NPS Form 10-900
(Oct. 1990)

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NAT. REGISTER OF HISTORIC PLACES
NATIONAL PARK SERVICE

4134

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in How to *Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name U.S.S. LST 325

other names/site number

2. Location

street & number 840 LST Drive N/A ☐ not for publication

city or town Evansville N/A ☐ vicinity

state Indiana code IN county Vanderburgh code 163 zip code 47713

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this ☑ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☑ meets ☐ does not meet the National Register criteria. I recommend that this property be consider significant ☑ nationally ☐ statewide ☐ locally. (☐ See continuation sheet for additional comments.)

[signature] 4/24/2009
Signature of certifying official/Title Date

Indiana Department of Natural Resources
State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. (☐ See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that the property is:

Signature of the Keeper Date of Action

☑ entered in the National Register. Patrick Andrus 6/24/2009
☐ See continuation sheet

☐ determined eligible for the National Register.
☐ See continuation sheet

☐ determined not eligible for the National Register.

☐ removed from the National Register.

☐ other, (explain:)

U.S.S. LST 325
Name of Property

Vanderburgh County, IN
County and State

5. Classification

Ownership of Property
(Check as many boxes as apply)

- ☑ private
- ☐ public-local
- ☐ public-state
- ☐ public-Federal

Category of Property
(Check only one box)

- ☐ building(s)
- ☐ district
- ☐ site
- ☑ structure
- ☐ object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
0	0	buildings
0	0	sites
1	3	structures
0	0	objects
1	3	Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions
(Enter categories from instructions)

DEFENSE: naval facility

Current Functions
(Enter categories from instructions)

TRANSPORTATION: water-related
RECREATION & CULTURE: museum

7. Description

Architectural Classification
(Enter categories from instructions)

OTHER: military transport ship

Materials
(Enter categories from instructions)

foundation N/A
walls N/A

roof N/A
other METAL: steel

Narrative Description
(Describe the historic and current condition of the property on one or more sheets.)

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for the National Register listing.)

☑ **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.

☐ **B** Property is associated with the lives of persons significant in our past.

☑ **C** Property embodies the distinctive characteristics of a type, period, method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

☐ **D** Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

Property is:

☐ **A** owned by a religious institution or used for religious purposes.

☐ **B** removed from its original location.

☐ **C** a birthplace or grave.

☐ **D** a cemetery.

☐ **E** a reconstructed building, object, or structure.

☐ **F** a commemorative property.

☐ **G** less than 50 years of age or achieved significant within the past 50 years.

Areas of significance
(Enter categories from instructions)

MILITARY
ENGINEERING

Period of Significance

1942-1945

Significant Dates

1942
1943
1944

Significant Person
(Complete if Criterion B is marked above)

n/a

Cultural Affiliation

N/A

Architect/Builder

Philadephia Naval Ship Yard

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography
(Cite the books articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):
☐ preliminary determination if individual listing (36 CFR 67) has been requested
☐ previously listed in the National Register
☐ previously determined eligible by the National Register
☐ designated a National Historic Landmark
☐ recorded by Historic American Buildings Survey #
☐ recorded by Historic American Engineering Record #

Primary location of additional data:
☐ State Historic Preservation Office
☐ Other State agency
☐ Federal agency
☐ Local government
☐ University
☑ Other
Name of repository:
USS LST Ship Memorial, Inc.

10. Geographical Data

Acreage of Property Less than one acre

UTM References
(Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing
1	16	449330	4200700
2			
3			
4			

☐ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Steve Boeder / Paul Diebold

organization USS LST Ship Memorial date 12/22/08

street & number 840 LST Drive telephone (812) 435-8678

city or town Evansville state IN zip code 47713

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 0r 15 minute series) indicating the property's location.

A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items
(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of SHPO or FPO.)

name USS LST Ship Memorial

street & number 840 LST Drive telephone (812) 435-8678

city or town Evansville state IN zip code 47713

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend listings. Response to this request is required to obtain a benefit in accordance to the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.)
Estimated Burden Statement: Public reporting burden for this is estimated to average 18.1 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.O. Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Projects (1024-0018), Washington, DC 20503.

Section 7 – Description

OVERVIEW

This National Register of Historic Places nomination includes LST 325 and three associated LCVPs hung on the ship's davits. The LCVPs post-date the period of significance and are therefore non-contributing. They do further visitors' understanding of the function of the ship and do not detract from the significance of LST 325. The ship retains its original hull, engines, operating systems and even armament (rendered permanently inoperable).

The Tank Landing Ship or LST was the only ship designed and built for the Navy with the capability to land on beaches, unload troops and supplies and then retract off the beach. The LST is 328 feet long and 50 feet wide. The lower deck or tank deck is 230 feet long, 30 feet wide and 12 feet high. It could carry 2100 tons of cargo. The LST is a shallow drafted vessel with a flat bottom, bow doors and stern anchor with 900 feet of 1-5/8" cable. During landing operations, the anchor is dropped allowing the cable to unroll off a winch. After unloading, the winch is engaged and the LST is pulled from the beach. The anchor also helped stabilize the ship while it was on the beach. The unloading took place through the bow doors. There was an elevator on the first LSTs but on later models, a ramp replaced the elevator. The ramp connects the main deck to the tank deck. Troops disembarked either through the bow doors or via cargo net on the side of the ship. LSTs were also equipped with a floating causeway which was used as an extension of the ship to the beach and facilitated unloading.

The LST was powered by two diesel engines. The maximum speed was 11.5 knots. Six ballast tanks are in the bow and four are situated near the engine room. The tanks helped keep the ship stable in open waters and during beach landings. Water from the ballast tanks next to the engine room was used to cool the engines during beach landings so as to avoid drawing in sand. LST's were equipped with anti-aircraft guns. The USS LST 325 has six-40 mm and four-20 mm guns. These guns were not designed for use against land targets but for defense against attacking enemy air craft. By itself, a LST is an easy target. However, LST's traveled in convoys of usually 15-30 in number. By doing this, their fire power was significantly enhanced which gave them a formidable defensive capability.

Since returning to the U.S., the USS LST 325 has been maintained according to its original design and continues to be sea worthy. It is moored in Evansville, Indiana. Tours are conducted daily and the ship is taken out one or more times per year to participate in events and to allow many people, especially families of veterans, see and tour the ship. The USS LST Ship Memorial Inc. has spent over one million dollars in maintaining the ship.

General Specifications: (LST-542 Class)

Hull: All-welded steel 3/8" thick Length: 327' 9" Beam: 50-feet
Designer's water line: 316' 0" // Bilge radius: 18-3/8"
Forward perpendicular (F.P.) 10' 0" // Aft perpendicular (A.P.) 1' 9"
Midline perpendicular (M.P.) 24-inches forward of frame #26
Design draft - forward 6' 8-1/2" // -aft 13' 0-3/8" [Displacement @ D.D. 3,590 tons]
Draft (forward): (empty) 1-1/2-feet; Beaching trim: 3 to 6-feet;
Full load (1,900 tons) 8-feet
Draft (aft): (empty) 10-1/2-feet; Beaching trim: 10 to 13-feet;
Full load (1,900 tons) 14-1/2-feet
Bow ramp: Length - 23-feet (13-foot opening height) Width - 16' 3"
Bow doors: Quantity - Two (2) Height - 24-feet Width - 14' 11"
Tank deck opening: 15-feet wide by 13-feet high
Screws: Two (2) 4-blade; diameter: 7' 0";
Design RPM = 300; Pitch ratio to dia: = .705
Design pitch 4.935; Area disc = 38.484 sq.ft.; Shaft dia. = 6-1/8"
Displacement (empty): 1,650 tons 4,080 tons full-load
Crew size: 9 Officers; 109 Enlisted
Engines: 2 - 900 hp diesels (1,700 screw horsepower)
Range: 9,500 naut. miles @ 9-knots
Armament: 2 - twin-40mm mounts; 4 - 40mm mounts; 8 - 20mm mounts

MAIN PROPULSION DIESEL ENGINES:

The diesel engine is an internal combustion power unit, in which the heat of the air being compressed is sufficient to ignite the diesel fuel as it is injected directly into the cylinder. Diesel engines differ from gasoline engines principally because they do not require an ignition system to sustain operation.

In automobiles the 4-cycle (4-stroke) design is almost universally used. In the 4-cycle design; [stroke #1--INTAKE] the piston moves from the top in a downward direction in the cylinder drawing the fuel-air mixture into the firing chamber through an "open" intake valve; [stroke #2--COMPRESSION] next the intake valve "closes" and the piston moves upward to compress the fuel-air mixture; [stroke #3--POWER] as the piston reaches the top of the cylinder the spark plug "arcs" a high-voltage electric flash which ignites the fuel-air mixture and drives the piston downward with great force; [stroke #4--EXHAUST] as the piston reaches the bottom of its stroke, the exhaust valve "opens" and the piston moves upward to exhaust the burnt gases; once at the top of this stroke, the process begins anew. The engine obtains one power-stroke for every 4-times the piston has traveled the distance from the top of the cylinder to the bottom, or bottom to top. An automobile engine delivers horsepower through rotation at a fairly high rpm (revolutions per minute) of 3,500 to 5,000, or to nearly 18,000 in Indy cars.

The diesel engine presents a practical design for the use of a 2-cycle (2-stroke) operation. This means that the engine gets one power-stroke for every two times the piston has traveled from the top of the cylinder to the bottom, or bottom to top. Thus, the diesel engine produces a high output in horsepower while utilizing a very low rpm. Diesel power plants must be a very strong (sometimes translated "heavy") engine, which necessitates operating with lower rpms to reduce the inertial forces which would be formidable at the higher speeds.

In a 4-cycle engine half the time is spent operating as an air-pump. In the 2-cycle engine, intake and exhaust take place during part of the compression and power strokes. To provide the means of pumping air, a specially designed blower forces the air into the cylinders to expel the exhaust gases and fill the cylinders with fresh air for combustion. A series of ports cut into the circumference of the cylinder wall, above the piston while in its lowest position, admits the air from the blower into the cylinder as soon as the top face of the piston uncovers the ports.

The unidirectional flow of air towards the exhaust valves produces a scavenging effect, leaving the cylinders full of clean air when the piston again covers the inlet ports.

As the piston closes the air scavenging ports [stroke #1--COMPRESSION], the exhaust valves "close" and the charge of fresh air is subjected to the final compression. The LST engine was designed for a compression ratio of 16:1 and compares to an automobile engine of about 9:1 when designed to run on 87-octane gasoline.

Shortly before the piston reaches its highest position, the required amount of diesel fuel is sprayed into the combustion space by the fuel injector. The intense heat generated during the high compression of the air ignites the fine fuel spray immediately, and the combustion continues as long as the fuel spray lasts. The resulting pressure [stroke #2--POWER] forces the piston downward until the exhaust valves are again opened. When the piston reaches the near bottom of its travel, it again uncovers the air ports and the cylinder is again swept with clean scavenging air, and the process begins anew.

MAIN PROPULSION DIESEL ENGINES (2):

Manufacturer:	Electro-Motive Division of General Motors Corp, LaGrange, Illinois
Unit Designation:	#12-567A
Horsepower:	900 Brake Horsepower (shaft)
Design:	V-12 with 45° Angle between banks 2-Cycle 6,810 cubic inches of displacement
Bore & Stroke:	8-1/2" x 10"
Compression Ratio:	16 to 1
Rotation:	Counter-clockwise when viewed from air-clutch end
Cylinders numbering:	Right side 1 to 6; Left side 7 to 12 (viewed from rear of engine)
Firing order:	Port Engine - 1-6-8-11-2-5-9-10-3-4-7-12 with clockwise crankshaft (LaGrange) rotation and counter-clockwise rotation at line shaft (aft Falk box) Starboard Engine - 1-12-7-4-3-10-9-5-2-11-8-6 w/counter-clockwise crankshaft rotation and clockwise rotation at line shaft (aft Falk GBox)
RPM Range:	275 rpm -- idle 744 rpm -- full speed 800 rpm -- flank speed
Other specs:	Solid unit injector in each cylinder head Two blowers supply fresh air at 3# to 5# pressure (above atmospheric) to the space around the cylinders at a temperature not to exceed 140°F to provide scavenging air to the engine

Engine operating temperature 165°F (do not exceed 180°F)

4 exhaust valves per cylinder

Crankshaft journal	7-1/2" diameter
Crankpin journal	6-1/2" diameter
Compression rings	3
Oil control rings	

Lubricating oil pressure 28# @ 744 rpm (20# at 275 rpm) (40# cold)
Piston cooling oil pressure 20-30# @ 744 rpm (8# at idle)
(Piston cooling oil was injected into the funnel on the piston to cool the piston and lubricate the wrist pin)

Lubricating oil temperatures 140°F minimum; 180°F maximum
Fresh water temperatures 140°F minimum; 170°F maximum
Outlet salt water temperature 130°F MAX (higher = salt deposits)

Fuel pump motor rated @ 1/4 HP @ 1,150 RPM
Auxiliary generator output -- constant 76 volts
Battery 32-cells, rated @ 426 Amp-Hrs (8 hr rating)
Gravity 1230-1250

Note: The following items are to have variations between cylinders which are practically negligible

1. compression pressures
2. fuel injection timing
3. quantity & quality of fuel injected
4. firing pressures
5. exhaust valves timing & lift
6. exhaust gas temperature

MAIN PROPULSION SUPPORT SYSTEMS:

Main Engine Storage Tank: 3,500 gallons of lubricating oil (located immediately aft of the after engine room bulkhead)

Reduction Gears Storage Tank: 700 gallons of lubricating oil (located immediately aft of the after engine room bulkhead)

Gravity fill pipes are located on the main deck, port or starboard, at a distance of 5'8" aft of frame 35.

Lubricating Oil Purifier - Sharples Centrifuge located just inboard of port main engine between frames 33 & 34.

Lubricating Oil Equipment:	Capacity	Normal	Minimum
Main Engine sumps	100 gal	75 gal	50 gal
Main Engine storage tank	3,500 gal		
Reduction Gears storage tank	700 gal		
Main Engine settling tank	700 gal		
Reduction Gears settling tank	700 gal		
Sludge tank	250 gal		

Lubricating Oil Scavenging Pump:
150 gpm @ 1,051 RPM @ 744 RPM of Main Engine speed

Lubricating Oil Service Pump:
75 gpm @ 45 psi; 37 gpm @ 16 psi @ 1,051 RPM @ 744 RPM of Main Engine speed

Dry Weight of Main Engine, Clutch Assembly & Falk Reduction Gear Box: (29,000+13,600) = 42,600#

Diesel Engine Lubricating Oils:

Navy Symbol	SAE#	S.S.U./130°
9110	10	90-120
9170	20	140-180
9250	30	200-280
9370	40	320-430
9500	50	92-105

General Motors - Diesels for Generators:

Model #	3-71	6-71
Number of cylinders	3	6
Bore	4-1/4"	4-1/4"
Stroke	5"	5"
Displacement - cu.in.	212.7	425.3
HP @ max 2000 RPM	83	165
HP @ 1200 RPM	63	125
Max Torque @ 1000RPM	262 ft.#	525 ft.#
Firing Order: RH Drive	1-3-2	1-5-3-6-2-4
LH Drive	1-2-3	1-4-2-6-3-5
Dry weight	1186#	1597#
Lube oil - quarts	16.0	34.0
Water cap-engine only	9.5 gal	21.5 gal

MAIN PROPULSION REVERSING REDUCTION DRIVE

The transfer of power from the V-12 diesel engine to the propeller shaft was through the use of a reduction drive with a pneumatic clutch designed and constructed by the Falk Corporation. Its operation would permit reduction of the engine speed to the propeller shaft speed, provide for both a forward and reverse (astern) direction of rotation, and a means to connect and disconnect the engine from the drive unit.

General Description:

The capacities of the unit and the component gears are as follows:

Unit Rating	900 hp	@	744 rpm engine speed
Main Gears	1,250 hp	@	744 rpm engine speed
Reverse Idlers	1,150 hp	@	744 rpm engine speed
Reverse Gear	1,040 hp	@	950 rpm reverse pinion

Propeller Thrust Bearing Capacity -- 30,000# @ full speed (forward or astern)

Main Reduction Gear Unit:

The transmission unit consists of a fully-enclosed forward and reversing gear train designed to transmit 900 hp @ 744 rpm full engine speed. The cast iron housing is horizontally split for accessibility and consists of three sections: the main base, the center section, and the upper cover section. The foundation mounting bolt flanges are cast on the main base.

Automatic gear dipped lubrication is effected by a large reservoir of oil in the bottom of the base, which has a capacity of about 65 gallons and provides for a 2" dip of the main gear. Use of an auxiliary oil pump to transfer the oil through a cooler and strainer and into the cover of the transmission, and then through a series of troughs to the proper points to provide effective lubrication. The pump and cooler were designed to provide about 20 gallons per minute at a pressure of 5 to 15 pounds per square inch.

Clutches:

Two (2) pneumatically-operated Falk Airflex clutches are mounted in a flywheel extension which is bolted directly to the engine flywheel. Engagement of the forward clutch with a drum mounted on the high speed pinion shaft transmits power directly to the main reduction gear and shaft. Engagement of the reverse clutch with a similar drum on the reverse gear shaft drives through the step-up and reverse pinions on the main gear, which changes the direction of rotation of the main output shaft. The clutch controlling mechanism is mounted on the inboard side of the transmission unit. Engagement of the clutches with the drums is caused by the admission of compressed air to the resilient gland, causing its inner circumference to be constricted and to use friction to engage the drum surfaces and prevent slippage.

Reduction Gearbox Construction:

Main reduction gears (forward) had an input-output ratio of 2.48 to 1.00 and constructed of an alloy cast steel gear that was heat treated to a minimum of 160 Brinell hardness. The tooth proportions were:

119 teeth, 4 d.p., and a 21" face, with 30° or 23° helix angle, double helical.

A chrome-nickel-molybdenum steel pinion meshes with the main gear and was cut to:

48 teeth, 4 d.p., and a 21" face, with 30° or 23° helix angle, double helical.

The main gear is pressed and keyed in position onto the carbon steel shaft. A thrust bearing is mounted at the forward end of the shaft, anchoring the shaft in the axial position so that the propeller thrust is transmitted through the shaft to the bearing and onto the housing. Mounted and keyed to the aft end of the main shaft is the propeller shaft coupling.

To prevent oil leakage from the enclosed gear case, the output shaft is provided with a cast iron oil retainer and a Neoprene ring.

The forward carbon cast steel clutch drum is mounted and keyed in position on the extended end of the main pinion shaft. The forward end of the main pinion shaft extends through the step-up reverse gear shaft. The pinion shaft is mounted on radial bearings and is kept in position by means of a steel keeper plate and cap screws. The inner diameters of the keeper plate and the steel rings are babbitted to provide an oil seal for the main pinion shaft to prevent the oil from escaping along the shaft to the clutch drum.

Main reduction gears (astern) had an input-output ratio of 2.52 to 1.00 and meshed with a pinion gear. The chrome, nickel, molybdenum steel step-up reverse gear is mounted and keyed in position on the shaft and was cut to:

> 101 teeth, 5 d.p., and 7-1/8" face, with 30° or 23° helix angle, double helical.

The pinion gear was cut to:

> 79 teeth, 5 d.p., and 7-1/8" face, with 30° or 23° helix angle, double helical

The reverse pinion gear meshed with the main gear and was cut to:

> 37 teeth, 4 d.p., and a 21" face, with 30° or 23° helix angle, double helical

Main bearings were of the anti-friction roller-type and required no adjustments. Lubricating oil was circulated by an electrically-driven oil pump, and the sea water circulated through the cooler was driven by the same motor as the oil pump.

Note: d.p. = diametral pitch (number of teeth divided by pitch diameter). The pitch diameter is basically measured from a point at 1/2 of the tooth height (--or-- from the base of the tooth cut on one side to the top of the tooth on the other side) directly through the center line of the gear. For machinists, it is measured from the pitch circle, (mid-point of the addendum and dedendum, which makes allowance for the clearance). Generally, diametral pitch will be a whole number, like: 4, 5, 9, 10, etc.

Falk Airflex Clutches:

The Falk Airflex clutches consisted of a rubber gland molded to a steel ring. The gland was constructed to receive air under pressure so that its inside diameter which is lined with molded friction blocks, could be compressed against the outside diameter of the drums mounted on the reduction gear boxes.
The glands were designed to operate with about 100# per square inch of air pressure, and the safety pop valve was preset to relieve pressure at 110#.

Note that the forward and reverse drums and the glands which acted upon them were directly in-line with one another. It was absolutely necessary to insure that the "forward" gland was completely deflated before the "reverse" gland was inflated, or vice versa. You would have frictional forces "smoking" the friction blocks, or worse, a seized gear box, if a mistake like that were to occur. In normal operating conditions the conning officer would order the engines "stop" for a brief period of time (20 - 25 seconds), allowing deflation of the gland and a near-stop of the rate of rotation of the propeller shaft, before ordering a change in rotational direction of the propeller shaft.

Compressed air was directed to the proper gland by moving a hand control lever to the desired position of forward, neutral, or reverse. The clutch assembly, when properly installed, was aligned so that a dial indicator would verify all readings on runout to be no greater than 0.015" in 180° of clutch rotation for parallel alignment and 0.025" in 180° of clutch rotation for angular alignment.

Background on the Falk Drives:

The drive chosen for the LSTs was to be similar to one originally designed by Falk for the diesel powered "Bull Calf", a towboat used on the Mississippi River to propel heavily laden oil barges. A few other tug and towboat installations, which were "firsts" for Falk engineers and designers, paved the way for all reverse drives operated with pneumatic clutches to be installed on LSTs and other specialized war craft.

The LST drive was similar, in principle only, to the "Bull Calf" type of unit. The unit required a great deal of engineering work before a pilot model could be built. Pilot units of the Falk LST drive were rushed to completion in order that they could be installed in the first completed hulls for sea trials. The first ships were launched with considerable anxiety on the part of all who was participating in the construction of the radically new vessels. The trials were successful beyond expectations and no modifications were necessary in the design of the drives.

BOW DOOR EQUIPMENT:

LSTs, including LST 325, are equipped with a unique feature for a vessel design for open sea use: the bow is fitted with moving doors. The doors and internally-stowed ramp allowed LSTs to bring armored vehicles directly to the beach. The bow door is handled by two 3-horsepower bow door drive units, each consisting of a gear motor which drives a screw through open gearing. This screw is engaged by means of a taper and wedge to a rack traveling in a rack guide and mating with a segment made fast to the bow doors. Motors are operated by means of push button stations marked "OPEN", "CLOSE" and "STOP". Four of these push buttons are provided per vessel, two for each motor. Two limit switches are provided, one at either end of the travel of the rack. These limit switches are actuated by a switch stop. Adjustment of these two limit switches must be made after assembly so as to provide for the proper arc of travel of the bow doors. Clearance is provided between the hub flanges of the screw gear, and the bedplate washers. This clearance is such that when the doors are almost closed, and the bow door limit switch has operated, the doors may be jacked together and locked by means of turn-buckles. The limit switch which operates to shut off the motor when the bow door closes should be so set that after the door has come to rest it may be completely closed by means of the above mentioned turn-buckles, making use of the clearance specified previously.

Extreme care must be taken during installation of the bow door equipment to insure that the rack and rack guide are properly aligned with the bow door segment and that the gear motor base is properly shimmed to correspond with this alignment. If the rack guides are not sufficiently rigid, deflection will be permitted and the screw may be so loaded as to cause severe deflection, unduly increasing the load on the electric motor.

The bow door equipment is designed for a rack thrust of 14,000 pounds at a rack speed of 1.98 feet per minute. Care should be taken that this equipment is not allowed to be operated at extreme overload or without proper lubrication.

RAMP GATE EQUIPMENT:

The ramp gate equipment consists primarily of a main shaft mounting two wildcats at the extreme ends and driven through a double reduction set of spur gears by a 10-horsepower gear motor. The equipment operates in both directions by means of push button stations marked, "HOIST", "LOWER" and "STOP".

A limit switch is provided which is operated by a sprocket of the low speed shaft and which actuates the arm of a track type limit switch. This limit switch is arranged to operate in the lower or open position of the ramp gate only. An additional limit switch is provided which is to be mounted so as to be operated by the ramp gate itself when being closed. This limit switch is to operate in the upper or closed position of the ramp gate only. The adjustment of this limit stop should be made carefully so as to shut off the motor at the proper time and prevent the ramp from damaging the ship structure. The ramp gate gear motor is provided with regenerative braking in the lowering direction, in order to prevent the ramp from lowering at excessive speed.

The ramp may also be lowered without the use of power by disengaging the sliding pinion, and locking it in the disengaged position. Before doing it, it is necessary that the hand brake wheel be tightened in order to prevent the ramp from falling after the pinion is disengaged. After release of this pinion the ramp may be lowered by releasing the hand brake a sufficient amount to permit the ramp to start to lower. Care should be taken not to allow the ramp to fall at too great a speed. When operating under these conditions it should be borne in mind that as the ramp lowers, its load increases progressively and will be more difficult to hold the nearer it approaches a horizontal position.

If difficulty is experienced in engaging or disengaging the sliding pinion it may be readily shifted by operating the hand release on the electric brake, at the same time rotating the high speed gear slightly by hand, bringing the teeth of the sliding pinion and the teeth of the low speed gear into alignment in order that they may properly mesh.

If one chain is tighter than the other during installation or if by some reason excessive sag develops in one or the other of the chains, it may be brought back into alignment by disengaging the coupling bolts and rotating the coupling in the proper direction a sufficient amount to engage with the next set of holes, thereby bringing the chain into the same tension.

This ramp gate machinery is designed for a load on the chains of 17,250 pounds and a speed of rotation of the wildcat shaft of 2.62 RPM. Care should be taken that this equipment is not allowed to be operated at extreme overload or without proper lubrication.

GENERATING EQUIPMENT:

The generators are designed for parallel operation without equalizer leads, and are driven by a diesel engine mounted on the same base. There are three (3) generators located in the auxiliary engine room. The generators are rated to deliver at 240/120 Volts, 417 Amps, 100 Kilowatts (KW), @ 1,200 RPM on a 3-wire circuit, using natural ventilation for cooling, and at an ambient temperature of 40°C (Celsius).

ELECTRICAL DISTRIBUTION:

Distribution was controlled through a series of six (6) power panels mounted with circuit breakers and switches comprising the switchboard. Reading from left to right when facing the front of the switchboard.

Panel #1 -- D.C. Generator #1 & Power Feeders:
This panel receives power from 100-KW D.C. Generator #1, through a 500-Ampere D.C., 3-Pole, 3-Coil, type "KB" A.C.B. Circuit Breaker equipped with reverse current trip and "Hold-In" device. Mounted on this panel are instruments, and instrument switch, and generator field rheostat and three (3) power feeder circuits.

D.C. ammeters with their shunt indicate the current in the positive and negative generator cables. Facing the front of the switchboard, the ammeter on the right indicates current in the positive cable, and the one on the left indicates the current in the negative cable. The voltmeter may be used to indicate either generator or bus voltage. By turning the eight-stage voltmeter switch to positions #1, #2, or #3 the generator voltage is indicated. In positions #4, #5 and #6 the appropriate bus voltage is indicated.

Panel #2 -- D.C. Generator #2 & Power Feeders:
This panel receives power from 100-KW D.C. Generator #2, through a 500-Ampere D.C., 3-Pole, 3-Coil, type "KB" A.C.B. Circuit Breaker equipped with reverse current trip and "Hold-In" device. Mounted on this panel are instruments, and instrument switch, and generator field rheostat and three (3) power feeder circuits.

D.C. ammeters and voltmeter on this panel operate exactly the same as on the Panel #1.

Panel #3 -- D.C. Generator #3 & Power Feeders:

This panel receives power from 100-KW D.C. Generator #3, through a 500-Ampere D.C., 3-Pole, 3-Coil, type "KB" A.C.B. Circuit Breaker equipped with reverse current trip and "Hold-In" device. Mounted on this panel are instruments, and instrument switch, and generator field rheostat and three (3) power feeder circuits.

In addition to the ammeters and voltmeter on Panel #1, and #2, this Panel contains an ammeter with zero-center scale to indicate current in the neutral ground connection. The voltmeter is a twelve-stage switch, and positions #1, #2, or #3 indicate generator voltage. Positions #4, #5, or #6 indicate bus voltage. Positions #7, #8 or #9 indicate shore power voltage.

Panel #4 -- D.C. Power Feeders:
This panel receives power from the generator bus and may be fed from either generator running separately or any combination of generators operating in parallel. On the top section are mounted two (2) type "KB" A.C.B. Circuit Breakers. One of these is a 400-Ampere D.C., 2-Pole, 2-Coil, manually operated for the stern capstan feeder. The other breaker is a 350-Ampere D.C., 2-Pole, 2-Coil, manually operated for the ventilating tank space feeder. On the lower section are mounted fourteen (14) fused knife switches for 2-wire feeder circuits. Ten (10) for active circuits and four (4) spares.

Panel #5 -- Shore Power, Lighting Feeders, Power Feeders and Battery Charging Circuits:

This panel receives power from the generator bus. Located on the top section is the Shore Connection Breaker of 400-Amperes, 3-Pole, 2-Coil, manually operated. Also on the top panel is the Shore Power Indicating Lamp, and the charging ammeter, with knife switches for various battery charging circuits. On the lower section are mounted sixteen (16) fused knife switches for feeder circuits. Eleven (11) are active 3-wire circuits, two (2) for active 2-wire circuits, and three (3) for spare 2-wire circuits.

Panel #6 -- Power Feeder Circuits:
This panel receives power from the generator bus. Mounted on the panel are three (3) fused knife switches, one for an active 2-wire circuit, and two (2) for spare 2-wire circuits.

SOUND POWERED PHONE SYSTEM:

There were three (3) circuits installed, and cross-over switches were installed in the wheelhouse to permit linking of the various circuits into a single network, if necessary. The circuits were:

1JV -- Ship Control & Maneuvering circuit
Station #1 -- Wheelhouse
#2 -- Engineroom
#3 -- Auxiliary Engineroom
#4 -- Steering Gear compartment
#5 -- Chief Engineer's Stateroom
#6 -- 15JY tie-switch (located in wheelhouse)
#7 -- 2JV tie-switch (located in wheelhouse)

2JV -- Engineering
Station #1 -- Wheelhouse
#2 -- Gyro Compass room
#3 -- Bow Door & Ramp Operating room - Port side
#4 -- Bow Door & Ramp Operating room - Starboard side
#5 -- Aft Winch Control
#6 -- Conning Station
#7 -- Tank Deck Control Station

15JY -- Gun Fire Control
Station #1 -- Conning Station
#2 -- Forward M.G. - Navigating Bridge
#3 -- Aft M.G. - Navigating Bridge
#4 -- Forward M.G. - Main Deck
#5 -- Forward M.G. - Belting Station
#6 -- Aft M.G. - Belting Station

TABLE OF TANK CAPACITIES

Note: Tons are expressed in long tons = 2,240#
(7.48 gals/cu ft)

Tanks -- Salt Water (Full Capacity)

Compartment #	Location (Frame #s) P=Port;S=Stbd;C/L=Ctr	Gallons	Tons of Salt Water @ 261.8 gal/35 cu.ft.
A-404W	10-12 C/L	32,385	123.70
A-405W	10-13 S	10,907	41.66
A-406W	10-13 P	11,865	45.32
A-410W	13-16 P	16,311	62.30
A-411W	13-16 S	16,311	62.30
A-413W	16-19 S	17,413	66.51
A-414W	16-19 P	17,413	66.51
A-415W	19-22 C/L	55,050	210.27
A-416W	19-22 P	18,274	69.80
A-417W	19-22 S	18,274	69.80
B-404W	28-31 P	19,754	75.45
B-405W	28-31 S	19,754	75.45
B-409W	31-35 S	19,329	73.83
B-410W	31-35 P	19,329	73.83
A-418F (fuel/water)	22-25 C/L	57,636	220.15
A-419F (fuel/water)	22-25 S	19,124	73.05
A-420F (fuel/water)	22-25 P	19,124	73.05
A-421F (fuel/water)	22-25 C/L	55,090	210.43
A-422F (fuel/water)	25-28 P	19,977	76.31
A-423F (fuel/water)	25-28 S	19,977	76.31
	TOTALS	483,297	1,846.03

Tanks - Fresh Water (Full Capacity)

Compartment #	Location (Frame #s) P=Port;S=Stbd;C/L=Ctr	Gallons	Tons of Fresh Water @ 269.3 gal/36 cu.ft.
C-409W	35-38 S	17,986	66.79
C-410W	35-38 P	17,986	66.79
C-412W	36-38 C/L	22,767	84.54
C-413W	38-41 C/L	35,089	130.50
C-416W	38-41 P	13,216	49.08
C-417W	38-41 S	13,216	49.08
	TOTALS	120,260	446.78

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National Park Service

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Void Space -- Coffer Dam

Compartment #	Location (Frame #s)	Cubic Feet	
C-411V	2' Fwd 36-36 C/L	375.13	

Fuel Oil Tanks -- 95% Capacity

Compartment #	Location (Frame #s)	Gallons	Tons-Diesel Oil @ 310 gal/41.5 cu ft
A-418F	22-25 C/L	54,754	176.62
A-419F	22-25 S	18,168	58.61
A-420F	22-25 P	18,168	58.61
A-421F	25-28 C/L	52,336	168.82
A-422F	25-28 P	18,978	61.22
A-423F	25-28 S	18,978	61.22
A-424F	4' Fwd 28-28 P	2,425	7.82
A-425F	4' Fwd 28-28 S	2,425	7.82
A-411F	33-34 S	965	3.11
A-412F	33-34 P	965	3.11
	TOTALS	188,162	606.96

Diesel Engine & Reduction Gear Lubricating Oil Storage Tanks -- 95% Capacity

Compartment #	Location (Frame #s) & Used for	Gallons	Tons-Lubricating Oil @ 290.9 gal/38.9 cu ft
C-402LUB	2' Aft 35 & 2' Fwd 36 C/L - Diesel Lube Oil	3,316	11.40
C-401LUB	2' Aft 35 & 2' Fwd 36 S - Eng. Oil SettlingTk	664	2.28
C-403LUB	2' Aft 35 & 2' Fwd 36 S - Gear Lube Oil	664	2.28
C-404LUB	2' Aft 35 & 2' Fwd 36 P - Gear Oil SettlingTk	664	2.28
	TOTALS	5,308	18.24

(Courtesy of the Howard Steamboat Museum, Jeffersonville, Indiana)

Stern Anchor Winches, Cables, & Anchors:

Electric-powered stern anchor winches on the LSTs resemble towing winches on fleet tugs, but they are specifically designed for the job they do. They can be set to pay out at three different speeds and heave in at four speeds. While they are not constant-tension winches, they can be set to automatically keep a strain on the anchor cable to prevent the stern of the LST from swinging around while beached.

The cables are 900 feet of high-grade plow steel wire 1-5/8 inches in diameter. The first 15 to 20 feet of the outboard end of the cable is painted yellow to make it easier to estimate when the anchor will break out. Every hundred feet the cable is marked with yellow bands--one band 9-inches long for each hundred feet. That is, at 100 feet, l band; at 200 feet, 2 bands; at 300 feet, 3 bands, and so on up to 700 feet. Halfway between the 100-foot markers there is one 12-inch white band. That is, there is only one 12-inch white band at 50 feet, 150 feet, 250 feet, etc. Between 700 and 800 feet, the entire cable is painted yellow. The last 100 feet (800 to 900) are painted red.

The anchor was a 3000-pound Danforth type. A stern anchor is secured on a catting frame at the stern by a wire strap stopper extending from the main deck down under lugs on the shank of the anchor and back up to the main deck. A turnbuckle at one end of the strap facilitates tightening, and a pelican hook at the other provides a quick release.

Operation of the Stern Anchor Winch During Beaching:

1. Rig the anchor buoy.
2. Release the stopper.
3. Push setup button to energize controls.
4. Move controller 1 point left to DRIFT and back to OFF to make sure motor brake operates.
5. Release "dog" on cable drum and secure with "pedal latch".
6. See that spiral jaw low-speed clutch is open.
7. On the order, "Standby", partially release clutch brake (high-speed compressor) 5 turns. (Not enough to allow cable to run out)
8. On the order to let go the anchor, release clutch brake 20 turns or more.
9. When the anchor digs in (sets), move the controller back to OFF position.

CAUTION: Failure to release clutch brake will damage motor and motor brake!

Normally, the anchor is dropped between 700 and 500 feet from the spot where it is expected the midships portion of the LST will ground. Occasionally, however, the entire 900 feet of cable will be run out and lost overside. In order to expedite recovery of the cable and anchor, an emergency buoy is rigged so that it can be quickly and easily attached to the end of the cable as the cable pays out. The buoy is triced to the lifelines or at some other convenient place. The buoy line is led to the anchor cable fairleader and a clove hitch loosely looped around the cable and hung on the fairleader. In an emergency, the clove hitch can be quickly drawn tight around the cable and the buoy either tossed overside or pulled free from its lashings by the weight of the cable.

After the anchor has been dropped during the beaching run, the man in charge must keep the conn informed of the amount of cable out, the tension (strain) on the cable, and the angle (direction the cable is tending) of the cable. Tension is reported in the same manner as for a bow anchor; angle is reported by the clock method.

After beaching, heave in all slack in the anchor cable by moving controller to SLOW or to NORMAL heave. Then set up on the clutch brake. If the wind or tide tend to swing the stern, maintain strain on cable by setting controller in AUTOMATIC. Set tension adjustment at 15,000-pounds or higher, if necessary.

Operation of Stern Anchor Winch During Retracting:

1. Move controller to OFF position.
2. Release clutch brake compressor.
3. Move controller to SLOW heave.
4. When cable drum stops turning, step down on the mechanical latch pedal and engage low-speed spiral jaw clutch. Make sure you push hard enough to engage fully.
5. Move controller to NORMAL heave and attempt to retract vessel. If the anchor drags, move controller to OFF.
6. If motor stalls because it can't start vessel, move controller to OFF for a short interval.
7. Repeat the heaving operation until vessel moves astern.
   CAUTION: Never leave controller on heave unless the motor is turning.
8. As the ship begins to move, the motor will speed up. When the speed indicator (tachometer) shows 500 rpm, move controller to MEDIUM heave; when the motor reaches 800 rpm, move controller to HIGH.

NOTE: If it is necessary to slack off the stern anchor cable while the winch is in low gear, push the bypass pushbutton below the low-speed clutch and move the controller to SLOW stick-out. When sufficient cable has been payed out, release the button and winch will stop.

High speed heaving:

When the motor speed reaches about 1300 rpm or when low speed clutch opens automatically:

1. Set up on clutch brake compressor to shift into high speed.
2. Set controller on automatic heave with tension adjuster setting between 15,000 and 20,000 pounds.
3. The winch is now under automatic control and should heave in cable fast enough to seep out all slack as the vessel backs, but the conn must be kept informed of the situation at the stern at all times in order to keep from overriding the cable.

NOTE: If necessary, put the winch back into low gear to get the anchor to break ground.

Typical Cargo:

On ocean passages, the LST could carry an LCT which would be side-launched from the main deck, after ballasting the ship to a list of almost 20-degrees.

The upper deck was designed for 10-ton gross vehicle weights, and many times this was exceeded, which then required weight-spreading chocks to be used.

A typical manifest for an LST was: 26 - 6x6 trucks; 4 - Jeeps; 6 - 4x4 cargo trucks; 1 - 4x2 machine-shop trailer; 1 - 5-ton crane; 2 - bulldozers; 2 - 40mm guns on carriages; 115 tons of rations; 200 tons of fuel in drums; 40 tons of ammunition and 12 tons of miscellaneous gear. All this had to be secured for sea by using chains and chocks to prevent shifting as the vessel rolled on the sea. The loading for tanks and their support equipment was 20 Sherman tanks.

Armament:

The USS LST 325 has six-40 mm "Bofors" cannon and four-20 mm "Oerlikon" guns. The original WWII issued and installed weapons were found stowed on board and were reinstalled as part of the restoration of the ship. All have been rendered inoperable.

Crews and Berthing:

Mostly, the skippers were Lieutenant, in rank, without "long-in-the-tooth" experience in ship handling. Running aground is a primary fear of almost all officers and sailors. Running aground on a "V-hull" ship with the loss of water buoyancy, as the tide ebbs, would probably result in a roll of about 45-degrees. This moves the weight of the vessel to the frames and may cause extensive damage. A grounded LST rests on its keel and double-bottom and, unless pounded by surf, the LST should remain seaworthy. For an LST, broaching on a beach is feared. The ship is at the mercy of the surf, and any engine power ahead or back moves the ship parallel to the beach, instead of perpendicular to the beach. An LST skipper needed good ship handling skills and nerves of steel.

Prior ship handling experience on single-screw, single-rudder vessels like cargo ships, or destroyers with twin-screws and rudders, may not have been a great advantage to LST skippers. The handling characteristics of a "V-hull" differs considerably from "flat-bottom -- shallow-draft" and may well have necessitated an unlearning/rethinking process to properly respond to the behavior of the LST.

Because of the flat bottom, shallow draft, pronounced drag, relatively high freeboard, 4,000 tons of displacement when fully-loaded and the relatively low power, the ship presented unique handling problems for the conning officer. Generally, LST skippers were required to navigate in congested waters without the use of tugs, and would use their own LCVPs to assist when conditions warranted.

Troop accommodations were lavish by major landing craft standards. The troops had multiple four-tier bunks with heads and a sea water shower. About 135 troops (officers & men) could be carried on a long voyage, with considerably more for a voyage of a few days.

The crew was required to develop "sea legs", to compensate for the continual rolling of the ship, even in relatively calm waters. The LSTs were usually moored to buoys out in the more crowded harbors, and rolled even then. It was expected that the roll would reach 30-degrees in rough weather, and the inclinometer in the wheel house would reach the 45-degree mark in the typhoon blows. The LST was particularly seaworthy in storms, if not pitched directly into solid water against the bow. Standing on the tank deck, at the aft ladder, the ship's flexing of several feet (3+) could be immediately appreciated. This flexing absorbed the forces of the sea on the hull without causing the ship to break up.

Crew Berthing:

In the mid -50's the berthing was "officially" listed at 252 bunks. Of course, we all know that some enterprising sailors created their own sleeping accommodations in various locations aboard ship. In general, the breakdown was:

Crew Officers	6 staterooms	1 - Commanding Officer 1 - Executive Officer 1 - Engineering Officer 3 - shared in 2's for Operations/Navigation/etc	
Crew Enlisted	12 compartments	9 persons/compartment	
Troop Officers	3 staterooms	3 - shared in 3's (Senior Officers)	
	1 compartment	9 persons	(Junior Officers)/ (Non-commissioned)
Troop Enlisted	1 compartment	116 persons	

This arrangement permitted bunking for 9 crew officers, and 108 crew enlisted. The troop accommodations were for 9 senior officers, 9 junior officers, and 116 enlisted. During the mid-50's, many of the LSTs had about 6 officers and about 90 enlisted persons comprising the crew.

Officer quarters bunks had a slightly more plush mattress, was deck-mounted with a storage drawer under and, when bunked, had sturdy square posts to support the upper bunk.

The staterooms were approximately 8 ft x 10 ft, except for the Commanding Officer's which was only slightly larger. The Commanding Officer also had a sea cabin located over the wheelhouse, and slept there when the ship was underway and the sailing conditions warranted. The ship's crew compartments were approximately 23 ft x 9 ft, and with the troop compartment in the aft-section having an average size of 35 ft x 36 ft.

The enlisted personnel bunks were a rectangle formed of tubular metal construction, had a strong canvas with grommets a few inches smaller than the frame dimensions lashed by a line (rope) to the metal frame, and a 4-inch cotton-filled mattress laid on top. The crew's bunks were grouped in tiers of 3 bunks high, suspended in hangers on the bulkhead, and by chains on the inboard side at the head and foot ends. All 3 bunks could be folded up, in unison, toward the overhead (ceiling) and held there by means of a hook. The phrase used would be to "trice-up" bunks, and it provided more compartment room during non-sleeping hours. Each crew compartment had 3 sets of 3-tier bunks per compartment, mounted on the outside bulkhead (wall). On the inner bulkhead, the lockers were mounted, with some of the deck (floor) space being used up by motor-generator sets (MG sets), etc., and the ductwork and electrical cabling were mounted on brackets to the overhead.

The troop enlisted bunks were arranged in four sections. One row along each bulkhead (starboard and port), and two double rows mounted to the stanchion rows in the center area of the compartment. This was the arrangement: (4-tier was 116; 3-tier was 75 bunks)

Starboard side	3 sets @ 4 bunks/tier =	12	3 sets @ 3 bunks/tier =	9
	4 sets @ 4 (double row) =	32	4 sets @ 3 (double row)=	12
	6 sets @ 4 (double row) =	48	6 sets @ 3 (double row)=	36
Port side	6 sets @ 4 bunks/tier =	24	6 sets @ 3 bunks/tier =	18

Miscellaneous Construction Details - LST-542 Class [Things you may wonder about ?]

Hull frame spacing: 2' 0" from fwd perpendicular to Frame # 8 (prow to aft end of tank tunnel)
8' 0" from frame # 8 to frame # 31 (tank deck tunnel thru aux. engineroom)
6' 0" from frame # 31 to frame # 35 (main engine room)
8' 0" from frame # 35 to frame # 41 (shaft alleys to after crews quarters)
2' 0" from frame # 41 to frame # 63 (aft crews quarters to stern)

Watertight doors had two (2) common sizes: an opening of 26" x 60", or 31-1/2" x 68-1/2"
All heights from the deck to the collar were standardized at 9-1/4" height.
The four (4) corners were standardized at a 10-3/4" radius, and the collar stock was 4" wide by 3/8" thick (the collar formed the "watertight seal" with the gasket mounted around the rim of the door).

Crew's Berth framing: Aluminum #6061-T6 (round tubing), with a 1.315" O.D. and 0.133" thick.

It measured 74-5/8" long (centerline to centerline) by 27" wide (centerline to centerline) and had 2-1/2" radius corners. The chain sleeves were spaced at 52" and the location of the wall mount brackets could range from 48" to 52" apart.

Vertical ladders were formed from 2-1/2" wide by 3/8" thick flat stock, and solid 3/4" O.D. round stock of 11-1/2" lengths were welded at 12" intervals to form the ladder. An L-bracket was welded from the bulkhead to the ladder rail to provide a 4-1/2" clearance from the centerline of the rung to the bulkhead.

Rung ladders (when welded to a bulkhead) are formed by bending a 3/4" O.D. round stock into a U-shape with 1/2" radius corners and a minimum of 6-1/2" width (centerline to centerline). Clearance from the bulkhead to rung centerline was 2-1/2" at an absolute minimum.

Other construction details:
A Single-Post Mast was 52' 0" in height and the yardarm was 25' 0" in total length. The main mast consisted of 3 sections welded together with a 12" overlap.
base section was 10" dia., with a 0.307" wall, and 22' 0" long of med. steel tube
mid section was 9" dia., with a 0.342" wall, and 22' 0" long of med. steel tube
top section was 7-5/8" O.D., with a 0.301" wall, and 10' 0" long of med. steel tube
yardarm was of 3 sections welded together with a 12" overlap.
mid section was 6" O.D. seamless, with a 0.1875" wall, and 17' 0" long tube stock
end sections were 4" O.D. seamless, with 0.108" wall, and 5' 0" long tube stock

The yardarm was inserted in a sleeve made from 6-5/8" O.D. pipe stock of 3' 4" in length, which was split and had ears welded on to accept bolts to "clamp" the yardarm firmly. A U-bracket was fabricated using plate stock 8" wide by 3' 3" long, and 3/4" thick. It was welded butterfly-style to the mast and then to the sleeve, on the aft side of the main mast.

The base rested on the navigation bridge deck, and a collar was welded to the mast and that was in turn welded to the roof line edge of the deck house. The eyes for the guy wires were welded at a height of 33' 6" from the base line, and the mast's yardarm mounted to the bracket at a height of 41' 0" from the base line of the mast.

The mast beacon light was mounted 34' 0" from the base line, and the base plate for the ship's horn was mounted 22' 6" from the base line. The aircraft warning beacon was mounted atop the mast, and the navigation lights (red-port, green-starboard) were mounted at the ends of the yardarm. Eyes for the flag halyards were welded to the yardarm, six (6) per side. The guy wire for the yardarm had eyes 12" from the ends, to the eyes 3' 10" from the top of the main mast.

LCVP Welin Boat Davit working load: 26,600#

Dimensions of cargo hatch on main deck: 29' 9" long by 16' 0" wide

Gun Tub Dimensions: Twin 40MM mount - (bow & stern) - 9' 6" radius
Single 40MM mount - 6' 2" radius
Single 40MM mount - (port and starboard bow) - 7'6" radius
All gun tubs were designed with wall heights of 3' 4"
Platform supports were 6" x 4" x 7# Ts cut from 12" x 4" x 14# I-Beam stock

Vehicle Hold-down cleats (on main deck): formed from 3/8" thick stock and measured 2-1/2" high with a 14-7/8" diameter and a height of 2-1/2". The center cloverleaf was a 6-1/2" diameter circle with a pattern of an "X" using a 7/8" radius at the base of the lobes.

Ramp from the main deck to the tank deck (which replaced the earlier-version elevator) was 39' 8-3/4" long by 16' 3" wide, with a depth of 20" in the center section.

LCVP - Landing Craft Vehicle Personnel

The LCVP served the LST as a tug, liberty boat, water ambulance, ferry, carrying of troops/vehicle to the beach, and as a lifeboat. There were few amphibious operations in the last years of World War II in which LCVPs did not take a major part. The LCVPs included in this National Register nomination were not originally assigned to LST 325, and were built after World War II, in the 1950s. However, they are built to the same specifications as war-time LCVPs and their inclusion here as non-contributing structures allows the full significance of the role LST to be understood.

Armored, with 2 Browning .30 cal. machine guns in ring mountings aft, and the steering position inside the cargo well to a position by the port quarter forward of the engine compartment. Carried on deck or in single to three-tier davits of American transports, the LCVP could be launched when loaded, but only from appropriate davits. Their use in beaching was simplified by the late stages of the war: driven hard ashore, they would be nudged off the beach by trucks. Between 1942 and 1945, some 23,358 LCVPs were built.

There were some minor design differences. The engine was either a Hall Scott 250-hp gasoline, or a Gray 225-hp diesel. Diesel was preferred for the reduced fire hazard of fuel oil, although the gasoline engines produced a better power-to-weight ratio and could be used in continuous high-speed operation.

The LCVP Specifications:

Hull: wood   Length: 36-feet   Beam: 10-feet, 5-1/4-inches   Draft: 26-inches
Displacement (empty): 18,000#   Crew size: 3   Engine: Gas or Diesel
Range: 100 miles @ 9-knots   Armor: 1/4-inch STS on ramp and sides
Armament: 2 - 30-caliber machine guns
Loads: 36 troops; or, 3-ton truck; or, 8,100# of cargo

Gray Diesel Marine Engine (used on the LCVP):

Number of Cylinders	6
Bore & Stroke	4-1/4" x 5"
Displacement & HP	425 cu.in. [HP = 225 @ 2100 RPM]
Compression Ratio	16:1
Exhaust valves/cyl	2
Main bearings	7
Lube oil capacity	20 - 30 quarts (dry engine) SAE-30

Firing Order:

Model 64	1-3-6-2-4 (turns a right handed propeller)
Model 65	1-4-2-6-3-5 (turns a left handed propeller)
	[Note: crankshaft rotation is opposite propeller's]
Starter/Generator	32-volts

When the USS LST 325 left Crete, the Crete government gave it four (4) LCVPs. There were four davits on the USS LST 325 on which the LCVPs were mounted. The USS LST 325 was built with two davits and two davits were added later during WWII. After returning to the United States, one of the LCVPs was given to another LST United States association. Two of the davits were also removed. At present, there are three (3) LCVPs attached to the USS LST 325.

The three (3) LCVPs are not Higgins boats because they were built after the war and not in a Higgins factory. However, they built according to the same specifications as the Higgins boats.

The only difference is that these LCVPs had a thin overlay of fiber glass put over them in order to help preserve them.

The three LCVPs have been built according to the following specifications:

- Displacement: 18,000 lbs. (light)
- Length: 36'3"
- Beam: 10'10"
- Draft: 3' aft, 2'2" forward
- Speed: 9 knots
- Armament: 2 .30-cal machine guns
- Complement: 3
- Capacity: 36 troops or 6,000 lb. vehicle or 8,100 lb. general cargo
- 225 hp. Diesel (gray) or 250 hp. gasoline (Hall-Scott) engines

SKIPPERING AN LST: HANDLING CONSIDERATIONS:

Several factors have the potential for altering an intended course through the water, which is especially critical in confined harbors, straits, while beaching or retracting and/or in shallow waters:

- advance which is the distance the ship will travel before she begins to answer the change -- a combination of the amount of time it physically takes the crewmen to change the rudder and/or speed of the screws after the orders of the conning officer is given, and the start of an actual response of the ship itself to the changes in rudder angle and/or speed of the screws;
- current which is generally created by a river flow, including its eddy currents;
- shallow water which interferes with the propeller currents, and reduces rudder effectiveness;
- surf which are those swells, and breakers encountered in shallow water and which may not be traveling perpendicular to the beach;
- tide which is rising, ebbing, or in a slack condition;

- transfer which is the distance gained on the water along the direction of the old course while making a course change of 90-degrees;
- wind and its sheer as the ship moves from the "open" and comes alongside a pier, or another ship;

Draft and trim greatly influenced the ship's handling characteristics, and experienced skippers felt that a draft of 6-feet forward and 13-feet aft was near the ideal when underway. The drag of 7-feet would nearly balance the sail area caused by the freeboard, high bow and superstructure of the ship. With a 7-foot drag, the pivoting point would be a little forward of the bridge and permit holding the bow up into gale strength winds while underway.

RUDIMENTARY PROCEDURES FOR HANDLING THE LST:

This portion of the procedures must, of necessity, be very brief and assume that the waters are relatively calm, reasonably deep, and with no more than a light breeze, as the operating conditions. When wind, current, tide, and surf conditions become a significant factor, the conning officer is forced to use greater rudder angles, increased screw power, more skillful line handling, anticipate the ship's responses more accurately, and possibly lower the LCVP to assist in the ship maneuvers intended.

Essentially, a ship will perform with many of the characteristics of an automobile being driven on glare ice. The initial movement from a "no way on" (dead in the water) condition, will begin only after the screw wash is able to overcome the resistance of the ship to remain stationary. Conversely, once the ship is moving it will take some time before the effect of backing the screws will be apparent. In addition to thinking well ahead of the anticipated maneuver, the skipper is generally better able to complete the maneuver satisfactorily if the ship's speed is no greater than that which is necessary to maintain steerage (rudder response) in congested areas, and when a precise placement of the ship must be made. Then, in the final several ship lengths to the precise placement point, the engines and lines will be employed to hold the bow in the desired position, and then to bring the stern in to its proper position.

1. Making a turn -- from a "dead in the water" condition:

Turning while having no way on, is accomplished relatively rapidly, with little if any headway gains, by going ahead one-third on one engine and back one-third on the other, while putting the rudder over in the direction in which the bow is swinging.

Because of the flat-bottom's relatively less "braking" effect on the ship's swinging movement, it will be necessary to prevent an over-swing, either by stopping the engines once the swing has begun, or to give engine and rudder commands to "meet her" as she nears the desired course heading.

2. Handling along side -- mooring to a pier, wharf or another ship:

The approach should be made slowly when bringing an LST alongside. She is slow to respond to a backing command, and if we are not careful, we will overshoot our desired point. Coming in wide and slow will generally be the best option.

If going portside alongside another LST , it may be advisable to lower the bow anchor to the waterline to prevent any possible contact of the anchor with the other's shell plating.

In strong wind, it may be advisable to use the LCVP to "hold" the desired bow position, by using it as you would a tug. In light wind backing on only one engine, or the use of a different speed on the starboard and port engines, may be used when the way on is insufficient to allow control by means of the rudder.

Once the bow line (#1) is over to the pier, wharf, or other ship, it can be used to hold the bow's position, while a spring line is then put over and used to maneuver the ship parallel alongside.

The use of fenders, whether the pneumatic or the manila type, should be used to prevent any metal-to-metal contact with another ship, or with the pier/wharf. At least two fenders are used while moored.

Generally, 6 lines will be used to secure the mooring. The #1 line at the bow chock, and the #6 line at the stern chock. Lines #2 and #3 will form a crossing pattern to the pier/(ship) from chocks just aft of the #1 line. Lines #4 and #5 will form a crossing pattern to the pier/(ship) from chocks just forward of the #6 line.

The lines are usually 2-1/2-inch manila hawsers with a parting strength of 46,000#. The lines are doubled-up once the ship's mooring is made fast, resulting in 3 lines at each of the 6 line positions after another "bight" of line is passed to the pier/(ship).

3. Handling along side -- leaving a mooring berth:

Engines will be started and brought to operating temperatures. Lines will be singled up (the doubling bight being hauled aboard). Generally, lines #4 and #5 will be hauled aboard.

Assuming the mooring has been made portside to, the bow anchor will be secured at the waterline to prevent damage to the alongside ship as we back off.

Line #6 will be slacked to permit the stern to move out, and #3 line will be eased. The rudder will be put over to Left-Full position. The outboard screw (starboard, in this case) will be ordered "ahead one-third" for several seconds and as the movement of the stern away from the alongside pier/ship begins, the engine is stopped. The ship is beginning a pivot on the #2 line (after bow spring line). As the stern clears any obstructions, the #6 line is cast off. The ship's stern will continue to drift out under the inertia until the desired angle (45-degrees, if practical) to begin backing is achieved.

Lines #3 and #2 are cast off, the order is "rudder amidships", the engines order is "all back one-third", and the #1 line is slacked, and then cast off as the ship backs cleanly away from the mooring.

When well clear, the order for "all engines stop" is given to insure shafts will stop turning, and then the desired turn may be made using the "dead in the water" technique. The bow anchor is drawn into the hawsepipe, and secured for sea.

4. Mooring to buoys:

Mooring will generally be made fore and aft, rather than just swinging from a bow chain mooring. The approach of the bow to the buoy should be made from the windward side, so any leeward drift will bring the bow to the buoy.

The LCVP will have been lowered with the coxswain and buoy crew of at least 3 men. The anchor will be stopped in the hawsepipe, the anchor chain broken and the shackle attached. A line (dip rope) is attached to the chain a short distance above the shackle and led out.

As the ship nears the buoy, the coxswain drops 2 men on the buoy, and comes alongside to receive the dip rope, carrying it to the buoy. It is run through the ring on the buoy, a messenger is attached and thrown to the ship. In the interest of safety, the buoy crew should return to the LCVP until the anchor chain is ready to be attached to the ring on the buoy. The dip rope is run to the gypsy head and a strain taken while the anchor chain is walked out. As the anchor chain reaches the buoy ring, the 2 men return to the buoy, and the shackle is engaged and the pin inserted. The buoy crew returns to the LCVP once again.

The deck crew will have stopped the Danforth kedge (astern) in its cradle and attached the shackle to the end of the wire cable and bent on a dip rope. The coxswain will attach the dip rope to a cleat on the LCVP and tow the cable to the stern mooring buoy while the stern winch pays out on the cable. The buoy crew runs the dip rope through the ring on the buoy, and attaches it to the cleat on the LCVP. The boat pulls the cable end to the ring, and the shackle is engaged and the pin inserted. The buoy crew returns to the LCVP and the LCVP stands by as the orders to heave in or pay out anchor chain and stern cable is given to achieve the proper position of the ship between the buoys.

5. Leaving a buoy mooring:

Engines will be started and brought to operating temperatures.

In general, the stern cable is cast off first, in the reverse of its being secured to the buoy. The dip rope may be only long enough for the LCVP to remove the strain enough to remove the shackle and permit the buoy crew to return to the LCVP before letting go of the dip rope. The stern cable is heaved in and secured to the stern anchor once again to insure it will not foul the screws.

The bow anchor chain will be heaved in until the bow is over the buoy, and the buoy crew has bent on a dip rope. A strain will be taken on the dip rope and the shackle removed. The buoy crew will return to the LCVP and the dip rope is let go. The chain is heaved in and secured to the anchor once again.

As the LCVP clears the buoy, the rudder order is “full right rudder”, and the engine order for “starboard engine ahead one-third” and “port engine back one-third” is given. As the swing of the bow to port begins, the engines are ordered “all engines stop”. The order “rudder amidships” and the wait for the proper angle to be attained to begin backing clear.

6. Anchoring without buoys:

If possible, the approach will be made directly into a light wind. A heavy wind will tend to push the bow to port or starboard, so backing into the wind under these conditions will be much easier to achieve.

The deck crew will test the anchor engine, free the anchor in the hawsepipe, set the brake, and notify the conning officer.

Proceed to the charted bearings, taking sightings, to insure anchoring in the proper location. The bow anchor may be allowed to walk out if the anchoring will be in deep water. Take off all but one stopper, shackle on the anchor buoy line, disconnect the wildcat and when ready to let go the anchor, notify the conning officer. The anchor chain pay out will be approximately 6-times the depth of water at the site of anchorage.

The ship will then be backed, and the command "stand by the anchor" will be given. As soon as way is on, the anchor will be ordered to "let go". By backing as the anchor is let go the anchor chain will not be piled and/or the anchor fouled.

Backing will continue as the anchor strikes bottom and the chain slows, begin to apply the brake to set the anchor, then release the brake and the chain will be laid out on the bottom. The deck crew will report the fathoms of chain out as the chain markers pass the wildcat, and which way the chain is tending. If the chain tends around the stem, the brake is set immediately, and the conning officer takes measures to increase backing speed.

Since the ship will be anchored at stem and stern, the fathoms of chain will be greater than the ship will tend, once the stern anchor has been placed. Since an LST has only 900-feet of stern anchor cable, this ship will not be anchoring in deeper water than about 15 to 20 fathoms with this method.

After letting go the stern anchor, and setting it, the stern anchor cable pay out and the bow anchor chain heave in is performed so as to achieve the desired position of the ship between anchors. The stoppers are passed, the chain is slacked between the stopper and windlass, and the brake is set.

Upon weighing anchor, the stern anchor will be heaved in first, and without use of the screws if possible to prevent fouling. Then the ship will be slowly moved ahead as the bow anchor is brought to short stay. When the anchor is at short stay, the conning officer may want to use the anchor to swing the ship around to a desired heading for departure. Achieving that, the anchor will broken out from the bottom and the report is made "anchor is up and down". When the conning officer is ready, he will order "anchor aweigh". As the anchor comes into view, the report is made that "anchor is in sight, and anchor is clear" or "fouled" as the case may be.

7. Effect of Shallow water:

Shallow water disrupts the normal water depth of flow under the hull, and will be noticed as a "rooster tail" wake even when moving ahead with a low screw speed on. More significant is the lack of rudder response since, with 5 to 10-degrees rudder on, the ship's response will be almost imperceptible.

8. Underway in rough seas:

The ship is very seaworthy, but she has a tendency to roll smartly in rough seas. The sloping bottom and bluff bow cause her to slap and pound when facing into a rough sea. The shallow draft at the bow allows the forefoot to come clear of the water and slap hard as it comes down. When the bow takes solid water, the ship shudders and the flexure of the hull is pronounced.

To reduce the beating, we can ballast down forward, change speed, change course, or a combination of these options. Taking the wind off either the starboard or port quarter, and selecting a course which angles through the troughs and crests at a speed which is sufficient to maintain steerage is a practical solution. This will generally increase the roll experienced, but will reduce the pitching, the pounding on the bow section, and the clearing of the screws from the water.

9. Beaching & Retracting -- general considerations:

Beaching trim is obtained by flooding or pumping out the salt-water in the forward ballast tanks, as well as changes in the fuel and fresh water ballast tanks located farther aft. The desire is to place the bow as close to the water's edge as possible. For most beaches, it was not possible to drop the leading edge of the ramp onto dry land, so pontoon or bulldozed earthen causeways were often used effectively. The underwater beach sand contains a considerable water content which acts as a lubricant to slide the LST's bottom up onto the beach closer to the shoreline. The disadvantage is that under the pressure of the ship it causes the sand to produce a suction which will resist the forthcoming retraction.

When an LST beaches on a normal sand bottom, there is no sudden jolt, it is more like a toboggan coming to the end of its run. Damage can occur when rocks, coral heads, or metallic objects are struck.

Beaching and retracting is a complex exercise, and will be further explained in its two-parts, but the general requirements are:

a. the ship must be heading into the beach directly perpendicular to the wave action as she grounds -- preventing the surf from attempting to broach her, as it would if being pounded on either quarter;

b. the stern anchor is placed to windward with as close to 600-feet of cable laid out from the stern winch after grounding, as is practical; (relative bearings taken on landmarks nearly abeam should be used to determine the "let go" point for the stern anchor)

c. the possible requirement for the use of the engines and/or rudders to maintain the beaching without broaching or backing off while unloading;

d. the movement forward, while beached and unloading, may not be advisable if personnel or equipment safety factors are involved;

e. the stern anchor cable must be under strain as the ship backs off the beach to insure it does not become fouled in the screws or rudders;

f. the use of ballast water is to be circulated through the ship to supply fire main pressure, flushing water, cooling machinery, etc., should the ship be left high and dry by a receding tide.

10. Beaching to discharge cargo:

For a normal beaching to discharge cargo, in the change from ocean-going to beaching trim, we pump out ballast forward and may take on ballast aft to obtain the desired trim.

The bow doors would be undogged except for the top dog (specially-designed turn-buckles).

Consider the stern anchor placement position. The stern anchor will be placed about 900 feet from the shoreline. The calculation of about 600-feet of cable, plus 300-feet of ship from bow forefoot to stern winch, plus 150 feet from the bow to shoreline, less 50 feet of slack, less 100 feet of offset to windward. The anchor will be in about 4 to 5- fathoms of water, and permits a safety margin of about 300-feet of cable on the winch drum. The cable is marked with yellow bands at each 100-feet -- 1 yellow band at 100-feet; 2 yellow bands at 200-feet; etc. As a warning, the stern cable is painted yellow the entire distance between 700 and 800-feet, and painted red between 800 and 900-feet (the bitter end).

The engine speed used in beaching is generally TWO-THIRDS or even STANDARD, with the objective to place at least 30% of the area of the hull bottom aground. The bow must be forced a considerable distance beyond the point of contact, even with as little as a 4-foot draft on the forefoot of the bow. It was common to drive the ship up onto the beach sand for about another full-foot of water depth or more, or about another 50 to 100-feet after first contact of the bow forefoot. Basically, with 30% of the hull bottom in contact with the beach, it means the contact would extend to a point slightly aft of the main deck ramp.

Once the ship has grounded and has been driven as far up the beach slope as she will go by use of the ship's engines, it is desirable to take steps to insure that the ship will remain in place. The salt water ballast tanks are re-flooded to hold the ship on the beach more firmly, and to partially compensate for the weight being off-loaded.

Then a strain on the stern anchor cable would be taken to assist in preventing broaching.

The remaining bow doors dog would be removed, the doors opened, and the ramp lowered.

The ramp may very well be lowered into a depth of 3-feet of water at a distance of some 150-feet from shoreline, to as much as a 5-feet depth at a distance of 250-feet, without consideration being given for sandbars. This would exist on the designed beach gradient of 1-foot drop in every 50-foot distance to seaward from the shoreline. This would be the case when assuming a forefoot draft of as little as 4-foot to as much as a 6-foot draft. Marrying to a pontoon causeway may be required if the cargo needs to be "dry".

11. Retracting from the beach after discharging cargo:

After discharge of cargo, the ramp would be washed and raised, the bow doors would be closed and dogged. All equipment used in tie-downs, etc. would be stowed, and the ship made ready for sea.

When ready to retract from the beach, the forward ballast is pumped out, lightening the bow and letting it come free from the sand more easily. The stern anchor would have been winched to take a strain once the ship was beached. The stern anchor now has the job of helping to keep the ship from broaching in the surf while retracting from the beach, until the ship can be effectively maneuvered by engines and rudder control in the deeper waters.

Beach suction can be a significant factor in retracting operations. Due to the weight on the sand, the lubricating water has been squeezed out and friction replaces it. The objective is to move sand away and reintroduce the water film necessary to lubricate our hull's movement. Many times the engines must be ordered "all back full" to create a propeller wash strong enough to move the sand away from the hull. In addition, it may be necessary to swing the stern from side to side with engine power, but not so radically as to induce a severe swing that risks a broaching. Even the use of fire hoses being directed on the sand at the edges of the hull has been tried.

In a crowded beaching area, some skippers have dragged the bow anchor underfoot to prevent the bow from swinging into another vessel as it backs from the beach. The stern anchor cable must have a continual strain taken to prevent overriding it and fouling the screws.

Having laid the stern anchor (kedge) out about 600-feet has the advantage of a sufficient scope of cable to provide maximum holding power, and once the anchor is aweigh while retracting from the beach, a good decision can be made of the water depth sufficiency to begin the maneuver of turning the bow to seaward. Other factors in deciding to make the turn would be the strength and direction of the surf, and the wind.

Finally, the ship would be re-ballasted to provide the desired ocean-going trim.

Evaluation of Integrity

LST 325 is a rare surviving World War II vessel that saw combat use. It is furthermore exceptionally rare for its degree of preservation. So intact is LST 325 that it could perform its original intended mission of delivering supplies, vehicles and personnel to a beach, utilizing all its original 1942 operating systems, yet today.

The hull, with patching and reinforcement for ice conditions, is the original steel plating laid down in 1942. The decks, internal compartments, and superstructure (bridge, conn, etc) are unaltered. The power plants, electric winch motors, Falk clutch, bow doors and opening system, are all original to the ship. Propeller shaft and screws are original. The ship retains its original electrical equipment, however, most operating systems have been rendered redundant by installation of modern control switches with appropriate safety circuitry. For example, the original annunciator remains in place in both engine room and bridge, but, a new throttle control device was installed in the 1960s. Similarly, the original circuit breaker knife switches still function, but are redundant due to installation of a new circuit box. The radio room contains both original radio equipment and radio equipment added over the years. Much of the WW II era radio equipment can still be used today.

Armament is original to the ship, though it has been rendered useless. The Greek Navy removed and stowed the guns on board; the LST group reinstalled and incapacitated them.

Unfortunately, LST 325 no longer retains its original complement of LCVPs. The current LCVPs associated with the ship date to the 1950s, though they duplicate exactly the technology of those built during the war. The current LCVPs are non-contributing to this nomination.

Section 8 - Statement of Significance

USS LST 325 is a rare and intact historic U.S. Navy vessel that meets National Register criteria, A and C. Built in 1942, in Philadelphia (PA) Naval Ship Yard and commissioned on February 1, 1943, USS LST 325 participated in the invasion of Sicily (July, 1943); Salerno (Sept., 1943) and Normandy (June, 1944). During the Normandy invasion, the USS LST 325 made over 40 roundtrips from France to England, carrying troops, supplies and wounded. The USS LST 325 is one of a few surviving U.S. vessels that actually went ashore on D-Day in 1944 and is significant as a rare example of special purpose naval warfare invasion vessel, the Tank Landing Ship (LST). Of the over 1,000 built, USS LST 325 is the only fully functional LST that has been maintained according to its original design.

The ship earned two battle stars during WWII. LST 325 was decommissioned in July, 1946, and, in 1964, was acquired by the Greek Navy. Rep. Ralph Hall of Texas helped secure the needed congressional authorization that gave the USS LST 325 to the LST Memorial Inc., a Pennsylvania not-for-profit nationwide corporation, thus ending a six year search by the group for an LST. Their goal was to make the needed repairs to the ship and bring it back to the U.S.A. A total of 60 men traveled to Greece from July through September, 2000, in order to make the needed repairs and prepare the USS LST 325 for departure to the United States. Fortunately, the USS LST 325 had not been stripped of parts and equipment. Walking its decks today provides visitors with a potent lesson in the technology, strategy, and personal sacrifice of World War II.

USS LST 325 is nationally significant. As a former U.S. Navy – built vessel, funded by the federal government for prosecution of a formal U.S. declaration of war, the ship can only be evaluated at that level. While it can be said with reasonable certainty that no more than 10 of the World War II – commissioned LSTs survive today, LST 325 is the sole fully functional and intact example.

Introduction

Fascist aggression, ambition and greed collided with the empires of established world powers during the Second World War. Germany, Japan, and Italy entered into war to secure "rightful" lands. Overall, Nazi Germany's leaders foresaw brief, decisive land engagements while Tojo's government hoped to secure areas rich in raw materials before any unified response could be mounted.

Japan began its conquest of Asia in 1931 with an invasion of Manchuria, then, in 1937, the Japanese Army sent a force to subdue China. British, American and French forces and territories were not under attack by the Japanese until after Pearl Harbor, December, 1941.

Hitler's ambitions for a German empire simmered over in March 1938, when German forces annexed Austria without firing a shot. The British policy of appeasement lead to the partitioning of Czechoslovakia later the same year, and in 1939, Germany seized all Czech lands. Hitler and Stalin negotiated a non-aggression pact in August of 1939. The German flank thus secure, on September 1, 1939, German Wehrmacht units invaded Poland.

Polish forces were defeated quickly. The ensuing "sitzkrieg" or phony war was shattered in May 1940 when German Panzer squads smashed through the Belgian Ardennes and on into France, subduing French resistance by June. The French and British forces could not stop the German assault.

Two experiences at this early point in the war in Europe dramatically illustrated the need for special purpose transport ships. First, in the evacuation at Dunkirk, the Allies not only lacked a proper fleet of troop transports, but, the fact that no docks and handling cranes were available also meant that thousands of otherwise battle-worthy artillery pieces and scores of field equipment had to be disabled and abandoned.

In late May, 1940, with the Wehrmacht pushing back the British, French, Belgian and Dutch Armies, there were a total of 338,226 Allied forces retreating toward Dunkirk. The need to rescue these troops became evident but the task was an overwhelming one. The large British ships had a deep draft, making it impossible for them to come close to shore. In order to execute the rescue, Prime Minister Winston Churchill asked for any type of ship or boat to help with the troop withdrawal. As a result, 900 small fishing boats, ferries and other private craft assisted in the rescue. They were transporting the troops from the shore out to larger ships that took the troops to England. The rescue of the troops took several days and proved to be a success. However, the Allies had to leave behind 2,000 guns, 60,000 trucks, 76,000 tons of ammunition and 600,000 tons of fuel supplies. The inability to execute a swift rescue of the troops and removal of the supplies demonstrated the need for a ship with the ability to land directly on the beach and to retreat off the beach.

Second, neither the Kreigsmarine or Wehrmacht had planned for an overseas invasion. Operation Sea Lion, Hitler's plan to invade England, would depend on ships capable of landing troops and equipment on beach heads. Control of the air was essential; Goering boasted that the Luftwaffe would subdue the R.A.F. in a matter of weeks. When the Battle of Britain dragged out for months, Hitler postponed, then canceled Sea Lion. While air superiority was essential, the lack of proper troop and vehicle ships ended all hope of invading England. The Allies were well aware of Germany's ship building issues, thanks to intelligence intercepts.

Japan had devised a plan to expand its land area. Its expansionist policies were legitimized by the other fascist powers in September, 1940 when Germany, Italy and Japan all signed the

Tripartite Pact. After the attack on Pearl Harbor and the declaration of war by the United States in December, 1941, Germany and Italy declared war on the United States. As a result, the U.S. was now at war with Germany, Japan and Italy and an ally to England. At the time the United States entered WWII, Germany had gained control over much of Europe, Italy was fighting in North Africa and Japan was carrying out an aggressive action in the South Pacific. The Allies decided on a strategy to first defeat Germany/Italy and then Japan.

At first, the American strategy in the Pacific was to hold Japanese advances. At Coral Sea in May 1942, U.S. forces thwarted the Japanese invasion of Port Moresby, New Guinea at great cost. Then at Midway, in June 1942, the U.S. Navy carrier-based concept proved overwhelming. Navy airmen sank four Japanese carriers, handing the Imperial Japanese Navy their first decisive defeat. In early 1943, U.S. military planners formulated Operation CARTWHEEL, the island-hopping strategy for victory in the Pacific. Well before this time, the need for adequate shipping support was self-evident, and U.S. Navy observers had made note of the landing craft and support vessels utilized by the Japanese. Taking the war to the Japanese-held islands was going to require a special purpose vessel.

But the need for LSTs was first to be met elsewhere. The Second Washington Conference, June 1942, called for a response to Soviet demands to open a second front in Western Europe to relieve pressure from the Nazi invasion of the Soviet Union. Operation Barbarossa, as the Werhmacht command called it, had pushed the Red Army far into its own territory and claimed tens of thousands of Soviet soldiers. As Roosevelt and Churchill held the Second Washington Conference, the Werhmacht was pushing to Stalingrad; the Battle of Stalingrad would begin in August, 1942. The Allies had no time to waste. Capture of the Stalingrad area meant unlimited oil supplies for the German war machine.

Though the Allies had begun to open a "second front" in the skies over Europe, U.S. air power was insufficient to draw enough support away from the East Front in 1942. Therefore, an invasion by ground forces was critical. During the Second Washington Conference, Churchill and Roosevelt committed their forces to an invasion of North Africa. Churchill had often made statements that Italy was the "soft underbelly" of Axis-held Europe. Operation TORCH, the Allied invasion of North Africa, would be the precursor to subduing the Mediterranean and Italy.

The strategy for the invasion of Europe was crafted in part by England's experience in the Battle of Dieppe. This German-occupied port on the northern coast of France was targeted by the Allies in August, 1942. Over 6,000 troops, mainly Canadian, were supported by large British naval and Allied air force contingents. The objective was to seize and hold a major port for a short period to demonstrate that it was possible and to gather intelligence. The battle included naval bombardment, air attack, and troop combat. The attack was a complete failure in all aspects except one. It provided a great learning tool that helped the Allies craft an amphibious assault on Northern Africa, Italy, Europe and islands in the Pacific. Of the 6,086 troops who participated in the Dieppe attack, 3,623 were either killed, captured or wounded. The Allied air forces lost 119 planes and the Royal Navy had 555 casualties. Seizing a fortified major port or urban area by direct assault was out of the question.

The Dieppe experience and the technological advances made since WWI changed the approach an attack on the European continent would be made. The British and American doctrine on amphibious assaults was also different. The British preferred a "soft" approach in which night assaults were preferred along with avoiding direct confrontation with enemy forces. They emphasized mobility and surprise attacks. Blockades and negotiated settlements were also part of their strategy. For hundreds of years, England ruled its empire with a strong naval force due to geographical circumstances.

The American doctrine, on the other hand, was quite different. Americans used a direct approach consisting of determining the enemy's strength and attacking it. They preferred the daytime because ships could be more easily navigated and shore operations could be executed more effectively. The American doctrine sought to maximize use of battleships and aircraft bombers.

As was shown in the Battle of Dieppe, an amphibious assault required the cooperation of and coordination of land, air and sea forces. The 20th century brought changes in technology which had to be factored. Radar, radio communications, military intelligence, long range artillery, machine guns, the internal combustion engine, airplanes and the size of armies all changed. The British experience was that seldom was a hostile force met during a beach landing on enemy shores. With the advances in technology, countries were able to monitor the movement of enemy forces. Consequently, the Werhmacht knew of the impending attack on Dieppe and met it with sufficient forces to gain an overwhelming victory.

One other lesson learned from Dieppe is to avoid beaches with organized defenses. Search out those potential landing areas that have no or minimal defenses. One technological advance that would greatly contribute to this strategy would be the development of a ship that could make beach landings in order to deliver troops, armor and supplies.

Need, Design and Construction of the LST

The Allied strategy during World War II called for recapture and occupation of Axis-held territory and home lands. By necessity, the Allies had to be able to ferry supplies and troops across substantial bodies of water in every theatre. Churchill had thought of the idea of a tank lighter or ship during World War I – a special purpose vessel that could deliver tanks. Churchill continued to be convinced that the shock of vessels disgorging battle-ready tanks onto a beachhead would provide overwhelming success during an invasion.

But it was the painful lesson of Dunkirk led the British to re-investigate the concept of shallow draft freight ship. The decision to invade North Africa by 1942 also made creation of appropriate landing craft a high priority – to the point of interfering with construction of U.S. Navy fighting ships. As with many military technological breakthroughs during the war, the LST was born of an immediate demand yet brilliantly conceived for its purpose.

In their first attempt to develop a ship with the capability of making beach landings, the British converted three shallow-drafted tankers to LSTs. While the concept was acceptable, the redesign proved to be unsatisfactory. Additionally, survival of the Royal Navy depended on production of warships. In November, 1941, the British Admiralty then requested the United States to redesign and produce the LST. John Niedermair, who worked for the U.S. Bureau of Ships, developed a rudimentary design for the LST in a matter of days. Niedermair's design resulted in the only U.S. Navy ship ever made that has the ability to deliver soldiers and materiel directly to a beachhead. The British Admiralty immediately accepted Niedermair's concept and ordered 200 under terms of Lend-Lease.

The ability to land on remote, undeveloped beaches proved to be a significant advantage and helped avoid potential high troop loses. This advantage would prove as evident in the Pacific where few islands had adequate harbors, as it would in the European Theater.

The degree to which the LST not only played a role in Allied victory but dictated strategy was felt at the highest levels during the war. Implementation of Operation OVERLORD in June 1944 was threatened by the lack of available LSTs, and their disposition was debated at Cairo Conference (November 1943) and Tehran Conference (November-December 1943).[1] During this time, Churchill complained that "the destinies of two great empires…seemed to be tied up in some god-dammed things called LST's (and) LST engine experts of which there was a great shortage." [2]

Churchill's famous rant points out that sheer production was one issue, but training crews and shaking down vessels also took time. The LST had a number of general purpose crew members like any combat ship of the war. But, due to its specialized purpose and range of equipment, the LST required a dedicated crew that was highly trained and functioned as a team. The skipper had to be familiar with deep-ocean and shallow water operation. He had to coordinate the highly

[1] See generally Richard Leighton, "OVERLORD Versus the Mediterranean," in Kent Roberts Greenfield, ed., Command Decisions, Washington, D.C.: Center of Military History, Department of the Army, 2000, p. 255.

[2] Samuel Eliot Morison, History of United States Naval Operations in World War II, Vol 11: The Invasion of France and Germany 1944-1945. Boston: Little, Brown & Co., 1957; Morrison, on p. 28, states that the quote was from January, 1944 and was in a discussion between Eisenhower and Churchill.
Also quoted in Morison, The Two-Ocean War, p. 388-389.

complex series of tasks required to beach and back up what amounted to a sizable cargo ship, not to mention standard convoy and general maneuvers.

Workers at the Newport News shipyards built the first LST in June, 1942. Production of LSTs took place in established naval yards and five (5) inland facilities, which produced 670 of the total number of 1,051 LSTs built during WWII. These sites were in Seneca, Illinois; Evansville, Indiana; Jeffersonville, Indiana; Ambridge, Pennsylvania; and Neville Island, Pennsylvania. The Evansville facility built the most LSTs, 167. A common denominator to all these inland shipyards was their location on a navigable river, the Ohio or the Illinois. The balance of the LSTs was built in established naval shipyards. The USS LST 325 was built at the Philadelphia Navy Yard in October, 1942. By the end of the war, construction time was reduced to two months. At the beginning, the construction time was four months.

After WWII, only the Jeffersonville shipyard continued in a ship building activity by producing towboats and other river craft. The Seneca Yard went out of business but the people continue to celebrate their history through Prairie Shipyard Days each year. Evansville built a Museum of Science and Industry, celebrates its heritage each year through LST Week and is the homeport for the USS LST 325.

Deploying the LST

The Allies' strategy was to defeat Germany first and then Japan. Consequently, the initial deployment of LSTs was in North Africa, Italy and Normandy. The following lists some major battles and the number of LSTs involved: Sicily – 76; Gilbert Islands – 25; Normandy – 233; Okinawa -300; Iwo Jima – 63; Marshall Islands – over 40; Saipan – 50; Paulus – 52; and Leyte – 170.

The LST was able to serve in different capacities. By design, it was able to land on beaches, unload troops, vehicles and supplies and then retract itself off the beach by use of a stern anchor and winch. During the D-Day invasion, LSTs, including USS LST 325, made dozens of trips to and from England. Wounded soldiers were taken back to England for care. One or more LSTs were converted into hospital ships while others were modified to function as repair ships. Such ships would have cranes and other equipment installed in order to facilitate the handling a damaged craft in need of repair.

The main deck could accommodate small reconnaissance aircraft. There were 47 LSTs lost during WWII, 31 were sunk by enemy action and 16 were lost by accident. After the War, the U.S. Navy converted 88 for other uses, 416 were scrapped, 263 were converted to merchant ships, 230 sold to foreign governments and the remainder was lost or disposed of in other ways. During WWII, 265,000 sailors served on LSTs and over two million troops were transported by LSTs.

LST 325 in Action

USS LST 325 left the U.S. on March 19, 1943 for Oran, Algeria, arriving there on April 13th. At the conn was Lt. Commander Clifford Mosier, captain of LST 325 for the duration of the war. For the next three months, the ship and crew went through training exercises with American and British Army units. On June 28, 1943, it arrived in La Goulette in the Bay of Tunis to prepare for Operation HUSKY, the invasion of Sicily.

USS LST 325 left Tunis and arrived in the Bay of Gela on July 11 carrying vehicles and the men of the U.S. Army 1st Armored Division. The ship made five more trips to Sicily before Messina fell on August 17. On two trips, it carried back Italian prisoners. On September 13, the USS LST 325 sailed, as part of the Northern Attack Force, in support of the invasion of Salerno, Italy, carrying elements of the British 40th Royal Tank Regiment. It came under attack by German fighter bombers resulting in injuries to eight men. USS LST 325 made three trips to the beachhead at Salerno. In October, 1943, it returned to Oran and left on November 12th for England as part of a large convoy. On November 21, LST 325 came under fire from Luftwaffe fighter bombers that were using Henschel Hs 293 remote-controlled rocket-propelled missiles. Several transport ships in the convoy were sunk. The convoy arrived in Plymouth, England on Thanksgiving Day, November 25, 1943.

From December, 1943 to May, 1944, the USS LST 325 was involved in training exercises along the southwestern English coast in anticipation of Operation OVERLORD. On June 5, 1944, Lt. Commander Mosier and crew sailed from Falmouth, England carrying elements of the 5th Special Engineer's Brigade. USS LST 325 was part of the backup force for troops going ashore on Omaha Beach on June 6, 1944. Between June, 1944 and April, 1945, the USS LST 325 made 44 trips between England and France unloading at Omaha, Juno, Utah and Gold beaches and the City of Rouen on the Seine River. On December 28, 1944, it helped rescue 700 men from the troop transport, *Empire Javelin*, which had been torpedoed off the coast of France.

With victory in Europe coming on May 8, 1945, the military role of the LST in the European Theater was at an end. On May 11, 1945, USS LST 325 sailed in a convoy from Belfast, Ireland for the U.S., arriving on May 31, 1945 in Norfolk, VA. In August, 1945, the Japanese surrendered, ending WWII. USS LST 325 was sent to Green Cove Springs, FL and decommissioned on July 2, 1946. The U.S. Navy reactivated LST 325 in 1951 to assist in the construction of radar outposts on the eastern coast of Canada and Greenland. This work was done in 1951-52. In 1961, the USS LST 325 was taken out of service and became part of the National Defense Reserve Fleet. In 1963, it was reactivated and transferred to Greece in May, 1964. It served in the Greek Navy until 1999, when it was decommissioned a third time.

Post War LSTs

There were only two LSTs constructed in the immediate post WWII era. The USS LST 1153 and 1154 were commissioned in 1947 and 1949, respectively. They were the only steam driven LSTs built by the Navy. Several LSTs were involved in the amphibious assault at Inchon during the Korean War, the Viet Nam War, Operation DESERT SHIELD and DESERT STORM in the Persian Gulf. Many military strategists had begun to lessen the importance of being able to carryout an amphibious assault. The threat of such an assault, however, did play a diversionary role in DESERT STORM.

Due to the success at Inchon, 15 LSTs were built in the early 1950s. These were 56 feet longer than the WWII LSTs and had four diesel engines which increased their speed to 15 knots. In July, 1955, county and parish names were assigned to many LST's. In the late 1950's, seven De Soto County Class LSTs with a capability of 17.5 knots were built. In 1969, the Newport Class, which was the last class of LST, was introduced. Twenty such LSTs were constructed with the ability to sustain 20 knots. To achieve this, the traditional blunt bow door was replaced with a pointed ship bow. The Newport Class unloaded cargo via a 112 foot ramp operated over the bow. It also had a stern gate which facilitated unloading of equipment and vehicles into the water or onto other craft. The Newport type has been removed from the U.S. Navy, but serves in the navies of other countries, including Brazil, Mexico and Spain, among others. No LSTs remain in active service in the U.S. Navy.

Journey Back Home

In 2000, USS LST 325 was acquired by the LST Memorial, Inc and returned to the US. To give some background to the return of the USS LST 325 to the United States, there was a group of veterans that desired to ensure that the LST's contributions in WWII would never be forgotten. Their plan was to find and acquire a LST. Their search for a suitable LST led them overseas to Greece where they found USS LST 325. There was considerable work to be done to secure permission from the Greek and U.S. governments to sail the ship from Greece. There was also considerable physical work to be done: clean the ship, repair the engines, get fresh water onto the ship, pump oil and water from the ship. Repairs to the electrical system were needed in order to use several navigation and communications systems. Since the crossing, an additional generator and converter assist in powering the ship's electrical systems. The summer of 2000 in Greece was the hottest summer recorded for many years. Temperatures reached over 100 degrees for several days. Coupled with the average age of the crew at 72, the work became very difficult. The men tried to work during the early and later hours of the day. Over $100,000 was spent on repairs before leaving Greece. BP Oil donated 50,000 gallons of fuel for the trip. On November 14, 2000, the USS LST 325 set sail out of Crete with a crew of 30 men. The trip would cover 6200 miles to get to Mobile, Alabama on January 10, 2001.

Since its return to the United States, the USS LST 325 was docked in Mobile, Alabama. A permanent home was sought and the City of Evansville, Indiana was selected through an open bidding process. Evansville was not only a huge producer of LST's, but also P-47 fighter bombers and 40 other products used in WWII. The USS LST 325 was moved to Evansville in Sept-Oct, 2005, arriving on October 3rd.

The maintenance performed on the USS LST 325 has been done according to the original design. Repairs of the engines and generators, wiring of the ship, sandblasting and painting, fixing holes and performing thickness tests and restoration of the radio room are some of the maintenance and improvements done. Well over one (1) million dollars has been spent on the USS LST 325 since it returned to the U.S. The USS LST 325 has been very active since arriving in the United States. The USS LST Ship Memorial Inc. has participated in events and opened the ship to thousands of visitors.

Volunteers work on the ship year around, giving tours, operating the gift shop and performing maintenance. The ship is open 300 days of the year. A newsletter, called the Phoenix, is published three times per year.

Three other craft are on the USS LST 325. They are LCVPs, which is an abbreviation for Landing Craft Vehicle Personnel. These craft are also called Higgins Boats (named after their well-known designer, Andrew Jackson Higgins). The LCVPs are technically not Higgins boats. While they meet the specifications of the Higgins boats, they were not built in a Higgins factory and were built after WWII. All LSTs carried between two and six of these smaller craft. The LCVPs on the USS LST 325 are fully operational. LCVPs could carry either 36 fully equipped troops or a jeep and 12 troops. They carried troops and vehicles to the beach during the invasion.

The mission of the USS LST Ship Memorial, Inc. is to educate its visitors to the role of the LST in World War II, Korea, and Vietnam. It is our desire to preserve the memory of these ships and all the countless heroic men who died in battle during the service to their country.

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The Return of LST 325. video produced by National Audio Video for History Channel, 2005.

Section 10, Geographical Data, Verbal Boundary Description

The boundary includes the ship known as USS LST 325, its hull, decks, superstructures and permanently mounted equipment, and three LCVP boats currently associated/stored on board USS LST 325. The mailing address location of the ship is in Evansville, Indiana.

Boundary Justification

The boundary includes the significant ship in its entirety and all of its permanent mechanical systems and equipment, as well as three LCVP boats davited on the LST.

Photographs

The following information is common for all images, unless otherwise marked:

U.S.S. LST 325
Vanderburgh County, IN
Holly Tate
November 20, 2008
Image files stored at Indiana Division of Historic Preservation & Archaeology

NOTE: Ship is docked with bow roughly pointing east. Camera facings are given in relation to starboard/port and bow/stern when possible.

IN_VanderburghCounty_USSLST325_001
General view of ship, starboard side, camera facing northwest.

IN_VanderburghCounty_USSLST325_002
Bow of ship, starboard side, showing hinged bow doors and forward gun emplacements. Camera facing north.

IN_VanderburghCounty_USSLST325_003
General view of ship from astern/starboard, camera facing northeast.

IN_VanderburghCounty_USSLST325_004
View from astern, showing gun tub emplacements, top deck superstructure. Camera facing northeast.

IN_VanderburghCounty_USSLST325_005
View on top deck, facing aft, bridge and conning tower in background, large hatch to tank deck in right foreground, camera facing west.

IN_VanderburghCounty_USSLST325_006
View forward on top deck, raised AA gun tub emplacements in background, large covered hatch to tank deck in immediate foreground, camera facing east.

IN_VanderburghCounty_USSLST325_007
Conning tower with entry hatch, camera facing east.

IN_VanderburghCounty_USSLST325_008
Top deck looking forward from conning tower rail/catwalk, camera facing east.

IN_VanderburghCounty_USSLST325_009
Stern winch used for pulling ship off beach, aft of bridge/conning tower, camera facing southeast.

IN_VanderburghCounty_USSLST325_010
Stern starboard AA gun tub emplacement, viewed from bridge deck catwalk, davit arm for starboard LCVP in left foreground. Camera facing southwest.

IN_VanderburghCounty_USSLST325_011
Detail view of stern starboard AA gun emplacement. Camera facing west.

IN_VanderburghCounty_USSLST325_012
Anchor on port foredeck, camera facing east.

IN_VanderburghCounty_USSLST325_013
Bridge interior, original wheel, brass annunciator controls, looking in from starboard entry hatch, camera facing north.

IN_VanderburghCounty_USSLST325_014
Bridge interior, supplemental annunciator with chrome levers added by Greek Navy to lower left. Camera facing southeast.

IN_VanderburghCounty_USSLST325_015
Radio Room, immediately aft of bridge. Equipment includes original and later receivers/transmitters. Camera facing northwest.

IN_VanderburghCounty_USSLST325_016
Officers quarters. Camera facing north.

IN_VanderburghCounty_USSLST325_017
Chart Room, just behind bridge. Camera facing north.

IN_VanderburghCounty_USSLST325_018
View into galley from serving pass-through. Camera facing west.

IN_VanderburghCounty_USSLST325_019
Tank Deck, used for U.S. Army tanks, looking toward bow, camera facing east.

IN_VanderburghCounty_USSLST325_020
Tank Deck, bow end, bow ramp at center. Camera facing east.

IN_VanderburghCounty_USSLST325_021
Tank Deck, access hatch for unloading stretchers bearing wounded soldiers from trucks or ambulances into berthing areas, port side wall of tank deck roughly amidships, camera facing northeast.

IN_VanderburghCounty_USSLST325_022
Tank Deck, view aft, winch at center used to raise/lower bow ramp. Greek flag painted during ship's service in Greek Navy. Camera facing west.

IN_VanderburghCounty_USSLST325_023
Berthing area, port side. Camera facing southeast.

IN_VanderburghCounty_USSLST325_024
Berthing area, port side. Camera facing southeast.

IN_VanderburghCounty_USSLST325_025
Berthing area, triple bunked. Camera facing east.

IN_VanderburghCounty_USSLST325_026
Engine Room, one of two diesel power plants. Camera facing northwest.

IN_VanderburghCounty_USSLST325_027
Engine Room, Air intakes with air filters and root blowers on one of two main engines, camera facing west.

IN_VanderburghCounty_USSLST325_028
Engine Room, original main electrical control panel. Camera facing southwest.

IN_VanderburghCounty_USSLST325_029
Engine Room, original brass annunciators, camera facing southwest.

IN_VanderburghCounty_USSLST325_030
Engine Room, fresh water engine cooling system ("radiator"). Camera facing west.

IN_VanderburghCounty_USSLST325_031
Engine Room, valves used to move shift fluids from one storage tank to another, camera facing northeast.

IN_VanderburghCounty_USSLST325_032
Engine Room, Falk clutch, used to vary speed, direction of rotation and torque of propeller shafts. Camera facing south.

IN_VanderburghCounty_USSLST325_033
Engine Room, post-war engine controls are in sheet metal boxes to right, back up power plant to left.

IN_VanderburghCounty_USSLST325_034
Propeller shaft room, looking aft, shaft runs from lower right to center of image. Storage tanks flank this room. Camera facing west.

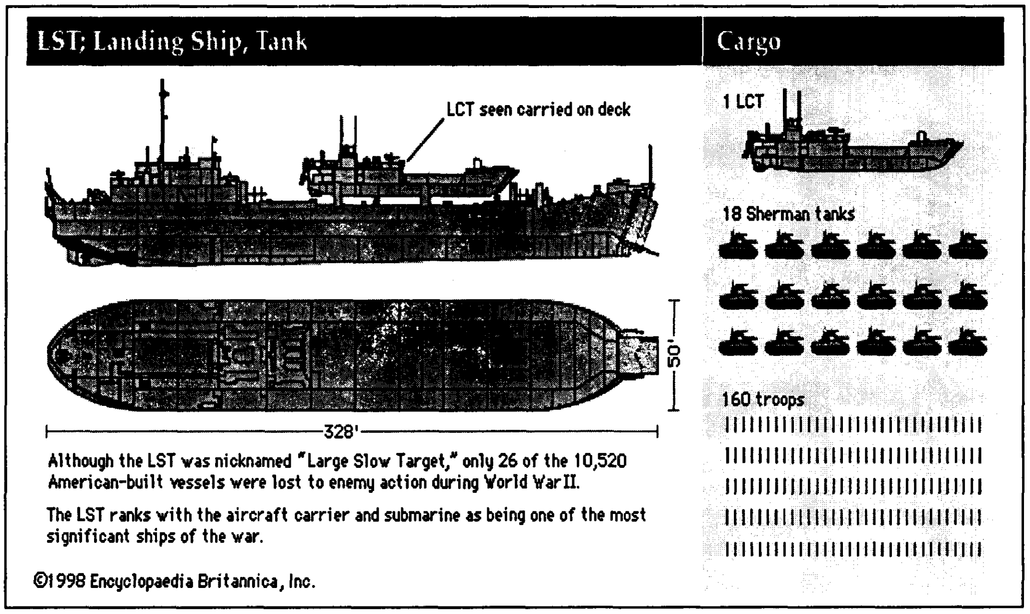
IN_VanderburghCounty_USSLST325_035
Port side LCVP, lowered to barge/dock on its davits, camera facing south.

IN_VanderburghCounty_USSLST325_036
Port side LCVP, bow ramp lowered. Camera facing west.

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Section number __additional data__ Page __52_ U.S.S. LST 325, Vanderburgh County, IN



Above, LST schematic diagram from Encyclopedia Britannica. NOTE: No LCT is included in this nomination. LCT is shown here to illustrate capacity.
Below, LCVP diagram, from
http://www.ibiblio.org/hyperwar/USN/ships/LCVP.html