious landing vessels over 200ft in length were designated "landing ships" and included the LST. Smaller vessels were designated "landing craft." Major variants were further identified by a mark number; for example, the landing ship, tank Mk II was abbreviated LST(2). Both the US and Britain shared the same designation system with mark numbers crossing international lines.

The first LST(2) keel was laid down in June 1942 and LSTs were slipping down the ways in September. LST-1 (ATL-1 when laid down, designation changed in July 1942) was laid down on June 19, 1942 and launched on September 7, to be commissioned in October. This was the grandfather of almost 2,000 US LSTs of all classes.





LSTs were the largest ships to be identified only by Bureau of Ships (BuShips) hull numbers, 1 through 1152, with gaps as 100 LSTs were cancelled in 1942. The remaining 158 post-war LSTs did not receive names until July 1, 1955, when they were christened with the names of US counties and parishes. US LSTs converted to auxiliaries also received names preceded by "USS," as well as new classification letters and hull numbers.

## LST DEVELOPMENT

Until the 1930s, ships' long boats ferrying troops ashore delivered landing parties against light to non-existent opposition. Most operations were of relatively small scale and once a protected landing site or seaport had been secured the operation involved the simple transfer of troops from transports. Supplies and equipment too were ferried ashore by boat and often freight barges were used, especially for heavy equipment. As armies adopted mechanization and the scope of future amphibious operations grew, it was necessary to land large quantities of vehicles. Efforts were made to develop tank landing craft. Tanks create special problems for landing craft – they are heavy, bulky, and give craft a high center of gravity, making them unstable. Should the craft have to beach further offshore, the water may be too deep for the tank to wade.

Landing craft with bow ramps, influenced by the Japanese *Daihatsu*, began to be developed on the eve of World War II, but these were for personnel and light equipment. At the time the British had no means of landing tanks directly on to beaches. Consequently, the Admiralty saw the need for larger ocean-going ships capable of landing large numbers of tanks and artillery pieces. Winston Churchill had earlier proposed such craft, but nothing had been done. Development of Landing Craft, Mechanized (LCM) and Landing Craft, Tank (LCT) began in 1940, but a greater capability was needed. US tank battalions and British tank



The main reason for the creation of the LST was to deliver large numbers of tanks to hostile shores. Here an M4A1 Sherman medium tank rolls off an LST over British-designed 10ft-long Vehicle Landing Ramps (VLR). The inside of the doors was normally gray, but was often repainted lead red, black, or one of the colors used for the hull camouflage.

regiments possessed over 50 tanks each. It would require an excessive number of LCMs and LCTs, carrying one and three tanks respectively, to land several battalions/regiments, to say nothing of the beach frontage required. LCTs were small and suited only for cross-Channel operations.

### **British LST development**

Churchill proposed a massive ocean-going landing ship capable of delivering 60 tanks to a hostile shore, the Atlantic LCT or ATL. Such a ship was impractical to construct and required too deep a draft to allow beaching. An alternative was selected in the form of three landing ships carrying 25 tanks each. It would require some 18 months before the "Winettes" could be completed. As an interim measure three shallow-draft tankers were modified. These were 380ft ships built in 1937/38 to transfer oil between the Venezuelan oilfields on Lake Maracaibo down the narrow, shallow Maracaibo River to refineries on Aruba Island. The Maracaibo-class LSTs, HMS *Bachaquero*, *Misoo*, and *Tasajera*, were convoyed to Britain in 1941. Their bows were rebuilt in a blunt design, reducing their speed, with a drawbridge gate and two 68ft sliding ramps to allow off-loading of 18 40ton or 22 25ton tanks or 33 lorries. Two LCMs were carried along with 200 troops. A kedge anchor and capstan were fitted on the stern. LSTs and large landing craft dropped the anchor as they approached shore and the cable was run out. The ship could then winch itself off the beach once its contents were off-loaded. The Maracaibos' speed, however, was too slow and their draft too deep for beaching on projected gradients. They participated in the North Africa invasion in 1942, with many lessons learned. One of the main lessons was the need for a means of bridging the water between the bow and shore. The US-designed pontoon causeway was the answer and the Maracaibos were fitted to carry 60ft causeways.

In the meantime the design of the purpose-built Winettes continued and they were renamed the Boxer-class LST Mk I in July 1942. Construction actually commenced in late 1941, but lasted over a year.



LST-157 under construction at Evansville, Indiana. Temporary cables support the ramp. The horizontal slots are for the geared door-closing ratchet and the upper vertical slots for the ramp chains. The heavy-duty door hinges can be seen along the sides. (Collection of the Evansville Museum of Arts, History and Science)

British shipbuilding capabilities were stretched, however, and nine corvettes were cancelled. More LSTs were required and the US agreed to build seven LST(1)s. With the development of the US LST(2) and the subsequent problems encountered with LST(1)s, the US-built Mk Is were cancelled.

The LST(1) was a 3,600ton vessel, 390ft long and 49ft wide. It could carry 13 40ton or 20 25ton tanks or 36 lorries plus 193 troops and a 169-man crew. A key characteristic was its more ship-shaped bow, which improved speed. Double doors opened outward, behind which was a watertight door, and behind this a sliding 124ft bridge-ramp. An elevator inside the superstructure allowed vehicles to be lifted to the upper aft deck and a 40ton crane was provided for loading them into LCTs.

Delays caused HMS *Thruster* to be completed in January 1943, the *Bruiser* in March, and the *Boxer* in April. The first US LST(2)s beat them off the ways by five months. The Boxer-class required too deep a draft and the future invasion beaches on the French coast had a 1ft drop in 60ft – 1-in-60 gradient; the LST(1) could handle only 1-in-35. A 1-in-60 meant that the Boxer's deep-drawing stern would leave the bow forefoot beached in 10ft of water some distance from dry sand unless the tide was out, in which case the ships were stranded. Ill-suited for mass production, the LST(1)s were too expensive and required 15 minutes to extend the bridge-ramp.

In 1944 the British were frustrated by the shortage of amphibious ships made available to Commonwealth forces in MacArthur's Southwest Pacific Area. They decided to build the LST Mk III in British and Canadian yards. Though of similar design to the LST(2), the LST(3) had a larger capacity. It was intended to be better at sea-keeping than its American counterpart. All 44 British-built and 27 Canadian-built LST(3)s were launched between late 1944 and mid-1945. One British and ten Canadian vessels were cancelled before construction began.

The LST(3) was 345ft 10in long, 54ft wide, had a larger deckhouse than the LST(2) and was somewhat more roomy, except the two boilers and steam engines took up considerable space on the tank deck and required a funnel on the deckhouse. The tank deck could hold 15 40ton or 27 25ton tanks plus 14 lorries on the weather deck, and could carry



LST-357 sliding down the ways at Charleston Navy Yard, SC. Once launched it would require weeks of additional fitting before it was commissioned.



an LCT(6). The LST(3)'s heavy reciprocating steam engines and boilers, which required more upkeep than diesels, its larger displacement (4,820 tons fully loaded), and its riveted hull construction to speed production, added too much weight and limited its beaching capabilities.

### **American LST development**

In September 1941, in what is considered the first American proposal for an LST, Marine MajGen Holland Smith proposed a tank carrier with a bow door and bridge-ramp carrying 18 light tanks. Not only could it unload on to a beach, but 18 LCMs would be carried to land the tanks.

While the LST(1)'s design was underway the British assessed their landing craft needs and proposed they be produced in the US under Lend-Lease – British shipyards were incapable of additional production. The British also needed 2,000 LCTs and these would be built in the US. LCTs were incapable of crossing the Atlantic on their own. Though built in sections for shipping, they would have to be assembled in Britain, a process that demanded additional labor, facilities, and time, plus would require scarce shipping space. The British proposed an improved LST in November 1941 to land tanks and transport LCTs. The new requirements were:

1. Carry 20 25ton tanks.
2. Beach on a 1-in-50 gradient.
3. 10-knot speed, 10,000nm range.
4. Simple bow ramp with power-operated doors.
5. Carry an assembled LCT as deck cargo.

The requirements were given to the Technical Director of the US Navy's BuShips, John C. Niedermair. He dashed out preliminary sketches for an ocean-crossing ship similar in design to the Boxer-class. The beaching requirements meant a flat bottom, far from conducive for an ocean-going ship. A new concept, though, made the ATL unique. When the flat-bottomed ship was at sea its bilges would be flooded to deepen its



LSTs built in the river yards were launched sideways because of the shallow and narrow waterway. Here LST-662 is launched at American Bridge, Ambridge, Pennsylvania. A 328ft ship impacting broadside after sliding 20-plus miles per hour down the way was impressive.

draft, thus increasing its stability. Approaching the beach the bilges would be pumped to reduce draft. The British quickly approved the concept and in the meantime work continued with a 280ft-long, 45ft 6in-wide design being discarded and a 328ft-long, 50ft-wide hull adopted to distribute weight efficiently. It would carry almost 1,000 tons of materiel. An assembled LCT could be carried on deck and launched over the side by listing the LST. LCTs could be disassembled into three sections, five sections carried internally, but a complete LCT could not be carried as deck cargo at the same time. Designed for a 1-in-50 gradient, the stern was deeper than the bow allowing the vessel to beach and remain level.

The LST was almost stillborn when Chief of Naval Operations Adm Harold Stark stated he foresaw no need for it. For vessels to be built for the British under Lend-Lease it was required there be a parallel US need. The British turned to US Army Chief of Staff Gen George Marshall, who readily supported the project, and the LST was born.

Special design efforts had to be made to deal with vehicle exhaust fumes in the enclosed tank deck, along with the design of the powered doors and ramp, and the weather-deck to tank-deck elevator. In order to reduce construction time, conserve materials, and reduce builder manpower, the design was kept simple using uniform-sized plates and shapes. Even an existing diesel locomotive engine was adapted. The hull was tested in a model basin, and it was discovered that the flat bottom caused 16–25 percent more water resistance than planned, but this was a necessary evil.

In January 1942 the Dravo Corp. of Pennsylvania was selected as the lead yard and Gibbs and Cox, Inc. of New York, a naval architecture and marine engineering firm, prepared drawings. The first contracts were let on January 23 for 500 LSTs. Sixteen yards built LSTs, some being long-established shipbuilders. Others were bridge-building and steel-working companies that had never before built a ship. New yards were built – five on the Ohio and Illinois rivers. These “cornfield yards” constructed over half the LSTs, which were sailed down the Mississippi to the Gulf of Mexico. The first keel was laid down at a veteran shipyard in



Construction details varied between LSTs, as demonstrated by LST-646 and 662 afloat in ABSD-6 (advance base section dock). LST-646 is fitted with two Welin-type davits and has a twin and two single 40mm guns on the forecastle. LST-662 has six pairs of davits and mounts a twin and four single 40mm guns plus two 20mm cannon aft of the twin 40mm. Note the movie screen (white square) aft of the forecastle on the weather deck.

### LST(2)-1-class characteristics

#### Dimensions

Length: 327ft 9in  
Beam: 50ft 1 1/2in  
Height of mast above mean  
waterline: 76ft  
Freeboard: 16ft 6in

#### Displacement

Light: 1,435 tons  
Fully loaded ocean: 3,800 tons  
Fully loaded beaching: 2,100 tons

#### Draft

Fully loaded ocean: 7ft 1in  
forward, 13ft 6in aft  
Fully loaded beaching: 3ft 1in  
forward, 9ft 6in aft

#### Speed

Top: varied between 10 and  
11.5 knots  
Economic cruising: 8.75 knots

#### Endurance

Loaded at 10 knots: 19,000nm  
Light at 10 knots: 21,000nm  
Loaded at 8.75 knots: 23,000nm

Newport News, Virginia, in June 1942 and LSTs were slipping down the ways in September. By the year's end 23 were commissioned. Some Navy officers, however, felt the large, slow vessels would make only one-way trips, being vulnerable to air attack.

### LST(2) construction

Once construction was underway in the latter half of 1942 and problems worked out, procedures refined, and workmen gained experience, LST production increased dramatically. In 1943 it required approximately four months to build an LST, but by 1945 this timeline was cut to two months. With numerous LSTs under construction in a given yard, some were turning out an LST every four-and-a-half days. By 1944 some yards had cut a day off this schedule.

The hull was assembled from 48 cellular sections each 10ft wide by 24ft long. The sections were sometimes fabricated at different sites and hauled to the yards by rail. The construction was robust, the designers foreseeing the rough handling a beaching ship would endure. Hull plates were 3/8in thick of all-welded construction rather than the originally suggested 1/2in. There was no armor other than at the conn, wheelhouse, and gun tubs. The double-hull with its outboard compartments along the tank deck's sides, and numerous ballast compartments and voids provided a degree of protection. While small numbers were lost in action, they proved to be stoutly constructed and buoyant, accepting much punishment. The bow doors and ramp were especially heavily constructed. Some 30,000 parts were required along with 13 1/2 miles of electrical wire and 6 1/2 miles of pipe. Fitting the two diesel engines, gearing, steering gear, three power generators, 130 electric motors, two air compressors, ballast, bilge and fire pumps, capstans, winches, refrigeration, galley appliances, power-distribution gear, ventilation system, firefighting system, communications and navigation gear, and armament were major undertakings.

Changes in design were kept to a minimum to prevent construction delays. All yards were required to comply with Gibbs and Cox plans and submit changes to them for approval. There were three sub-classes of LST(2)s with minor changes made on ships as they were produced. The

The interior of the LST mock-up building at Ft Knox, Kentucky. Here, obsolete M2A4 and M2A2 de-gunned light tanks used for driver training are loaded in the wooden building, which replicated exactly the interior of an LST.



LST-1-class was built into 1943 and the LST-491-class was begun in mid-1943, both costing approximately 1.4 million dollars. The LST-491-class, laid down in July 1943, saw the elevator replaced by a ramp that was hinged at the weather deck to be lowered to the tank deck (except LST-531). There is some confusion regarding this sub-class as there was also an LST-511-class, an LST-491-class with additional refinements – vehicles could be driven from the weather deck to the forward end of the tank deck and down the bow ramp. The LST-542-class, laid down in November 1943, added a raised conn (creating an 03 level), strengthened the weather deck for heavier cargo, removed the exhaust vents from the weather deck's amidships section, added a 4,000gal-a-day water distiller, and increased armament – the cost rose to 1.6 million dollars for each ship. The additional deadweight of the 542-class reduced its capacity from 2,100 to 1,900 tons and gave it a heavier displacement – 1,623 tons with a light load.

A total of 1,051 LST(2)s were built. The hull numbers reached LST-1152 though, as 100 ships were cancelled on September 16, 1942: LST-85–116, 142–156, 182–196, 232–236, 248–260, 296–300, and 431–445. Of those built, 113 were converted to specialized auxiliaries. A total of 390 LST-1-class were built, 50 LST-491-class, and 612 LST-542-class.

Another 115 LST(2)s were transferred to the RN, some after serving with the USN and others upon completion: LST-2–5, 8, 9, 11–13, 62–65, 76, 77, 79, 80–82, 157, 159–165, 173, 178, 180, 198–200, 214–217, 237–239, 280, 289, 301–305, 311, 315, 319–324, 326, 331, 336, 337, 346, 347, 351, 352, 358, 360–369, 371, 373, 380–383, 385, 386, 394, 401–430, 538, and 1021. The surviving RN LST(2)s were returned to the USN in 1945–47. The British had originally requested 200 LSTs, but only half the crews could be mustered. Four more (LST-33, 35–37) were transferred to the Royal Hellenic Navy in August 1943, operated under RN control and included among the RN LSTs.

## LST(2) DESCRIPTION

The LST(2) was unique in many ways and was the largest beaching-type landing ship. It was not just a specialized cargo ship; it was also a combatant.

From keel to topside the LST had five levels. The hold was divided into over 40 compartments, tanks, and voids containing the main and auxiliary engine rooms, shaft alleys, three diesel fuel tanks, 15 ballast tanks, five freshwater tanks (446 tons), ammunition stowage, and degaussing switchboard room. From LST-542 onwards one of the freshwater spaces was used for the water distiller.

The third deck was the tank deck, running most of the ship's length with narrow compartments along both sides. The second deck mostly did not exist, as the tank-deck compartment's high ceiling occupied much of it. This deck consisted of side compartments above the tank deck's side compartments.

The main deck included the weather deck extending from the deckhouse to the forecastle (fo'c'sle – pronounced "folk's'l"). The forward

### US LST Builders

American Bridge, Ambridge, PA\*:  
137–141, 261–295, 653–681,  
754–771, 829–849, 1081–1095  
Bethlehem-Fairfield Co. Baltimore,  
MA, Marine Div.: 401–430  
Bethlehem-Hingham, Hingham,  
MA: 906–979, 1060–1080  
Bethlehem Steel, Quincy, MA:  
361–382, 1004–1027  
Boston Navy Yard, Boston, MA:  
301–310, 980–1003, 1028–1037  
Charleston Navy Yard, Charleston,  
SC: 353–360  
Chicago Bridge & Iron, Seneca,  
IL\*: 132–136, 197–231,  
511–522, 600–652, 772–774,  
850–860, 1115–1152  
Dravo Corp., Pittsburgh, PA\*:  
1–5, 7–15, 17–20, 22–24, 26–60,  
730–753, 775–796, 884–905,  
1038–1059  
Dravo Corp., Wilmington, DE:  
6, 16, 21, 25  
Jeffersonville Boat & Machine,  
Jeffersonville, IN\*: 61–84,  
117–121, 181, 501–510,  
523–530, 682–729, 797–805,  
861–873, 1096–1100  
Kaiser, Inc., Vancouver, WA:  
446–475  
Kaiser, Inc., Richmond, CA:  
476–490  
Missouri Valley Bridge & Iron,  
Evansville, IN\*: 122–131,  
157–180, 237–247, 491–500,  
531–599, 806–828, 874–883,  
1101–1114  
Newport News Shipyard, Newport  
News, VA: 383–400  
Norfolk Navy Yard, Norfolk, VA:  
333–352  
Philadelphia Navy Yard,  
Philadelphia, PA: 319–332

\* "Cornfield yards" on the Ohio and Illinois rivers.

1 Degaussing (pronounced "de-gow-sing") is a system of electrical cables inside the ship's hull generating a magnetic field to protect it from magnetic mines.





Reinforcements disembark from LST-66 at Cape Gloucester, New Britain. The cable attached to the ramp's center end is not a normal fixture, but the snaking cable from the aft winch on the tank deck was routed to the weather deck to give the heavy ramp an assist when raised. Nine turnbuckle dogs (normally painted yellow) on either side of the doors were manually secured and released by crewmen climbing the ladder on the port door. Snatch blocks can be seen on the second I-beam from the doors' tops, to which lines were run to the opposite side over the brow to aid in closing the doors if their lower edges were jammed into the beach.

The elevator hatch on LST-325 displays the four hoist wheels through which cable ran to a capstan forward for raising and lowering the platform. Raising the elevator closed the hatch and it was battened by a tarpaulin. To the upper right of the elevator is a doghouse hatch providing access to the second and third decks. The rectangular box to the left is a tank-deck air intake.

portion of the main deck comprised the forecastle. On the aft portion was the deckhouse and atop this the bridge. Aft of the deckhouse was the fantail.

**Propulsion**

The main engine room was in the hold four decks below the deckhouse. It held two General Motors 12-567 V12 900hp diesel engines with Falk clutches and reduction gears. The auxiliary engine room was forward and held three six-cylinder Detroit diesel-electric power generators producing 100kW DC. Main engine exhaust vents, small rectangular ports, were located high on the hull sides below the deckhouse and smaller auxiliary engine exhaust ports were on the sides below the cargo hatch. Fuel storage was 607 tons in two amidships centerline and two smaller side tanks. Another 890 tons could be carried in ballast tanks. Diesel was consumed at ten tons per day at 10 knots to include running auxiliary generators. There were two 30hp 1,500gal-per-minute ballast pumps and two 30hp 250gal-per-minute fire and bilge pumps. Berthed or beached, two tons of fuel per day was consumed running auxiliary engines.

Two drive-shaft alleys ran aft from the main engine room. The two four-bladed screws were 7ft in diameter and counter-rotated turning outboard. The screws were protected by a skeg, a runner-like guard beneath them. A 10hp electric motor controlled rudders aft of each screw. Engine speed was controlled by revolutions per minute. Maximum safe revolutions were 250 at full-load weight, but could turn at 275 (flank speed) for short emergency runs. The ship could run on one engine.





### Third deck

The tank deck, 288ft long, 29ft 6in wide, ran forward from the steering gear and provisions compartments. The level portion of the deck was 262ft long as there was a "hump" just aft of the bow ramp. This prevented bow door leakage from entering the tank deck and being directed into the bilge. The forward side bulkheads narrowed to a "throat" for 16ft and then a 14ft wide opening led 10ft to the bow ramp. Maximum height of a vehicle entering the tank deck was 11ft 3in, although most of the deck's overhead was 12–13ft. On the aft end of the deck was a large snaking winch with an overhead-mounted cable trough allowing vehicles to be pulled on or off the LST. It could also be routed to the weather deck.

The number of vehicles that could be stowed on the tank and weather decks was dependent on their sizes and the combat loading of units that required different types of vehicles. On average some 70 trucks of different sizes could be loaded on both decks. In the tank deck an LST could carry in two rows 20 M4 Sherman medium tanks, or 18 Churchill tanks, or 39 M3/M5 Stuart light tanks in three rows, or 17 amtracs, or 22 "Duck" amphibian trucks, or 29 2½-ton cargo trucks or halftrack carriers. A traffic-control station in the port forward portion of the tank deck's side, on the second deck, monitored vehicle traffic and operated a traffic-light system. Tie-down points were provided in the tank deck in 1943 to secure general cargo.

The 14 side compartments on each side for shops and stores were approximately 10ft wide and 10–25ft long. The compartments were connected end-to-end by hatches. Few hatches led on to the tank deck. The machine shop was equipped with a metal lathe, drill press, and other metal-working tools.

Three compartments were aft of the tank deck. On the port side was the dry provisions room with storage for 90 days of food. A small medical stores room was also located there. To starboard was the refrigeration space with three lockers (meat, fruit and vegetables, dairy products) with a capacity of 21 tons in 842 square feet. This facility allowed for 90 days' meat, 14 days' fruit and vegetables, and 21 days' potatoes. Aft of these spaces was the steering-gear compartment, which included the emergency tiller.



This view of the weather deck of a British-manned LST provides an idea of the parking space available. The tank-deck vent stacks could be relocated to alternate openings just forward of the deckhouse. With only two 20mm guns on the forecastle, this ship appears less cluttered than US LSTs with their multiple gun tubs clustered on the forecastle.

Tank-deck ventilation was critical because of exhaust fumes. The LST was unique in that it was the only enclosed landing ship or craft requiring motor vehicles to run their engines inside. The Maracaibo-class used individual exhaust hoses attached to vehicles' exhausts and vented outside. The US Army built a wooden mock-up LST building at Ft Knox, Kentucky, in 1942 while LST design was still underway. The individual tank-exhaust hose system was tested first with adapters for vehicle exhaust pipes. The tanks were started and when the bow door opened they rolled out, automatically disconnecting their hoses. Carbon monoxide and other gases, generated once the tanks slipped their hoses, were measured as well as leakage – it was found that gases built to dangerous levels. Different arrangements of high-speed exhaust ventilating systems were tried until the 12 fan-vented exhaust stacks was selected. An exhaust fan was mounted in the base of each 40in-diameter 8ft-high stack.

### **Bow doors and ramp**

The bow opening was 13ft 3in wide and 13ft 7in high. The bow doors were opened by a 3hp motor-driven rack-and-pinion gear and closed by a ratchet device controlled from the tank-deck control room. A clamp and turnbuckles secured the doors. The bow doors leaked somewhat and while heavily reinforced with horizontal I-beams they were considerably weaker than a normal ship's bow, a factor limiting the LST's speed. To sufficiently reinforce the doors would make the ship bow-heavy.

Behind the bow doors was a drawbridge-type ramp 15ft 4in wide and 23ft 3/4in long secured by turnbuckles. The maximum angle of depression was 26 degrees and in this position its hinged end rested on a reinforced lip to project 2ft below the ship's keel. Resting on the lip, or with the ramp resting on the beach, pontoon, or dock, it could support 50 tons. Without resting on the lip or without its end supported by a solid surface, its two ramp chains could only support the ramp's weight. A 10hp electric motor lowered and raised the ramp and a handbrake was provided to stop the ramp in any desired position.



The aft-most compartment in the deckhouse is the galley. Like the wheelhouse, LST-325's galley has changed little and still boasts stainless steel appliances: steam table serving line, two grills, two ovens, large cooking and coffee kettles, dishwasher, and even an automatic potato peeler, all electric-powered.

## Second deck

The second deck mostly consisted of 12 compartments on each side above the tank deck's side compartments. The second deck compartments were about 7ft above the tank deck as a vertical continuation of the bulkhead. These compartments were used for troop berthing, messing, and equipment storage. Three and four-tier troop bunks were canvas lashed in steel frames. The troop bathrooms typically had seven sinks, three toilets, a continuous-flow trough urinal, and four saltwater showers.

A large crew-berthing compartment, showers, and bathrooms occupied the aft beneath the fantail. This also served as the enlisted mess deck. The triple-bunks were attached to wall brackets.

## Main deck

The weather deck ran forward from the deckhouse to the forecastle. It was designed to provide as much clear space as possible for vehicle and cargo stowage as well as carrying an LCT. Space was required for hatches, gun mounts, tank-deck ventilator stacks, and air-vent gratings. Two forecastle doghouses (covered hatches) among the gun tubs provided access to the second and third decks. The elevator was immediately aft of the forecastle. From LST-491 the elevator was replaced by a hatch located further forward with a drop-ramp. Just forward of the deckhouse was a 16ft x 29ft 9in cargo hatch, which allowed cargo to be lowered into the tank deck. The hatch cover consisted of 25 2in-thick 3ft 2in x 5ft 9in wood plank panels laid on four I-beams, five across and five lengthwise. To batten the hatch for weatherproofing it was covered with a tarpaulin. Two trunks, each functioning as ventilator, access, escape, and tool and parts lowering trunks, ran from the main and auxiliary engine rooms and shaft alleys.

Originally there was a tank-deck exhaust-vent stack amidships forward of the elevator, six more in three pairs evenly spaced down the weather deck, three set side-by-side immediately forward of the deckhouse, and two in the deckhouse's aft portion. To clear the weather deck for an LCT or other bulky cargo there were six alternate vent openings abaft and just forward of the three deckhouse vents. When the ramp hatch replaced the elevator the forward vent was moved to its port side.

The deck could support individual vehicles or equipment up to ten tons, which precluded tanks from being carried on deck; the entire weather deck was limited to 130 tons. The 5,000lb Baldt stockless main anchor with 720ft of chain was carried in the port bow hawsepipe with a 20hp capstan.

## Elevator/ramp

The weather deck-to-tank deck elevation on LST-1 through 490 and 531 measured 13ft 6in x 23ft 6in and was built by the Warsaw Elevator Co. of New York. It was lowered and raised by four steel cables connected to a 20hp winch. Four steel pipe

In later LSTs the elevator was replaced by a weather deck-to-tank deck ramp, greatly speeding up loading and unloading. When lowered the ramp's end rested on the "hump" just aft of the bow ramp, allowing vehicles to be driven straight out the doors. Here LST-666 unloads an Australian lorry at Morotai Island.



guideposts were erected, an activity requiring 1½ hours, before the elevator was used. These were removed to allow passage of tank-deck vehicles through the bow. The elevator could lift ten-ton loads and the load could be no higher than 10ft 3in. Average lift speed was 56 seconds and was lowered in 52. It required 2½–3 minutes to drive a vehicle on, raise it, drive it off, and lower it for the next. The elevator was slow, sometimes jammed, and amtracs could not be accommodated.

Beginning with LST-491 a ramp replaced the elevator. It was located further forward and measured 12ft x 32ft. The ramp served as a hatch when raised and when lowered it angled toward the bow door. The ramp had about a 40-degree incline and its lower end rested on the tank deck's "hump" aft of the bow doors. The ramp allowed vehicles to be driven off the weather deck much more quickly than the elevator, plus it accepted heavier vehicles.

### **Deckhouse and fantail**

The superstructure occupied approximately a quarter of the ship's length on the main deck's aft portion. The deckhouse was a 35 x 65ft structure atop which were the bridge and gun mounts. It housed four cabins for ship's officers and four for troop officers. A lateral companionway separated the galley from the rest of the deckhouse. A flag officer's two-room cabin for an embarked group or flotilla commander was in the deckhouse's forward portion. Officers' cabins had one to three built-in bunks with spring mattresses, lockers, a sink, and a desk in one- and two-bunk cabins. The galley was designed to reduce work time and manpower needs. A dumbwaiter sent meals to the enlisted mess below. Two or four pairs of Welin-type landing craft davits were fitted on either side of the deckhouse.

Aft of the deckhouse was the small fantail occupied by different combinations of gun tubs and the kedge anchor's capstan with 900ft of 1½in wire rope. The anchor was a 3,000lb Danforth.

The small bridge, 01 level, sat atop the deckhouse. Inside were the wheelhouse, chartroom, radio room, degaussing control room, and captain's sea cabin. A Sperry Mk XIV gyrocompass was mounted beside the wheel along with a binnacle housing the magnetic compass and an engine order repeater (annunciator). There were also gyrocompass repeaters in the conn and the aft steering-gear compartment.

The radio room held a large number of radios and associated equipment. The specific radio models varied between ships and over time. An example of radios used in 1944 include:

- MAB radio
- TBY radio
- TBX radio
- SCR-300 radio
- SCR-606 radio
- SCR-610 radio
- BC-536/611 transceiver
- RAO HF receiver
- RBH HF receiver
- RBL VLF receiver
- RCH receiver



LST-172 provides a view of an uncluttered ship before additional armament was added. It is armed with a 40mm and two 20mm guns on the bow, a 20mm on each corner of the deckhouse, and a 3in gun on the stern. The two stacks aft of the bridge are the aft-most tank-deck ventilators.

Atop the bridge was a low, open-topped square conning station, 02 level. Because the highest position on the ship (31ft) was far astern, and produced a considerable blind spot beyond the bow, an officer was required on the forecastle to relay steering instructions and closure rate when beaching or docking. A small steel-frame tower or a second compartment was often erected over the original conn to raise the conning station. The original conn compartment became the captain's sea cabin. This arrangement was incorporated in the LST-542-class. The conn and wheelhouse were protected by 15lb per square foot special treatment steel (STS) splinter protection. To the aft of the conn was the signal bridge with the radio/flag mast, flag boxes, semaphore flags, two 1,000-watt signal lamps, and the ship's bell. Very few LSTs were fitted with surface-search radar. Those that were mounted the SG, SL, or SU.

### Armament

The designers understood that antiaircraft defense was critical for LSTs. As with other ships early antiaircraft armament proved too light. Additional and heavier weapons were added. Some LSTs were fitted with Besler Model 317 fog-making machines and others equipped with floating smoke pots.

The most numerous weapons were Oerlikon 20mm Mk 2 and Mk 4 automatic cannons fed by 60-round snail drum magazines. A crew of five manned each. Late in the war some Mk 24 twin mounts were fitted and added two men.

.50-caliber Browning machine guns were mounted on LSTs in small numbers as last resort weapons against air attack, but were useful against small boats. There were two types of ".50-cals." – the M2 heavy barrel air-cooled gun and the M2 water-cooled. The water-cooled model had a slightly higher rate of fire, 500–650rpm as opposed to 450–500rpm, since it was intended as an air defense weapon. Some Browning .30-cal. M1919A4 machine guns might be mounted on LSTs and armed their LCVPs.

Heavier antiaircraft weapons were provided in the form of the 40mm Bofors gun. The dual Mk 1 mount was usually on the stern and/or bow and consisted of a Mk 1 right gun and Mk 2 left gun. The quad Mk 2 mount consisted of two pairs of twin guns. It was introduced in late 1942 and mounted on LSTs converted to auxiliaries. Both of



these Navy weapons employed powered mounts and were water-cooled, making them capable of a high sustained rate of fire. The single-barrel 40mm Mk 3 gun was an Army M1 on a Navy Mk 3 mount. They were air-cooled and manually trained. Single, dual, and quad guns had four-, seven-, and 11-man crews, respectively. All models were fed by four-round clips and fired at 120–180rpm.

A 3in/.50-cal. Mk 22 dual-purpose gun was sometimes mounted astern, but these were replaced by single 40mms, and later, twin 40mms. This was an obsolescent weapon moderately effective against aircraft, but deemed too light for surface targets. It fired a 13lb projectile out to 14,000yds. Ammunition included common (HE), antiaircraft, armor-piercing, and star. Its seven-man crew could pump out 18 rpm.

The actual armament of individual LSTs varied greatly. Additional weapons were added, both through design changes and in-theater add-ons. Weapon increases were not uniformly installed on all ships, even within the same unit or yard in the same timeframe. The early weapons plan called for a single 40mm, substituted by a 3in, on the stern, two 20mms on either side of the forecastle, and four 20mms with one on each corner of the deckhouse; some also mounted a 40mm on the bow. (The original design called for only six 20mms.) In 1944 seven 40mms and 12 20mms were authorized as an interim weapons allocation with an ultimate goal of two twin 40mms, four single 40mms, and 12 20mms. For control purposes the guns clustered on the forecastle were designated the "forward group," those along the sides of the weather deck were the "amidships group," and those on the deckhouse and fantail were the "aft group."

Army and Marine antiaircraft units carried aboard LSTs would set up their guns on deck: 37mm M1s, 40mm M1s, twin 20mm Mk 4s, and .50-calibers. The deck could not support the firing of 90mm antiaircraft guns.



Aft starboard side of LST-325 shows the Wellin-type davits in the lowered position. The after 40mm tubs can be seen behind the davits and the end of the signal bridge in the "V" of the forward davit. The port on the hull is the main engine exhaust vent.

## Landing craft

The LST was the only landing ship carrying its own landing craft. LSTs were fitted with two pairs of Welin-type 15ton gravity davits, one on either side of the deckhouse, for a LCVP. These were used for moving pontoon causeways, as ship's boats, and for utility duties. Prior to the July 1943 Sicily landing, many LSTs were fitted with six pairs of davits, two on either side of the deckhouse and one on either side just aft of the forecastle. The Sicily LSTs with extra landing craft were used as assault transports when LCVPs were not available. The additional craft were also used for control boats and as emergency repair and rescue boats. Most had six LCVPs, but sometimes one was substituted with a Landing Craft, Support (Small) Mk I - LCS(S)(1) - or a Landing Craft, Personnel (Large) - LCP(L). Landing craft were also used as the captain's gig, ferrying men and stores, and as tugs to assist LSTs in docking. LSTs were provided with 8-12 25-man life rafts, or Carley floats. These were oval or rectangular-shaped canvas-covered balsa flotation collars fitted with wooden lattice-type centers.

## THE LST IN ACTION

The LST can arguably be called the most versatile ship in World War II. Being essentially a large, empty, self-propelled box with ample above- and below-deck space made it useful not only for hauling just about anything, but for many other purposes when space was needed aboard a ship, a luxury scarce on most ships.

Of the 933 LST(2)s and conversions operated by the USN, only 26 were lost to enemy action and 13 to collisions, explosions, fire, storms, and groundings. Ten of the 115 RN Lend-Lease LST(2)s (including FDT-216 - see plate G4) were lost to the enemy and four to accidents. This was far fewer than originally feared for the "large slow targets" - during early operations such as those at Sicily 70 percent losses were expected. Most LSTs lost to enemy action were to mines, torpedoes (submarine, aerial, E-boat), aerial bombs, radio-guided bombs, or kamikazes. Many were fired on by artillery and while some were hit, none were lost.

There are two notable incidents involving multiple LST losses. The most controversial occurred during Operation *Tiger*, a Normandy landing rehearsal conducted at Slapton Sands on Britain's southeast coast on April 28, 1944. Nine German E-boats launched torpedo attacks on eight LSTs, sinking LST-507 and 531 and damaging LST-289. Some 750

## LST landing craft characteristics

All characteristics are with the craft fully loaded.

Craft	LCVP	LCP(L)	LCS(S)(1)
Length	35ft 10in	36ft 8in	36ft 8in
Beam	10ft 6in	10ft 10in	10ft 10in
Displacement	8 tons	9 tons	9.8 tons
Draft	2ft 2in (forward) 3ft (aft)	3ft 6in	3ft 6in
Propulsion	2-shaft * 220- 450hp	2-shaft * 150-265hp	1-shaft gasoline 250hp
Speed	8kts	8kts	12kts
Range	850nm at 6.25kts	50-130nm at 8kts	115km at 12kts
Complement	3	4	6
Armament	2 x .30-cal. MG	2 x .30-cal. MG	1 x .50-cal. MG 2 x .30-cal.
Capacity	36 troops or piece of 1-ton truck and 12 troops or 8,100lbs cargo	36 troops or 8,100lbs cargo or 8,100lbs cargo	MG or 2 x .50-cal. 3 x .30-cal. MG Some had 2x 4 1/2in rocket launchers (12 rockets)

\* Fitted with either diesel or gasoline engines of varied horsepower.



A weatherworn and war-weary LST-733 returns home. Harsh tropical conditions, high-tempo operations, and little time in port saw LSTs quickly take on a decrepit appearance. Many required significant work before they could be mothballed in the National Defense Reserve Fleet.

### Example LST(2) complement

Seven officers, 119 enlisted men  
*Officers*  
Commanding Officer (Lieutenant)  
Executive Officer (Lieutenant – junior grade)  
First Lieutenant (Lieutenant – junior grade)  
Engineer Officer (Ensign)  
Communications Officer (Ensign)  
Gunnery Officer (Ensign)  
Assistant First Lieutenant (Ensign)  
*Enlisted men*  
Chief Boatswain's Mate 1  
Boatswain's Mate 1st Class 1  
Boatswain's Mate 2nd Class 1  
Coxswain 2  
Chief Gunner's Mate 1  
Gunner's Mate 1st Class 1  
Gunner's Mate 2nd Class 2  
Gunner's Mate 3rd Class 3  
Chief Quartermaster 1  
Quartermaster 1st Class 1  
Signalman 1st Class 1  
Signalman 2nd Class 1  
Signalman 3rd Class 1  
Fire Controlman 2nd Class 2  
Seaman 1st Class 20  
Seaman 2nd Class 34  
Radioman 1st Class 1  
Radioman 2nd Class 1  
Radioman 3rd Class 1  
Radio Technician 1st Class 1  
Radarman 2nd Class 1  
Shipfitter 1st Class 1  
Shipfitter 2nd Class 1  
Chief Motor Machinist's Mate 2  
Motor Machinist's Mate 1st Class 2  
Motor Machinist's Mate 2nd Class 3  
Motor Machinist's Mate 3rd Class 4  
Electrician's Mate 1st Class 1  
Electrician's Mate 2nd Class 1  
Electrician's Mate 3rd Class 2  
Water Tender 1st Class 1  
Water Tender 2nd Class 1  
Water Tender 3rd Class 1  
Fireman 1st Class 4  
Fireman 2nd Class 4  
Yeoman 2nd Class 1  
Storekeeper 1st Class 1  
Pharmacist's Mate 1st Class 1  
Pharmacist's Mate 2nd Class 1  
Chief Commissary Steward 1  
Ship's Cook 1st Class 1  
Ship's Cook 2nd Class 1  
Ship's Cook 3rd Class 1  
Baker 2nd Class 1  
Cook 1st Class 1  
Steward's Mate 1st Class 1  
Steward's Mate 2nd Class 2

The one-hundred-plus-man crew of an LST often remained together from commissioning to discharge. The seven officers of LST-767 are seated in front and the four chief petty officers (CPO) flank them.

soldiers and sailors were dead or missing. Recent accusations of a cover-up are unfounded. The action was not publicly revealed because of wartime security and its overshadowing by the war's events.

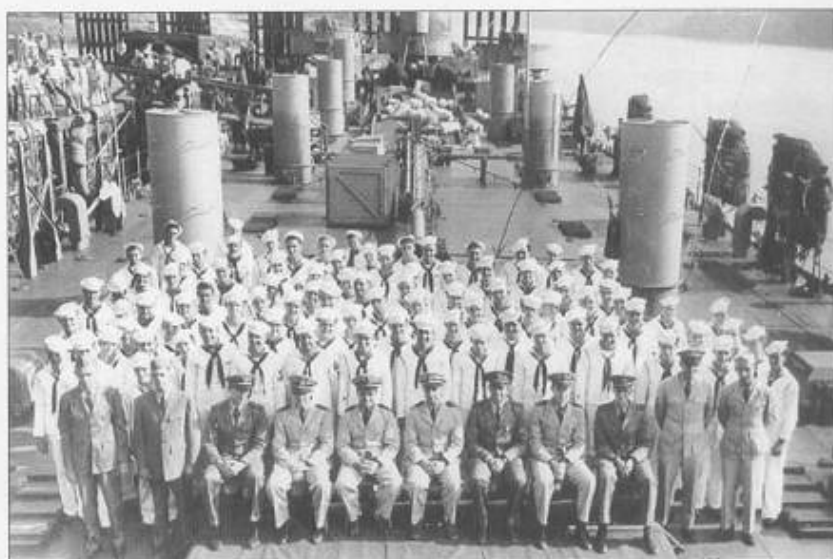
On May 21, 1944, LSTs were loading in Pearl Harbor for the Saipan assault. The accidental detonation of a mortar round caused a massive explosion, destroying LST-39, 43, 69, 179, 353, and 480 along with smaller landing craft. Thirty-four other vessels were damaged. Losses were 160 dead and 380 injured sailors and marines. The accident delayed the LST flotilla's departure by a day, but the time was made up.

### Crew and passengers

LST crew size varied and gradually grew with additional armament and the need for more technical specialists for efficient operation. Early ships had 8–10 officers and 100–115 enlisted men. Later two-davit ships had up to seven officers and 104 men while six-davit ships had nine officers and 120 men. Ships tended to be undermanned, however.

When additional officers were assigned, their positions included Operations, Assistant 1st Lieutenant, Damage Control, Supply or Stores, Assistant Gunnery, and Watch Officers. Ships were divided into four departments: Operations Department under the XO or Operations Officer, which included Signals; Deck Department under the 1st Lieutenant, which included Gunnery; Engineering Department under the Engineer Officer; and Supply Department under the Supply or Stores Officer.

Most officers were Navy Reserve, having been trained in basic ship-handling skills and assigned directly to LSTs, often without having previously set foot on a ship. The same applied to enlisted men trained in their specialties. Both officers and enlisted men learned how to handle their ship and perform their duties during their shakedown cruise and their passage overseas simply by using the ship's manuals. The situation improved, though. Officers previously serving aboard LSTs were given command of newly commissioned ships and as flotillas formed there was sometimes training time. New crews also received



training on commissioned LSTs from experienced crews before posting to a new ship, or they sailed their ship down the Mississippi River accompanied by a training crew. In the two-week trip they learned their jobs and the ship was turned over to them in New Orleans.

Coast Guardsmen manned 37 early LSTs; it was originally planned for "Coasties" to man 61 LSTs owing to projected Navy crew shortages. Coast Guard-manned LSTs were mixed in Navy flotillas with 24 serving in the Pacific and 13 in the European Theater.

Army and Marine passenger accommodations also varied. One source lists 12 officers and 165 enlisted men and another 16 officers and 147 enlisted men aboard a two-davit LST and 14 officers and 131 men on a six-davit. The galley could accommodate 200–250 troops in addition to the ship's company. It was not uncommon for additional troops to sleep on deck or in vehicles and they pitched tarpaulins and tents for protection from the elements. This situation was especially true for short passages in the Pacific and often all troops slept on deck because of sweltering below-deck heat. Some 550 troops could be transported in short hauls without major cargo.

An LST could carry a large number of casualties and often transported them from seaside battlefields to rear bases. Litter racks could accommodate 144 stretchers and were stacked three-high on the tank-deck side bulkheads. Another 135 or more litter cases could be accommodated in troop berthing. With litter racks on the sides, in berthing, and rows of litters on the deck, over 450 wounded could be carried.

### LST units

LSTs were organized into flotillas of 18 ships, commanded by a commander or lieutenant commander. His flag and small staff were carried aboard one of the LSTs provided with additional radios. The flotilla was divided into three groups of six LSTs under a lieutenant commander, each subdivided into two three-LST divisions. The groups and divisions were numbered in sequence through over 70 organized flotillas. To demonstrate, LSTFlot 1 was comprised of Groups 1–3 and its six divisions were designated Divisions 1–6. LSTFlot 5 had Groups 13–15 while its

LST-646 is fully dressed with national ensigns fore and aft (the foremast being temporarily erected) and a "rainbow" of signal flags as prescribed in regulations for its commissioning. It is painted in Tropical Measure 31/18L. Compare with Plate F1 for typical colors.







HMS LST-214 crosses the Atlantic en route to Britain with an LCT(5) carried on the weather deck. Two Army Motor Towboats, Large (MTL) are chocked inside. An LCP(L) is carried in the starboard davits.

divisions were 25–30. Groups and divisions were administrative groupings and ships were reassigned as necessary. Flotillas assigned to a numbered fleet could be under the administrative control of a Commander, LSTs or Commander, Landing Craft Flotillas.

When organized for combat, individual ships were assigned to task groups and units. Task organization varied depending on the landing plan, missions, and available ships. LSTs were mainly assigned to tractor flotillas, groups, and units as well as to follow-on reinforcement and garrison groups.

#### At sea

A long flat-bottomed vessel with high vertical sides is difficult to handle. For an LST, catching waves and wind broadside or even on the quarter caused serious rolling and significantly slowed its speed. The lack of bilge keels running along the hull's bottom curve amplified the roll. In a heavy sea taking large waves bow-on caused a noticeable ripple effect among the vehicles on the weather deck. The LST's modest sea-handling ability was a trade-off for the capability to beach such a large ship. An empty, un-ballasted LST drew only 1ft 6in at the bow. Even with the ballast tanks fully flooded and carrying the maximum weight of fuel, 1,060 tons, an LST empty of cargo was difficult to handle in rough seas.

At 15 degrees rudder and 9 knots a "large slow target" could make a 180-degree turn in about four minutes and at 30 degrees rudder and the same speed a turn in three minutes. It required 550yds for the 15-degree turn and 375yds for the 30-degree turn.

Another handling problem was the electric controls linking the ship's wheel to the rudders. It was common for the electric contacts to stick and the rudders remain locked in their last position as the wheel was turned. The indicator could say she was turning to port when in fact she was veering starboard. This of course made close-quarters convoy sailing and maneuvering in a seaport interesting, and collisions were not uncommon, though seldom serious. Steering problems occurred so frequently, one or more times a day on some ships, that two men stood watch in the aft steering compartment to take over manual control if necessary. It was not uncommon to see an LST in a formation zigging when other ships were zagging with loss of steering warning flags running up her flag-hoist.

A major concern at sea was securing the cargo. It was quickly found on early trans-oceanic passages that on the rolling ships heavy cargo and vehicles required more shackling than was normal. For port-to-port trips 800-plus tons could be carried with considerable fuel and freshwater as ballast. Actually, loads were more often considerably lighter as the bulk that could be loaded was less than the maximum weight.

The LSTs' hard use, long oceanic passages, and the fact that they were built only as short-lived ships meant crews had to work hard to maintain them. Spare parts were often scarce and battle-damaged ships were quickly cannibalized for parts and equipment.





LST-882 is fitted with timber cradles to carry an LCT and is painted haze gray. The black smudge on the hull side below the deckhouse indicates the main engine exhaust vent.

### LCTs and pontoons

One of the reasons the LST came into existence was the necessity to transport LCTs overseas. This feat was accomplished by loading an LCT on to an LST's deck with seaport derricks. Even smaller craft or light vehicles were in turn stowed aboard LCTs. The LCT rested on a cradle of five 40ft-long 12 x 12in timbers extending to the starboard side and secured by cables, turnbuckles, and bracing. An LCT(5) weighed 134 tons and the LCT(6) 143 tons. They were 117ft 6in and 120ft 4in in length, respectively; both had a 32ft beam. To launch an LCT over the side the timbers were greased and most of the securing cables unfastened. The LST's side rails, life rafts, and deck guns were removed from the starboard side and collision fenders dropped over the side. The starboard bilges were flooded and the port bilges pumped out to achieve a 27-degree list. The retaining cables were released and the LCT slid over the side. An LST could also transport six LCMs on the weather deck.

On a shallow-gradient shore even a shallow-draft LST could not always beach at the water's edge. Reefs, sandbars, or obstacles, as well as shallow water, could force an LST to beach further out. If the intervening water was sufficiently shallow, the surf light, and the bottom firm, some vehicles could wade ashore. Often, though, the gap had to be bridged. Beach-party bulldozers sometimes built short coral or sand causeways or ramps, but if the LST was beached too far from shore, or wave action washed away temporary causeways, other means were used.

In 1939 the USN developed a pontoon system comprised of reinforced steel 5 x 5 x 7ft rectangular one-ton standard pontoons capable of supporting a ten-ton load. Other components were a bow pontoon, wedge-shaped ramp pontoons, and connecting pontoons. Pontoons could be assembled into barges, self-propelled "Rhino" ferries, docks, piers, and causeways. A standard causeway was two pontoons wide and 15 long with connecting pontoons on the ends.

Two causeways up to 32 pontoons in length could be secured to the sides of an LST, cut loose as the LST approached, and momentum carried them ashore. The LST's LCVPs served as push-boats to position causeways. Intermediate sections were carried by other LSTs and once in the LST area off the landing beaches the intermediate sections were dropped and towed to the causeway site. Causeway sections could also be carried set on edge on the weather deck and launched over the side.

Two LSTs unload on to a two-section pontoon causeway. The inshore causeway has its bow pontoons fitted upside-down for a more effective off-ramp.



LST-219 docked to a causeway and held in-place by two LCM(3)s. These causeways are four pontoons wide with side extensions for docking additional landing craft, LSM-436 to the left and LCI(L)-743. A 3 x 7 self-propelled Rhino ferry is nosed up to the left.

Another means of closing the gap between ship and shore was to position one or more LCT(6)s end-to-end between an LST's ramp and the beach with their own ramps lowered and their removable stern plates unshipped to form a drive-through causeway. In the Pacific, wide coral reefs sometimes prevented LSTs from reaching the beach and sufficient causeways were not always available. An LCT or LCM would nose up to an offshore LST's lowered ramp and drop its own ramp on to the landing craft. Vehicles were trans-loaded into the landing craft and lightered ashore with the disadvantage of vehicles having to back off.



### Beaching and retracting

Beaching and retracting without assistance were complex operations and required a great deal of skill. For beaching the load had to be less than full capacity, especially if shallow waters were expected. For a 1-in-50 gradient the load was limited to 500 tons cargo, 72 tons fuel, and 50 tons freshwater, giving the ship a forward draft of 8ft. Combat loads of up to 850 tons might be carried, though. The operational necessity of carrying less fuel and water required sufficient resupply vessels. LSTs were not assault craft. They were beached only in later waves.

To beach the ship as close to the water's edge as possible, numerous factors were considered: angle of the waves striking shore, wind direction and speed, gradient, bottom conditions, and obstacles. Coral heads, large rocks, the more robust manmade obstacles, disabled vehicles, and broached landing craft could damage an LST. If the LST did not approach the beach perpendicular to the waves, and if the surf and/or wind were strong enough, the ship could broach,

that is, turn sideways, becoming grounded parallel with the shoreline. It therefore might be impossible to unload and could not retract itself.

The ship was trimmed not only by pumping ballast out of the forward tanks, but pumping in water to partly fill aft tanks, and fuel and freshwater might be redistributed. The bilges were not simply pumped dry, but the trim balanced to accommodate the cargo load's balance and expected gradient.

Once directed to land, the correct landing site was determined by observing beach marker panels and unloading site panels. The LST ran in at two-thirds speed or standard speed. Beach-party guides waved in LSTs, especially if the beach was crowded with other vessels. Relative bearings were taken on landmarks ashore to determine the release of the stern anchor and it was dropped to windward. The aim was to lay out 600ft of anchor line. All except the bow door's top dogs were undogged. Once contact was made against the beach an effort was made to drive a further 50–100ft so that about one-third of the bottom was in contact. The ship slid to a slow stop rather than a jolt as the wet sand acted as a lubricant. The forward ballast tanks were flooded to hold the ship in place. If the stern was afloat the use of engine-power and rudders was required to keep the ship in the correct location. It was still in danger of broaching, however, so slack was taken up in the stern anchor line and this also helped prevent broaching.

The bow doors' top dogs were released, opened, and the ramp dropped, often by simply releasing its chains to drop free. If the LST was beached on a 1-in-50 gradient, there was still water between the bow and shoreline, 3ft deep 150ft from shore, 5ft at 250ft – the end of the ramp would be submerged. In the Pacific, shallow fringing coral reefs proved to be the greatest obstacle preventing LSTs from nosing ashore and lengthy causeways were often necessary. Along many Mediterranean and Channel beaches, nearshore submerged sandbars run parallel to the beach. The water between the bars and shore may have been sufficiently deep for an LST, but the bars presented a barrier even at high tide.

Disembarking an LST's cargo was determined by the specific load, sea-state, beach conditions, and manpower. While tank-deck vehicles could be driven off quickly, it required more time to disembark the many vehicles on the weather deck. Bulk cargo required even more time: offloading periods could vary from two to six hours. If the LSTs were loaded with bulk cargo, it required up to 150 shore-party stevedores to unload. From August 1943 LSTs were authorized a 3½-ton caterpillar crane and a forklift to aid in unloading.

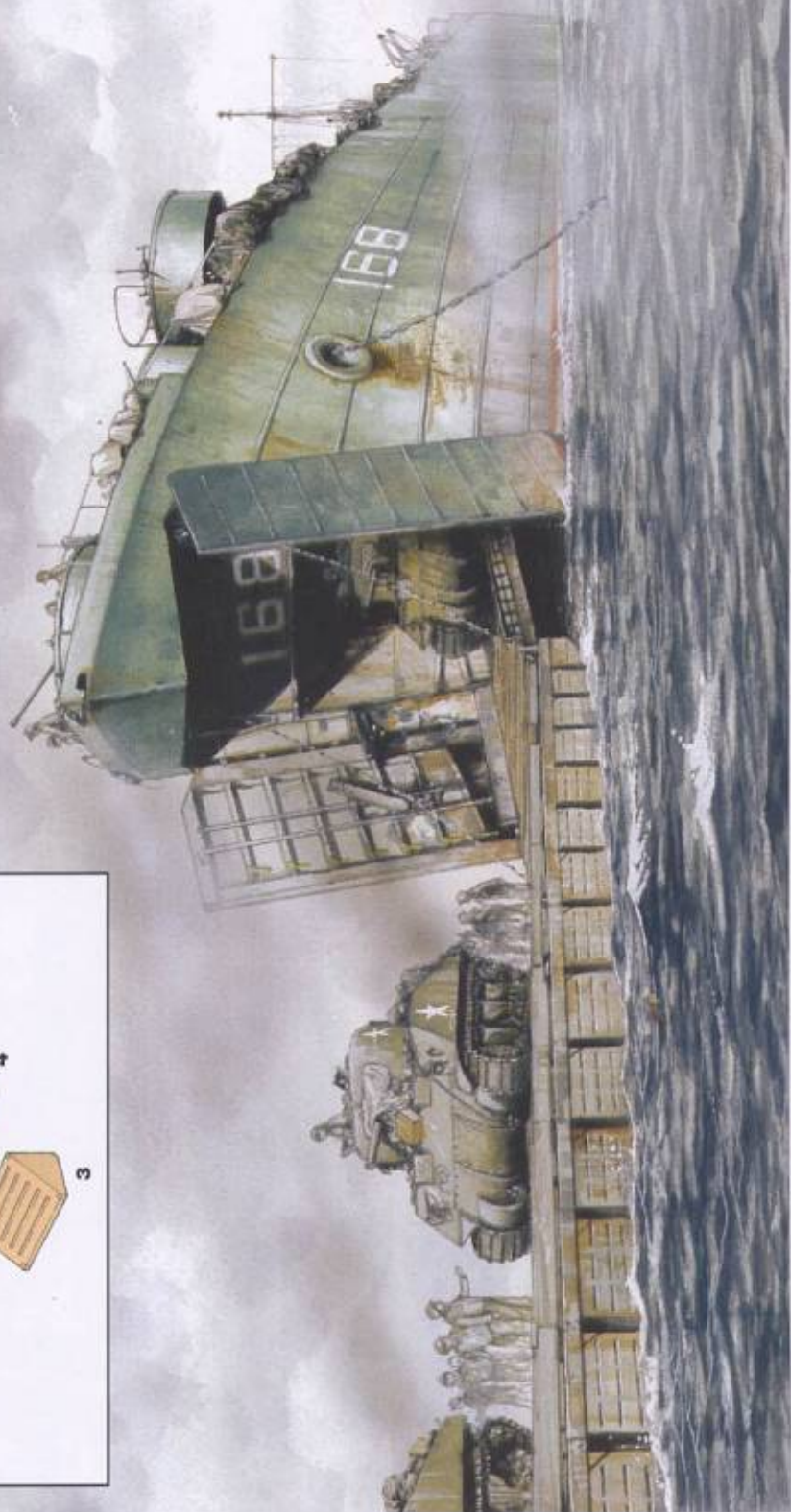
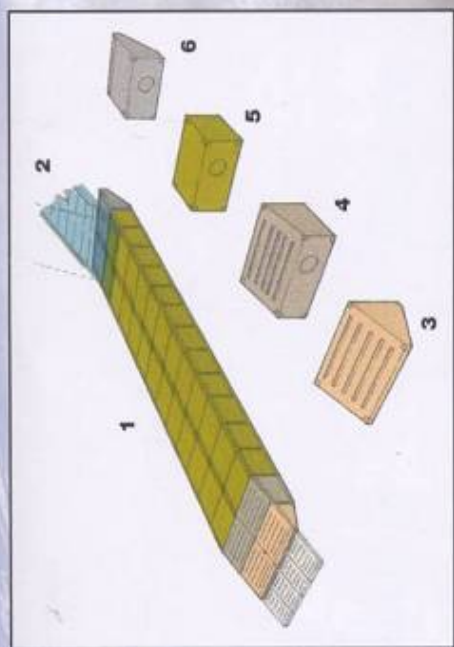
On occasion LSTs were intentionally stranded high-and-dry at low tide. Before the tide receded ballast water had to be taken on to ensure sufficient seawater was available for machinery cooling, fire-fighting, and toilet flushing.

**If only a short distance had to be spanned from the LST to shore a sand or coral ramp would be constructed, here by a D-8 bulldozer for LST-241. It appears that other than the engine and fire watches and lookouts a favorite crew activity was to congregate on the forecastle and watch unloading operations.**

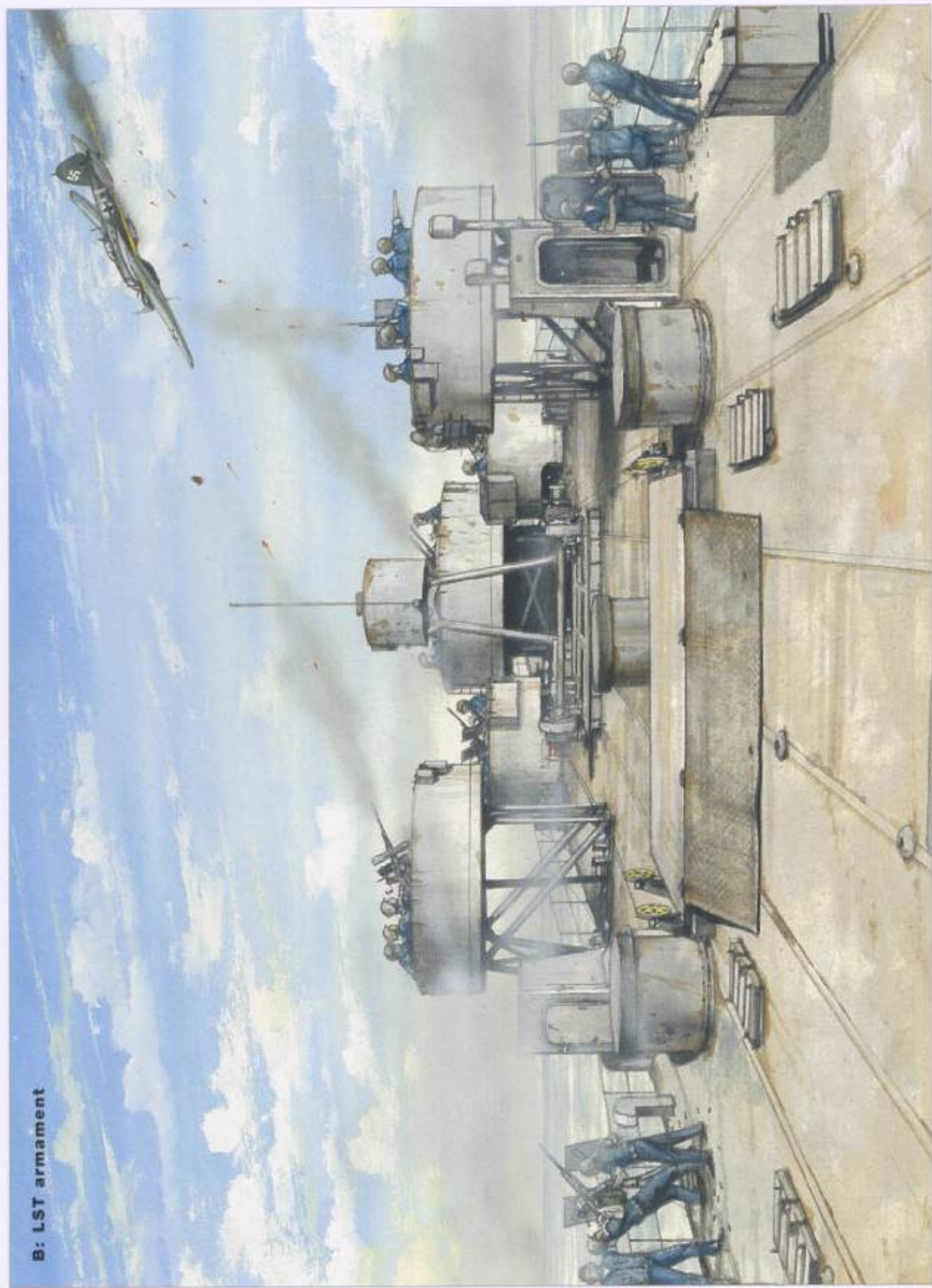




A: Beaching operations



B: LST armament



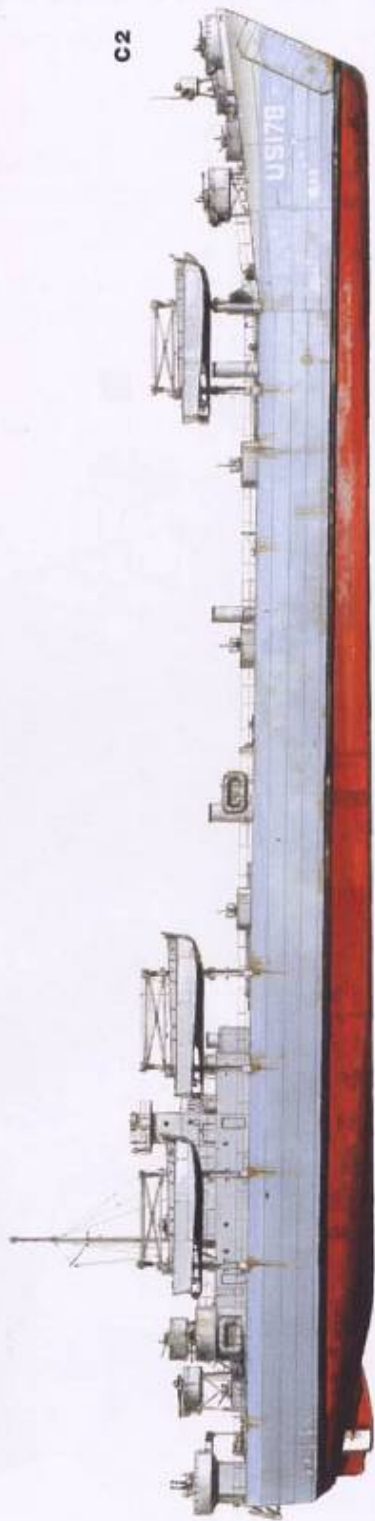


**C: LST(2) variant plans**

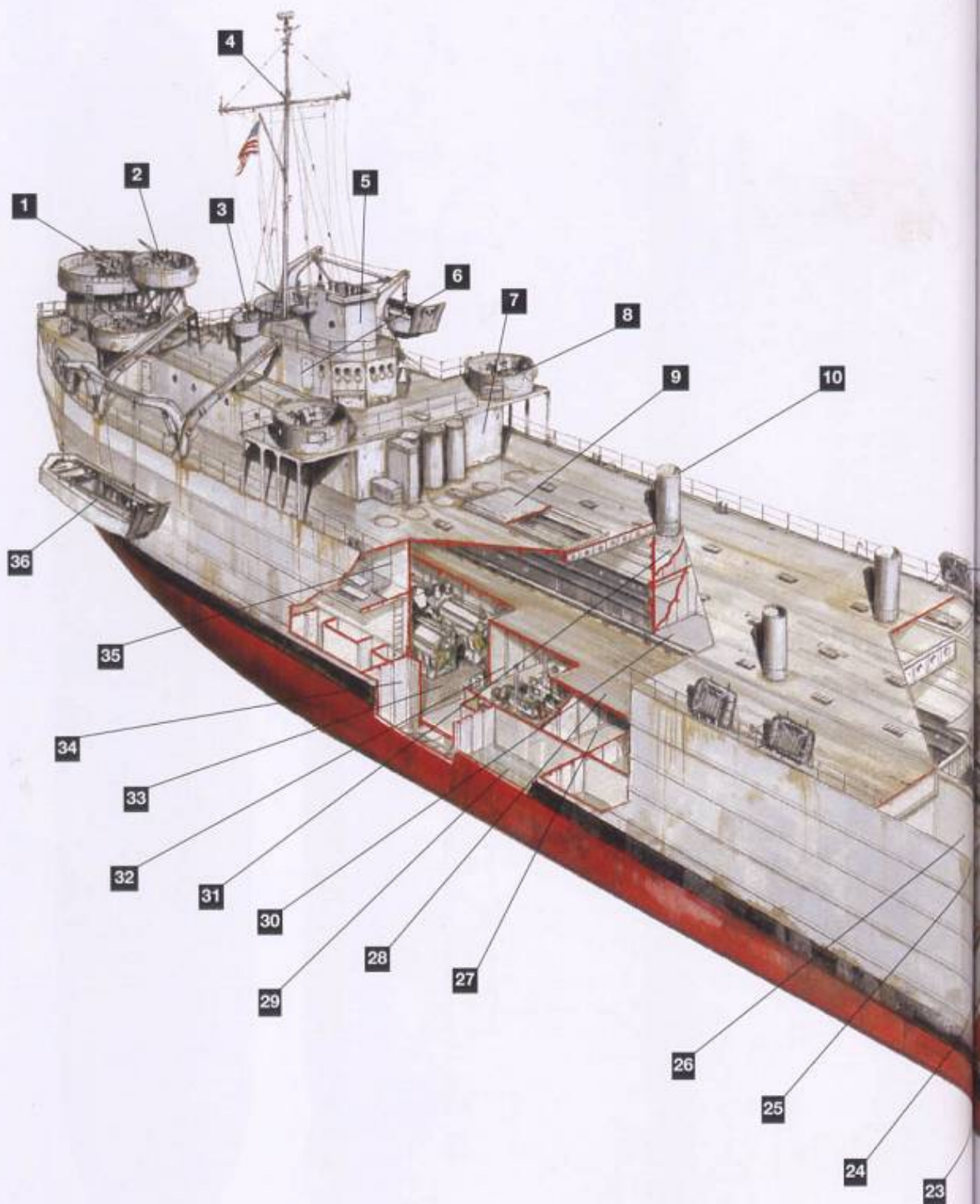
**C1**



**C2**

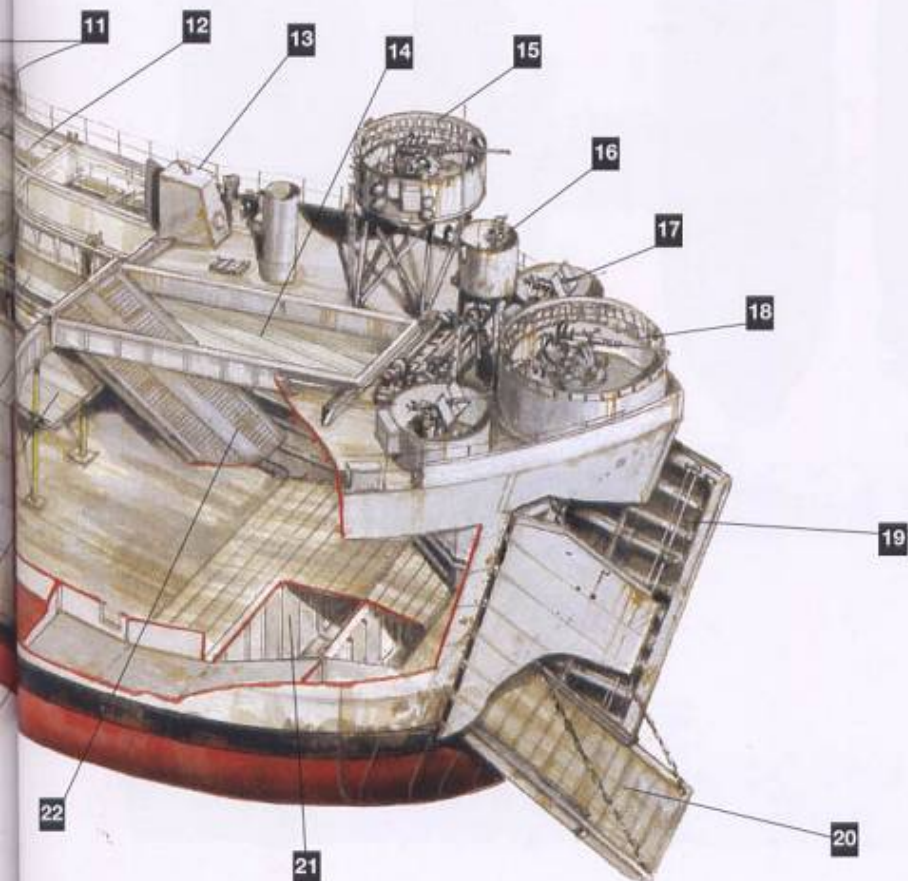


# D: ANATOMY OF AN LST(2)



## KEY

- 1 Aft dual 40mm AA gun
- 2 Aft single 40mm gun (additional 40mms on the aft corner ends of the deckhouse)
- 3 Signal bridge
- 4 Radio/flag mast
- 5 Conning station (level 02) (elevated on later ships)
- 6 Bridge with wheelhouse, radio room, captain's sea cabin, chartroom, and degaussing control room (level 01)
- 7 Deckhouse with wardroom/officers' mess, ship and troop officers' cabins (four), ship's office, and galley (main/weather deck)
- 8 Single 20mm AA gun
- 9 Cargo hatch
- 10 Tank-deck exhaust ventilator vent
- 11 Carley floats
- 12 Troop berthing
- 13 Doghouse hatch (access to second deck)
- 14 Weather-deck to tank-deck ramp hatch (LST-531 and after)
- 15 Single 40mm AA gun
- 16 Mk 51 40mm AA gun director (seldom installed)
- 17 Single 20mm AA gun
- 18 Forward single 40mm AA gun
- 19 Bow doors
- 20 Bow ramp
- 21 Ballast tank
- 22 Weather-deck to tank-deck ramp (lowered)
- 23 Bosun's stores
- 24 Elevator and guideposts
- 25 Elevator hatch (LST-1 through 491)
- 26 Troop berthing
- 27 Diesel fuel tank
- 28 Tank-deck (third deck)
- 29 Ballast tank
- 30 Crew stores
- 31 Troop berthing
- 32 Auxiliary engine room
- 33 Main engine room
- 34 Escape trunk
- 35 Troop mess
- 36 Landing craft vehicle and personnel

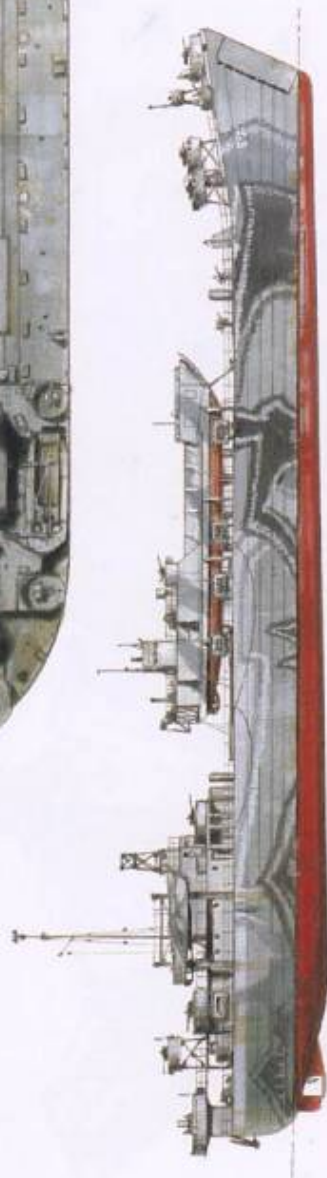




**E: LST(2) variant plans**



**E1**



**E2**



**F: LST variant and auxiliary plans**

**F1**



**F2**



**F3**



**F4**



**F5**





**G: LST variant and auxiliary plans**

**G1**



**G2**



**G3**



**G4**



**G5**





**LST-396 unloads M3 halftracks across a coral causeway, making the pontoons on her sides unnecessary. She is spot-painted in an effort to protect chipped off rust spots. The pontoons were typically battered, rusted, and scarred from hard use. The hull number is in black 2ft figures.**

Retracting from the beach was no less complicated than landing. The ramp was raised, being hosed down in the process, doors closed and dogged, and equipment secured. The forward ballast was pumped out and tension set on the stern anchor line. It did little to winch the big ship off the beach, but helped prevent broaching and was kept taut to prevent fouling in the propellers. The compressed sand was no longer a lubricant, but created suction and friction. Engines and rudders were used to slightly swing the stern to “wiggle” it off the beach, though caution had to be used to prevent broaching. “All back full” would allow the propellers to wash sand from beneath the hull and fire hoses were sometimes directed over the forward sides to wash out sand. On crowded beaches with other landing vessels beached closely, there was a danger of the bow, once re-floated, swinging into adjacent vessels – the bow anchor was sometimes dropped and dragged as the ship retracted to prevent this. As the ship neared the stern anchor both anchors were weighed and the ship continued to back out until clear and able to maneuver with engines. The turn to seaward was determined by wind and current directions.

## **LANDING OPERATIONS**

Amphibious operations were extremely complex and related doctrine evolved throughout the war as new tactics and techniques were developed, new types of units fielded, and new equipment and amphibious vessels deployed. The landing force’s mission, terrain, weather, enemy forces and defenses, and other factors influenced the conduct of operations. The execution of landing operations and the invasion force’s organization constantly changed, with no two actions alike. The employment of LSTs from mid-1943 also changed, influenced by the theater conditions as well as innovative ideas. They were more often than not employed in ways far different than those originally envisioned. One factor that had to be taken into consideration was the “S” in “large slow target.” The LST’s slow speed required that the LST convoy departed one or two days ahead of the rest of the invasion force.



**LST-4 approaches landing beaches in southern France. All but one of its six LCVPs have been launched. Three landing nets hang over the sides to allow troops to board landing craft. LST-4's hull number is preceded by the "US" required in the European-Mediterranean Theater.**

### **The Pacific**

The LST arrived too late for the August 1942 Guadalcanal landing, their first operational use being in the northern Solomons in June 1943. Prior to the November 1943, Tarawa Atoll assault, amphibian tractors, or Landing Vehicles, Tracked (LVTs), were employed as cargo carriers to haul supplies ashore, rolling across coral reefs and beaches and delivering loads behind frontline positions. Tarawa saw the first use of the amtrac as an assault vehicle. Beaching craft were often halted at the reef line, even at high tide, and the troops forced to slowly cross hundreds of yards of reef covered with potholes, crevasses, coral heads, manmade obstacles, and enemy fire.

The amtrac's value as an assault vehicle was realized and it became the standard method of delivering assault troops. From early 1944 two or three amphibian tractor battalions and an armored amphibian tractor battalion supported each assaulting Marine and Army division with some 300 amtracs and 75 amphibian tanks. In the early part of the war booms lowered amtracs over the sides of transports on which they were carried as deck cargo.

Beginning with Tarawa, amtracs were loaded aboard LSTs and speedily launched at sea. This procedure was accomplished on a larger scale during the January/February Kwajalein Atoll assault. LSTs were formed into "tractor groups" to transport and deliver amtracs. Up to



**An LST, its weather deck fully loaded, is nosed up to an extended causeway at Peleliu. Four additional causeway sections are off-frame. The staggered causeway provided vehicle bypasses and helped resist lateral currents. An LCM(3) scoots past.**

From top to bottom, LST-779, 808, 788, 760, and 724 disembark cargo on to Beach Green on Iwo Jima. The second, and most famous, of the Suribachi flag raisings was a flag obtained from LST-779. An LCT(6) is still carried aboard LST-808 and 779 has its pontoon causeways still attached to her sides. LSM-264 is beached below the LSTs. Note the ships are running their engines to prevent broaching. The water was deep right up to the shoreline and they found little purchase to run their bows ashore.



17 amtracs were loaded aboard each LST along with support personnel, repair parts, and fuel. At Saipan in June 1944 the Tractor Flotilla was organized into two tractor groups, each subdivided into two tractor units of eight LSTs each and a group LST reserve with six or seven ships. Two of the four groups had two pontoon-carrying LSTs.

The tractor groups, one supporting each assault division, moved into the "tractor area," an area offshore and closer in than the "transport area." The assault troops would board LCVPs and LCMs at their transports and boat to the "tractor transfer area." The amtracs would drive off their LSTs' lowered bow ramps and swim to the transfer area to link-up with the landing craft. The troops would transfer, not an easy task for fully combat-loaded soldiers amid ocean swells. The amtracs would form up into assault waves and with the LSTs' LCVPs serving as control boats they would make their run to shore. Sometimes the first-wave troops would boat to the LST and load their amtracs in the tank deck. Beginning with the Kwajalein assault, amphibian tanks "shot" the amtracs ashore as "Wave 0," coming ashore ahead of the amtracs. Once debarking their troops the amtracs would return to the reef line and pick up more troops at the "tractor transfer line."

At night, when landing operations ceased, amtracs returned to their mother ships, and crews and mechanics worked all night to ready them for the next day. There were instances when amtracs became lost in the dark amid the blacked-out ships and LST skippers refused to take "strangers" aboard. An amtrac out of fuel would sink, being unable to operate its bilge pumps. Recovered amtracs could not turn around once re-embarked on an LST and had to back out over the ramp, a tricky maneuver. It was proposed that turntables be fitted, but this was not done except in some post-war-built LSTs.

LSTs heavily supported all amphibious operations through the island-hopping Pacific War. LSTs were invaluable for delivering vehicles,





LST-738 burns off Mindanao after being struck by a kamikaze. USS *Moale* (DD-692) closes in to rescue the crew. Note the unusual amidships position for the large white hull number. The faint smoke on the horizon to the left is LST-742, also hit by a kamikaze aircraft.

supplies, and materials for the reinforcement and garrison forces. They were even used to transport displaced natives and repatriated Japanese troops home.

### Sicily

The first use of the new LSTs in the Mediterranean was the July 1943 Sicily invasion. Much of the American invasion force assembled at Bizerte, Tunisia, and included 72 LSTs, two of which were fitted with spotter-plane flight decks. Six to 14 LSTs were assigned to the half-dozen attack groups and tasked to land infantry, tanks, and artillery. The British also employed a number of LSTs to include the three LST(1)s.

It was for Sicily that the pontoon causeway was developed to bridge known sandbars. Insufficient pontoons were available and LCT(5)s were modified by cutting out and hinging a side bulkhead section. The LST would lower its ramp and the LCT would dock perpendicularly against it. A tank would drive into the docked LCT, another LCT would drop its ramp on to the docked LCT's lowered ramp, and the tank be driven on to it to be run ashore. It was a slow process, but necessary because of too few causeways. The later LCT(6) was fitted with a removable stern plate for the same purpose.

Another innovation resulted from the lack of attack transports and attack cargo ships, which carried large numbers of LCVPs and LCMs. The Licata Attack Force, carrying almost 28,000 troops, was allotted 36 LSTs and 40 Landing Craft, Infantry (LCI). LCIs were insufficient to land



A Piper L-4 Grasshopper spotter aircraft launches from LST-906, one of six LSTs modified as "aircraft carriers" by Seabees (men of the US Naval Construction Force) in the Mediterranean. The flight decks were usually deck blue (dark blue) with a white or yellow center-strip. Others lacked the side storage racks.



This oft seen photograph of LST-325's stern beached at Normandy provides an excellent view of the kedge anchor, prop guard, rudders, and skegs protecting the props. The stern anchor's capstan is beneath the forward of the two 40mm tubs. LST-388 is seen in the background. Note how her deck remains level on the 1-in-50 beach gradient.



assault troops and LCVPs were needed for the initial assault waves, the LCIs being too large to risk. Four additional pairs of davits were fitted to LSTs to provide 216 LCVPs. Some served as control and scout boats to mark the beaches, but even with five LCVPs boating troops, 180 men per LST could be landed in each wave. In addition to heavy equipment carried on LSTs, 500 assault troops were loaded aboard each.

The LSTs were loaded at Bizerte where large cranes were available and a loading ramp constructed to accommodate 18 LSTs. This was also the first assault in which DUKW 2½-ton amphibious trucks, "Ducks," would be used. They were loaded aboard LSTs and launched over the bow ramp at sea.

The use of LCVPs as assault craft launched from LSTs at night proved successful. Difficulties on the first day of the Sicily landings occurred when swells prevented LCTs from marrying up with LSTs to lighter tanks ashore and prevented Ducks from launching. Desperate to get tanks and artillery ashore, some LSTs were ordered to beach early. There were too few causeways available and landing craft broached when attempting to emplace them in the surf. It had been assumed that the pier at Gela would be available, but it was not. Scouts were supposed to locate gaps in the sandbars, but this proved impossible at night. Regardless, attempts were made. LST-338, for example, ran into the beach after sunrise and despite a strong current hampering causeway emplacement, plus air and artillery attacks, it unloaded 63 vehicles and 300 troops in two hours. Only two LSTs were lost.

The Sicily invasion saw the effective and innovative use of the LST and it was quickly realized how valuable these vessels were. LSTs went on to support operations at Salerno where over 100 were employed, at Anzio with 17 US and 49 British vessels, and in southern France with 72 ships.

### **Normandy**

A total of 168 American and 61 US-built British LSTs were employed for the June 1944 Normandy invasion. This operation required some LSTs to be redeployed from the Mediterranean. The LSTs assigned to



the Western Naval Task Force to support the American landings were organized into assault groups with other landing craft. An assault group could have six, 12, or 15 LSTs plus large numbers of LCIs, LCTs, and LCMs. More LSTs were assigned to two follow-up groups carrying reinforcements and equipment, 25 in one group and 43 in the other. At the time of the invasion, while over 1,000 LSTs would be built before the war's end, fewer than half that number were operational.<sup>2</sup>

The LSTs landed in the later of the over 20 assault waves. Most assault-wave tanks, because of the short Channel crossing, were delivered by LCTs. During the first month after the landing an average of 40 LST loads were delivered each day. Rough surf on D-Day morning precluded LSTs from off-loading on to Rhino ferries, but the sea calmed later.

While occasional air attacks hit the beachhead, LSTs would beach themselves after high tide, remaining grounded as the tide receded. This allowed them to off-load across the broad beach without the need for causeways or time-consuming lighters. Most LSTs making the Channel crossing carried a tethered barrage balloon at 100ft altitude.<sup>3</sup> A number of US and British LSTs were fitted with railroad rails on the tank deck to deliver French-gauge rolling stock.

An important service provided by LSTs at Normandy was casualty evacuation. Standard LSTs, and not just the specially fitted "hospital LSTs," were employed. Most LSTs were provided with one Army and two Navy doctors, two Army operating room technicians, and 40 Navy hospital corpsmen. One of each pair of LSTs would be selected after beaching for evacuating the wounded and the medical personnel from the other would transfer over. Other LSTs replenished battleships and cruisers with ammunition during the many weeks of fire support. Up to 1,000 tons of ammunition was loaded and two or three LSTs came alongside the big-gun ships and replenished them rapidly using extra cranes. LSTs continued to ply the Channel, hauling supplies, equipment, and materiel as the Allied offensive pushed toward Germany.

**LST-1 and 292 are beached high-and-dry at Normandy. It was initially feared complete beaching would break an LST's back, but this concern proved unfounded. Of course the ship was always at risk of air attack, but no "stranded" LSTs were lost to enemy action.**

<sup>2</sup> LST deployment, June 1944: 168 US and 61 British in the UK, 23 US and two British in the Mediterranean, 95 US on East Coast (none on West Coast), and 102 in the Pacific (no British in Far East).

<sup>3</sup> The very low altitude (VLA) balloons belonged to 320th Antiaircraft Balloon Battalion (VLA) (Colored). The balloons were placed aboard LSTs; the crews accompanied the tethered balloons and then moved them ashore. Realizing the Germans used the balloons as artillery aiming points, they were all eventually cut loose. One German aircraft loss was attributed to a balloon.

The interior of the tank deck, looking forward, of a British LST filled with wounded from Normandy. Three tiers of litters are set in side bulkhead racks and more litters on deck. Sometimes folding cots were used. Over 41,000 casualties were evacuated to Britain aboard LSTs.



## LST AUXILIARY VARIANTS

The LST was a remarkably versatile ship because of its available space within both its cavernous tank deck and weather deck. Some 113 LSTs were converted to auxiliaries, sometimes after first serving as a conventional LST, and others during construction.

In many instances the bow ramp was removed, bow doors welded shut, additional anchor scuttle added to the starboard bow, tank deck divided into work spaces and accommodations, and the weather deck crowded with shelters, shops, work areas, booms, derricks. The armament was also changed.

The 47 US Achelous-class Landing Craft Repair Ships (ARL) accompanied invasion forces to provide advance base repairs for damaged landing craft and were converted in 1943–45. The deckhouse was extended forward for workshops to just aft of the elevator. The elevator was removed and converted to a hatch. An athwartship 50ton A-frame derrick was fitted on the port side and two 10ton booms forward (60ton derrick and 25ton cranes after ARL-9) and space provided atop the deckhouse for damaged landing craft. Armament was a 3in gun (ARL-1–9), two quad 40mm, and eight 20mm guns. The tank deck was compartmented into foundries, machine, electrical, metalworking, carpentry, and other workshops. ARLs carried two LCVPs or 36ft motor launches. Later ARLs also carried an LCM. These modifications and armament were typical of the other types of repair ships based on LSTs, all of which were christened with the names of mythological characters, as were torpedo boat tenders.

The RN converted five LST(2)s to Landing Ships, Emergency Repair (Landing Craft), LSE(LC)-50–54. They differed in design from US ARLs, as they lacked the derrick and had a large superstructure forward.

Two types of Aircraft Repair Ship (ARV) were built on LSTs: ARV (aircraft) and ARV (engine). The two Fabius-class aircraft repair ships were ARV(A)-5 and 6 while the Aventinus-class engine repair ships were ARV(E)-3 and 4. Like the ARLs they had an extended deckhouse, workshops, plus engine testing equipment, but lacked the heavy derrick and had only one boom.



An unballasted LST-723 cruises with its lowered ramp above water. She has seen hard service judging from her deteriorating Tropical Measure 31/17L dappled edge scheme. This photograph was probably taken after it had participated in back-to-back operations at Iwo Jima and Okinawa. In 1944 6ft hull numbers were directed and time did not even allow the former 2ft numbers to be painted over.

Twelve Aristaeus-class Battle Damage Repair Ships (ARB-1-12) were converted in 1943-45 along similar lines to the ARLs. They were fitted with heavier lifting gear and workshops to provide light damage repair in forward areas.

The Portunus-class Motor Torpedo Boat Tender was represented by ten examples (AGP-4-5, 10, 11, 14-18, 20) converted in 1943-45. Its modifications were similar to the ARL, with a 50ton derrick and two 25ton cranes forward. They provided boat repairs, carpentry shop, fuel, water (water distiller installed), and accommodations for Patrol Torpedo Boat (PT) crews. One normally supported one or two motor torpedo boat squadrons of 12-16 boats and was essentially a mobile PT boat base.

Three LSTs were converted as Laysan-class salvage craft (tender) - ARS(T)-1-3 - in 1945. They provided tender duties to tugboat-like salvage ships (ARS). Their main value was to provide stowage for the large amount of specialized salvage equipment and materials needed by the small salvage ships lacking space for the extra equipment.

Sixteen Benewaw-class Barracks Ships (Self-propelled) (APB-35-48) were converted in 1944-45 by removing the bridge, extending the deckhouse forward to the forecastle, and building a large superstructure and bridge on the forward end of the deckhouse. Some were initially designated General Stores Issues Ships (AKSs), but were redesignated in late 1944. The lengthened deckhouse and tank deck were divided into officers' and enlisted berthing, galleys, messes, dispensary, laundry, provisions storage, and sanitation facilities. They had four water distillers. Double Welin-type davits were fitted amidships on both sides, each holding two LCVPs. They also had two ten-ton booms forward and were armed with two quad 40mm and eight 20mm guns. An earlier conversion, initially called the LST (Modified), or LST(M), retained the original deckhouse, added two 20 x 48ft Quonset huts on the centerline weather deck for officer berthing, and two rectangular compartments on either side with refrigerators, bakery, bathrooms, etc. to berth 990 personnel. This type retained the six LCVP davits and was armed with eight 40mm and 12 20mm guns.

The Landing Ship, Tank (Casualty Evacuation) - LST(H) - was an in-theater modification. "H" is usually said to mean "hospital" and the

vessels were called "first-aid ships." The first of the 38 conversions was made in 1943 and the conversions continued through the war. The ships were beached once the beachhead was secured and the wounded brought in through the bow door. Side compartments were converted to receiving, sterilizing, and operating rooms. On the tank deck 78 beds were installed along with lockers, toilets, wash facilities, and refrigerators. The wounded were triaged, treated, and moved to hospital-type beds. Once the ship had received all the wounded it had space for, it departed and delivered the casualties to hospital-equipped transports or, in the case of the Normandy landings, back to Britain. Six doctors, a dentist, and a number of medical corpsmen manned the LST(H). Some ships had only simple medical facilities and large numbers of wounded were merely received in litters. The British versions could accept 300 litters and 160 walking wounded and were manned by three doctors and 16 aidmen. The concept was not entirely successful – it was found in some cases that it would have been better to evacuate the wounded immediately to transports in smaller craft for further treatment rather than wait for the LST(H) to receive a full load. These ships retained their original hull numbers – LST-38 became LST(H)-38 – and were not named. Externally they appeared no different from standard LSTs (some converted in 1945 had extended deckhouses), and they retained their armament, and did not display the red Geneva Cross.

Two types of "aircraft carrier" LSTs were converted without receiving new designations. Six LST(2)s were so modified in the Mediterranean in 1943–44 with one or two used at Sicily, Salerno, Anzio, and southern France. They had a 16ft-wide, 220ft-long flight deck stretching from bridge to bow. Two Army Piper L-4 spotter aircraft could be carried. The superstructure prevented launched aircraft from landing back aboard, meaning an airstrip had to be available ashore.

The USS *Atlas* (ARL-7), an Achelous-class Landing Craft Repair Ship, displays features common to other LST repair ships: extended deckhouse, 50ton port side derrick, two ten-ton booms, sealed bow doors, and quad 40mm guns. This is a post-war photo judging from the black highlighted hull number.





LST-776 was rigged with a Brodie Device at the end of 1944 and used at Iwo Jima (Marine OY-1s) and Okinawa (Army L-4s). The system was developed by Army Capt James H. Brodie. Two 55ft kingposts were mounted on the port side on the aft end of the forecastle and on the aft end of the deckhouse. A 55ft arm angled out from the kingposts, 10 o'clock on the forward and 7 o'clock on the aft. A 300ft cable connected the two arms and was fitted with a sliding rectangular ring. There was also a trainable aircraft catapult on the weather deck. Twenty-five LSTs were to be modified with Brodie Devices, eight were completed, but the war ended before they deployed to the Pacific.

Three RN LST(2)s were converted to Fighter Direction Tenders (FDTs) in early 1944 to support the Normandy landings. They were fitted with extensive communications and radar equipment including a large rotating rectangular, frame-type radar antenna on the forecastle, a smaller one amidships, and numerous radio masts. The 255-man crew included a large complement of Royal Air Force specialists. To improve sea-keeping abilities since the vessels carried no cargo, pig iron ingots were stacked on their weather decks and the cargo and elevator hatches decked over.

\* \* \*

LST(2)s went on to serve in the Korean and Vietnam Wars and new upgraded classes were built in 1952-54 (LST-1156 Terrebonne Parish-class) and 1956-57 (LST-1171 DeSoto County-class). A new design lacking bow doors, but fitted with a long over-the-bow ramp, was built in 1969-73 (LST-1179 Newport-class) and the older classes decommissioned. The last LST in US service was decommissioned in October 2002, USS *Frederick* (LST-1184).

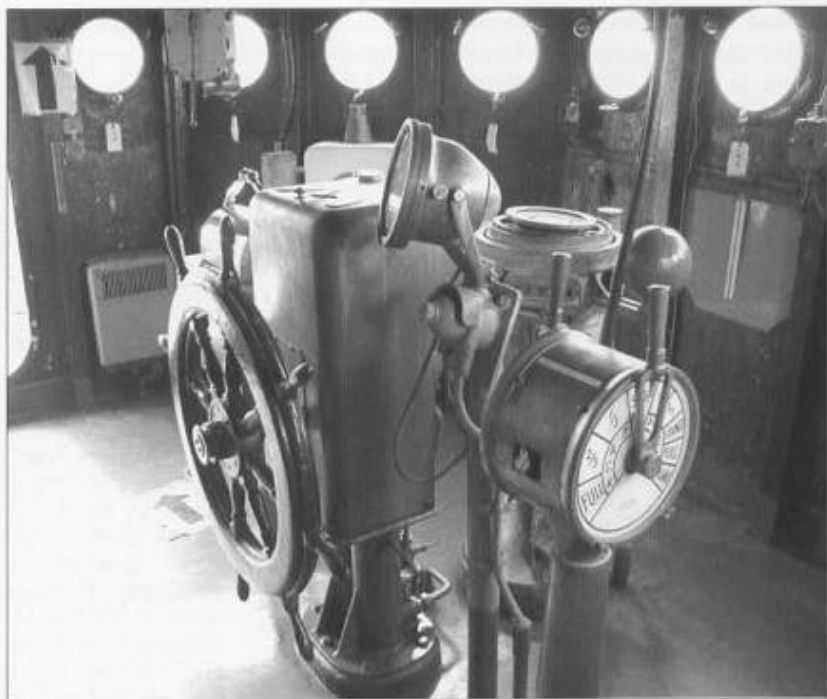
## THE LST REMEMBERED

The LST passed from USN service, but will be remembered as a venerable and trustworthy, if somewhat cantankerous, workhorse of World War II and later wars. A few World War II and post-war LSTs are still in use by foreign navies, but there are no LSTs in service with the USN and RN. The only operational LST(2) in America is LST-325 operated by the USS LST

USS *Yavapai* (APB-42), a Benewah-class barracks ship, is tied up to a mooring buoy and serves as a mother ship for an unidentified LST in the 850-block, LST-461, 662, 672, and 733. Their lowered bow ramps provide a convenient small craft dock.



Even though the still operational LST-325 has been outfitted with some modern navigation and communications gear, the ship's wheel, gyrocompass, binnacle housing the magnetic compass, and engine order repeater (annunciator) are the same as used in World War II.



Memorial Association, Inc. At the time of writing LST-325 was berthed at Chickasaw, Alabama, but will relocate to Evansville, Indiana, by the fall of 2005. LST-325 was purchased from Greece by the LST Association, refurbished, and sailed 6,500 miles from Crete to Alabama by a crew of World War II LST veterans in 2001. The ship undertakes cruises to other ports and is open to the public. Another restored LST(2), LST-393, is located in Muskegon, Michigan and may be visited by appointment. Former LST-3515, renamed HMS *Stalker* in 1947 and converted to a submarine support ship in 1958, was decommissioned in 1982 for disposal and is presently laid up in Portsmouth harbor. Efforts are being made to restore this last surviving British-designed LST(3).

LST commemorative plaques may be found at some of the remaining shipyards where they were built. A Large Slow Target sculpture dedicated to LST crewmen is found on the Navy Memorial in Washington, DC.

The United States LST Association was organized in 1985 to bring former shipmates together and hold reunions, and the British LST and Landing Craft Association was established in 1988 with the same aims.

The USN's LST Index website provides a brief history as well as photographs of all commissioned LST including those converted to auxiliaries.

## BIBLIOGRAPHY

- Baker, A.D. II. *Allied Landing Craft of World War Two*. Annapolis, MD: Naval Institute Press, 1985. (Originally published as *Allied Landing Craft and Ships*, ONI 226, 1944 with Supplement No.1, 1945.)
- Bruce, Colin J. *Invaders: British and American Experience of Seaborne Landings 1939-1945*. London: Chatham Publishing, 1999.

- Friedman, Norman. *US Amphibious Ships and Craft: An Illustrated Design History*. Annapolis, MD: Naval Institute Press, 2002.
- Jagers, Robert B. *Whales of World War II*. J.B. Jagers (privately published), 2003 (available from LST-325 website).
- Macdermott, Brian. *Ships Without Names: The Story of the Royal Navy's Tank Landing Ships of World War II*. London: Arms and Armour Press, 1992.
- Witter, Robert E. *Small Boats and Large Slow Targets: Oral Histories of United States' Amphibious Forces Personnel in WWII*. Missoula, MT: Pictorial Histories Publishing, 1998.

#### **LST Web Sites**

USN LST Index

<http://www.navsourc.org/archives/10/16idx.htm>

USS LST Memorial Association, Inc. (LST-325)

<http://www.lstmemorial.org/>

US LST-393

<http://www.lst393.org/>

United States LST Association

<http://www.uslst.org/>

British LST and Landing Craft Association

[http://www.lstlandingcraftassoc.org/index\\_nf.shtml](http://www.lstlandingcraftassoc.org/index_nf.shtml)

The lavish cargo capacity of the LSTs allowed them to be used for all sorts of roles their designers had not envisioned. Here LST-221, serving as an ammunition replenishment ship, transfers bombs to the carrier USS Hancock (CV-19).



## COLOR PLATE COMMENTARY

### A: BEACHING OPERATIONS

The LST existed to deliver tanks to hostile faraway shores. Up to 20 M4 Sherman tanks could be carried in the tank deck. The bow doors were secured by nine turnbuckle dogs on each side and a heavy clamping device. Eleven turnbuckle dogs secured the ramp (one top center, four each side, two bottom). A yellow or white centerline strip was occasionally painted on the ramp of USN LSTs and virtually all RN LSTs. It was common for the LST's hull number to be painted above the ramp and occasionally on the prow above the doors in smaller size. The railing on the port forecabin 40mm tub served as a deflector to prevent the gun from firing into other forecabin guns.

Pontoons could be assembled into various floating assemblies held together by bolted fittings called "jewelry." The standard causeway (1) was two pontoons wide and 15 long (2 x 15 causeway), and assembled from forward to aft, on which the LST's ramp (2) rests. From forward to aft (inshore and offshore ends) this causeway was assembled with two section wedge-shaped P4 (3) and P4 (4) ramp pontoons, 24 P1 (5) 5 x 5 x 7ft rectangular 1ton P1 standard pontoons capable of supporting a 10ton load, and P2 sloped bow pontoons (6), in this case used on the aft end. Causeways were sometimes assembled up to twice that length and three and four-pontoon wide causeways were also used. The minimum pontoon causeway consisted of an inshore and an offshore causeway carried with one lashed to either side of the LST. The inshore had P5s or P2s on one end and P3/4s on the other. The offshore causeway had P2s one end and P2s or P5s on the other. Only an inshore causeway is necessary here. Any number of intermediate causeways, up to a mile in length, could be linked together, either end-to-end with P5s or secured in a staggered assembly with P2 ends.

### B: LST ARMAMENT

LST armament varied greatly. The ultimate armament plan for an LST's "forward group," i.e. the forecabin-mounted guns, was a dual 40mm Mk 1 on the bow and a single 40mm on each side plus various numbers of 20mms, here on the light Mk 10 mounts. Powered 40mm dual guns might be backed by a Mk 51 gun director, which tracked and calculated range, deflection, and elevation. The director tubs and wiring were installed, but the director was seldom actually fitted. The HE-tracer rounds detonated on impact, although they self-destructed after 11.5 seconds - 5,400yds. The most effective engagement range was 2,000-3,000yds firing at 120-180rpm. The 20mms threw up a stream of fire at 550rpm, the idea being that attacking aircraft would run into a wall of fire. As the aircraft closed, gunners used the fire-hose principle, directing a stream of high explosive, HE-incendiary, and HE-tracers at the aircraft. The rounds only detonated upon impact with an effective range of about 2,000yds. Under continuous-fire conditions the 60-round magazine was replaced about every eight seconds.

### C: LST(2) VARIANT PLANS

**C1:** The initial LST-1 armament of six 20mm guns and a 3in gun (which some ships lacked) was far too light. Ships so armed were later up-gunned, similar to C2. The 3in gun was



**An alternate means of disembarking vehicles from an LST when pontoon causeways were not available was the employment of LCT(6)s with their stern plates removed.**

replaced by a single and later a twin 40mm Bofors. The ship is painted haze gray Measure 13, as were most upon completion. Decks are deck blue. The 2ft and 3ft white hull numbers proved difficult to identify at even 1,000yds. Black numbers were sometimes used in an effort to increase identification range. While LSTs were camouflaged, it was essential hull numbers be identifiable at long ranges for control purposes.

**C2:** LST-178 demonstrates the later improved armament with five single 40mm guns on the forecabin, a twin 40mm on the stern backed by three single 40mm and 14 20mm guns. It has been fitted with six Welin-type davits with five LCVPs and an LCP(L). Measure 22, the "graded system," with navy blue and haze gray (sometimes replaced by pale blue), was widely used in the Mediterranean and the Channel. Decks were deck blue. White hull numbers were 6ft high and in the European Theater were preceded or sometimes followed by a 6ft or 8ft "US." British LSTs went without nationality letters.

### D: ANATOMY OF AN LST(2)

LST-1 through 491 and LST-531 were fitted with a weather-deck to tank-deck elevator. Later classes used a more efficient ramp, shown here with the ramp lowered. When lowered the ramp's end ran straight on to the "hump" in the doors' throat. Note that the ramp hatch is larger and located further forward on the forecabin than the elevator hatch. This is a composite diagram showing both the elevator and weather-deck to tank-deck ramp; a given LST had one or the other. From within the tank deck the separation between the deck-level third deck and second deck above it was not apparent. The correlation of the two decks can be seen just aft of the bow doors on the starboard (right) side.

See plate for full details.





German prisoners from Normandy were often evacuated to Britain aboard returning LSTs. Some 1,000 POWs were often crammed aboard an LST for the short cross-Channel trip. LST-21 in the background has the required "US" painted above its hull number, rather than in the usual preceding position.

#### E: LST(2) VARIANT PLANS

**E1:** LST-125 is armed with three single 40mm guns on the forecastle, two single 40mms on the stern, two more on the aft deckhouse corners, and 12 20mm guns. Tropical Measure 31/18L was a common Pacific scheme with ocean green, deck green, haze green, and dull black. The decks and superstructure are painted deck green. White 6ft hull numbers were required from the end of 1944, allowing ships to be identified at 4,000yds. Camouflage measures specified colors, but the actual pattern was left to the crew and varied greatly, especially in the Pacific where many non-standard patterns were employed into 1943. Like most LST-1-class ships, it has been fitted with a raised conn built over the original.

**E2:** LST-909 is armed with three single 40mm guns forward, four 40mm guns on the corners of the deckhouse, a twin 40mm on the stern with another single aft of it, and a total of eight 20mm cannon. The LCT(6) deck cargo bears Measure 33/12L of ocean green and pale green. LST-909 is painted in a modified Measure 31/17L, another popular tropical camouflage scheme of ocean green, deck green, haze green, and dull black. Other shades were often used owing to paint shortages (paints were thinned to stretch them) and rapid weathering. The edges of the pattern are dappled to blend the bands naturally. Tropical schemes were intended to allow vessels to hide from aircraft along jungled shorelines and make their silhouettes indistinct when viewed from the surface against island backdrops. This is a rare instance when the hull number was blended into the camouflage pattern – upon arrival in the Pacific 6ft white numbers would

replace it. The ramp hatch replacing the elevator on the forecastle can be seen with its low access ramp aft. A conn has been built on a steel-frame tower.

#### F: LST VARIANT AND AUXILIARY PLANS

**F1:** The influence of the British Mk I Boxer-class LST can be seen in the classic US LST(2). While a larger ship at 390ft long rather than the LST(2)'s 326ft, the LST(1) had less capacity and drew more water, limiting beaching capabilities. The most noticeable visual differences were the amidships superstructure and funnel.

**F2:** The USS *Chimaera* (ARL-33) Achelous-class Landing Craft Repair Ship provided the basic design for other repair ships and tenders based on the LST(2). Armament for most of these ships included quad 40mm guns on the bow and stern and eight 20mm guns, and 36ft motor launches were often carried rather than LCVPs. The 50 or 60ton derrick is on the port side amidships and two ten-ton booms and kingposts are forward of the extended deckhouse. The vessel is painted with Measure 31 in navy green, ocean green, and pale green. Her hull number is found on the bow and stern in 6ft white numbers. It was common for 2ft classification code letters, with the "A" typically dropped, to accompany the hull number on auxiliaries.

**F3:** The USS *Oceanus* (ARB-2) Aristaeus-class Battle Damage Repair Ship, besides the aft quad 40mm, also mounts a 3in gun. An LCM(3) is tied alongside. The LST is painted with Measure 31 in navy green, ocean green, haze green, and pale green. Superstructures and masts were often haze gray, even on camouflaged ships, to blend with the sky, but *Oceanus* extended the camouflage pattern on to the superstructure and even the motor launches. Only a 2ft white "2" on the bow identifies the ship.

**F4:** The USS *Silenus* (AGP-11) Portunus-class Motor Torpedo Boat Tender is fitted with the heavier 60ton amidships derrick and 25ton cranes forward. It is painted in Measure 31 with navy green, haze green, and pale green for a marked contrast. The hull number is a 2ft black "11."



**French-gauge railroad cars were delivered to Normandy by rolling them off special ramps on to rail extensions laid down the beach. Note the gondolas are marked with the US Army Corps of Transportation insignia.**

The superstructure, mast, derrick, kingposts, and launches are pale green. Note that the ship is fitted with radar. A 78ft Higgins PT boat lies alongside.

**F5:** The USS *Kingman* (APB-47) Benewaw-class Barracks Ship (Self-propelled) provided accommodations for smaller landing craft crews as their LCTs, LCIs, etc. had limited accommodations. They were commonly known as "landing craft tenders" or "landing craft mother ships" and were named after US counties and parishes, the prelude to the name category that would be bestowed on all remaining LSTs in 1955. Identified by 6ft white numbers, the camouflage is simple navy green on ocean green. This design re-routed the engine exhaust vents from the sides through a funnel in the aft of the deckhouse.

#### **G: LST VARIANT AND AUXILIARY PLANS**

**G1:** LST-1110, serving as a pontoon causeway-carrier fitted with causeways of different lengths on its sides, here 2 x 30 pontoon causeways with P2 bow sections. Pontoons were painted to prevent rusting. Primer red and gray were common, but some primer yellow pontoons are mixed in with these primer red ones. The ship bears Measure 34 in deck

green and tan with all structures above the weather deck of haze gray. The LCVPs are splotted with a darker gray. Hull numbers are 6ft white. During the war simple block numbers were used without the post-war black shadowing. LST-1110 is a rare example of a ship fitted with four sets of davits. LSTs carrying pontoon barges were sometimes identified in the task force list by "PB" following their hull number.

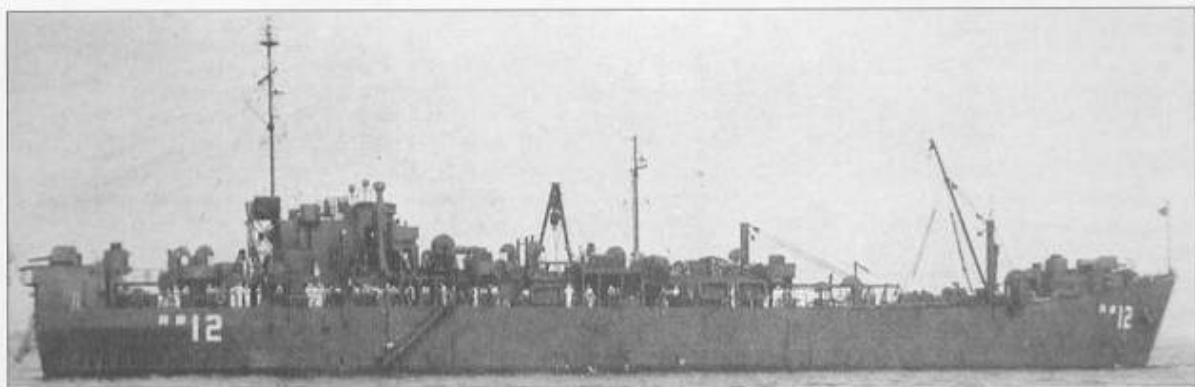
**G2:** The LST-16 "aircraft carrier" was one of the first of six LST(2)s modified in the Mediterranean, along with LST-158, 337, 386, 525, and 906. Most could only carry two Piper L-4 spotter aircraft, but LST-906 had two aircraft racks on each side and the enlarged flight-deck section forward of the bridge held four more. LST-16 is simply painted haze gray with a 4ft "16" on the bow.

**G3:** The LST-393 Brodie Device-equipped "aircraft carrier" carried three or four Piper L-4 spotter aircraft, one on the deck catapult. To launch the aircraft it was suspended on the aft end of the cable and the pilot lowered to it from the catwalk via a bosun's seat. The ship turned into the wind, the aircraft ran down the cable, and released itself before reaching the end. For recovery the aircraft would hook the ring and slide down the cable to a stop. LST-393 is camouflaged in Measure 31/18L with dull black, navy green, ocean green, and haze gray. She is identified by 6ft white numbers on the bow and stern.

**G4:** FDT-216 was one of three British Fighter Direction Tenders converted from LST(2)s, the others being FDT-13 and 217. They retained their six 20mm guns and single 3in gun. Their landing craft were removed and replaced by motor launches. FDT-216 was lost to a mine. A frequently used color scheme in the Channel was a mid-blue and pale gray. (HMS *Boxer* was converted to a fighter direction ship of a much different design in 1944.)

**G5:** LST-3515 was a Canadian-built, British-designed LST(3), outwardly larger than its American counterpart by 17ft in length and 4ft in beam. Five Landing Craft, Assault (LCA) were carried, up to seven on some LSTs. Overall the hull was painted a dull white with a smaller craft's silhouette on the sides in light blue. The white easily disappeared in Channel fog. The hull number is in black 4ft figures.

**The USS *Demeter* (ARB-12), an *Aristaeus*-class Battle Damage Repair Ship, is painted solid gray with its classification letters (the "A" typically excluded from auxiliaries) and hull number in white.**

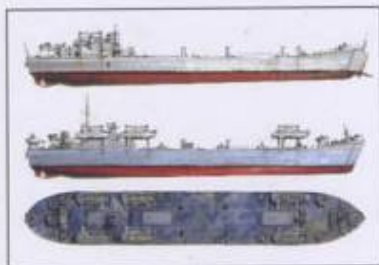


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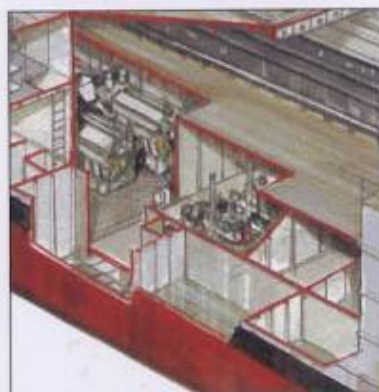
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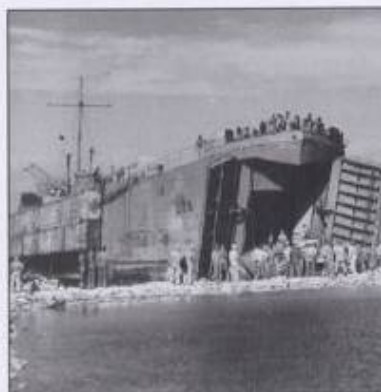
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## Landing Ship, Tank (LST) 1942–2002

The Landing Ship, Tank (LST) is one of the most famous of the many World War II amphibious warfare ships. Capable of discharging its cargo directly on to shore and extracting itself, the LST provided the backbone of all Allied landings between 1943 and 1945, notably during the D-Day invasion. Through its history, the LST saw service from late 1942 until late 2002, when the US Navy decommissioned the USS *Frederick* (LST-1184), the last ship of its type. This book details the development and use of the LST, including how it exceeded initial design expectations.

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