

Liberty Ship

U.S. Maritime Commission Emergency Cargo Vessel
EC2-S-C1

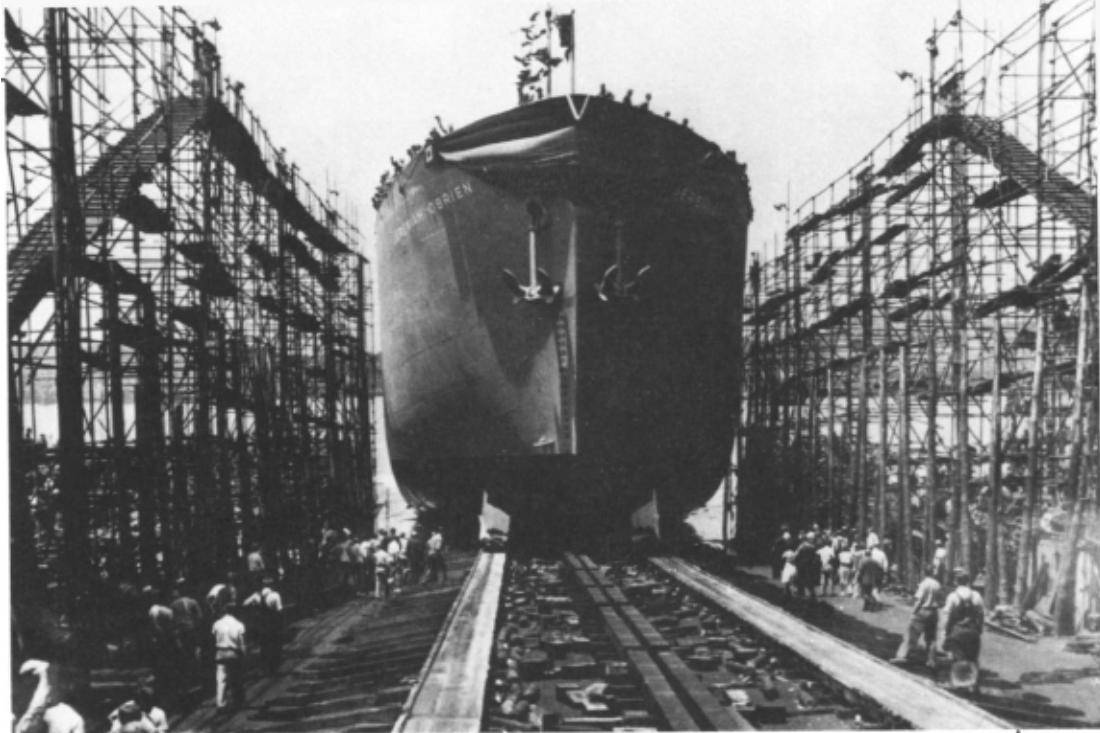
*A National Historic Mechanical Engineering Landmark
designated by
The American Society of Mechanical Engineers
18 September 1984*

SS Jeremiah O'Brien

America's last unaltered Liberty Ship in operating condition, open to the public at her home berth, Pier 3 East, Fort Mason, San Francisco, in the Golden Gate National Recreation Area.



The *SS Jeremiah O'Brien* slips into the water at South Portland, Maine, 19 June 1943
Photo: New England Shipbuilding Corporation



If ever dire necessity produced more fruitful inspiration in the realm of shipbuilding, it is not recorded. Between March 1941 and November 1945, 18 U.S. shipyards produced over 2,700 vessels of identical design — an unprecedented, and still unexcelled achievement in maritime construction in time of peace or time of war. Their classification, in the nomenclature of the U.S. Maritime Commission, was EC2-S-C1 (E for emergency — which was World War II; C for cargo; 2 indicating size or capacity by the index of approximate waterline length, 400 to 450 feet; S for steam propulsion; and C1 referring to the design).

That design was based on plans from the Joseph L. Thompson & Sons yard in Sunderland, England — plans very similar to those which, reportedly, had been used to build tramp steamers at Newcastle-on-Tyne in 1879. In any event, they were tried and true, virtually guaranteeing simplicity of construction and a functional reliability incapable of disruption even by inexperienced crews. They also resulted in a finished product of rather stodgy appearance. President Franklin D. Roosevelt described the ships as "dreadful-looking objects" and the press was soon calling them "ugly ducklings" (another F.D.R. term) and "sea scows". In an attempt to counteract the unfortunate impression created by these images, Admiral Emory Scott Land, Chairman of the Maritime Commission, referred to the vessels as a "Liberty Fleet" and designated 27 September 1941 — the day the first was launched, along with 13 other vessels — "Liberty Fleet Day".

The first EC2-S-C1 was the *SS Patrick Henry*, named after the Revolutionary War patriot who declared, "Give me liberty or give me death." That association certainly served to support Admiral Land's terminology and the vessels became known as Liberty Ships — a name to which their service records were to give full meaning for America and the world.

The original purpose of the Liberty Ship building program was to provide cargo space across the Atlantic faster than Nazi U-boats could sink the supply ships plying that route. By autumn of 1940, the British Isles were experiencing severe shortages, and it was in September of that year that the British Merchant Shipbuilding Mission visited the United States and contracted for the construction of 60 "Ocean class" vessels to be built in the United States for the trans-Atlantic route.

The 60 "Oceans" were produced for Britain, and the desperate need of our closest ally served to fire up our own shipbuilding program, which benefited greatly from the "Oceans" experience. The U.S. Maritime Commission's original intention had been to develop new plans for the American building program, but time was a vital factor and new plans would involve testing, and probably changes, followed by more testing. It soon became clear that the Commission could not afford this necessarily lengthy process and Admiral Land made the decision to use the time-honored British plans from which the "Oceans" were being built. The plans originally

SS Jeremiah O'Brien: Stern gun tub with 5 inch/38 caliber gun. Photo: Joanie Redington



brought from England for the construction of the "Oceans" had undergone a variety of modifications. They were further modified by the New York naval architects Gibbs & Cox and the U.S. Maritime Commission before they were put into service for the construction of Liberty Ships.

Like the British "Oceans", American Liberties crossed the Atlantic in convoy. They also braved the infamous Murmansk Run, sailed around the other side of the world to Vladivostok, and by the end of World War II had visited nearly every major port (and a vast number of minor ones) around the globe. That simple, chunky silhouette of a Liberty on the horizon, making for port, became a familiar sight all over the world. They carried foodstuffs in sacks, cans and boxes; seeds and fertilizers; coal and oil; locomotives and track; aircraft, some broken down with fuselage stowed in one area and wings and equipment in another, some complete, on deck; equipment and supplies for building airstrips, bunkers and houses; motor vehicles and replacement tires, parts and fuel; a variety of other items from C-Rations and toilet paper to washers, nuts, bolts and books; and they carried troops to nearly every theater of war, and troops, U.S. civilians and refugees to the United States from all over the map. Carrying anything and everything to wherever it was needed, they became, in fact, what the press had so unattractively designated them at the beginning of the building program — sea scows, or, as a San Francisco radio announcer (who served on a Liberty Ship at Normandy) has called them, "the shopping baskets of World War II". They also became brave

far beyond the expectation of their builders and the capacity of their defensive armament.

Many Liberty Ships sailed without defensive weapons, especially at the beginning of the program. Later, most were equipped with a 3 inch/50 caliber gun at the bow, a 5 inch/38 caliber at the stern, and eight 20-mm guns — two forward, four on top of the midship house and two aft. Ships fortunate enough to bear this armament also carried contingents of U.S. Navy Armed Guard — officers and crews, who supplemented the Merchant Marine personnel operating the ships, when the vessels came under attack. When a Liberty was under fire, the Armed Guard manned the weapons and was commonly assisted by merchant crewmen who hoisted and passed ammunition and relayed the 20-mm magazines.

Travelling as they had to in the "slow lane" (11 knots maximum for most), Liberties were easy prey for enemy marauders. Nevertheless, fewer than 200 were lost. They fought back, zig-zagged, dumped mines overboard, shot down planes, even sunk submarines and damaged raiders, and — shot up and leaking — made it back to friendly ports. They turned out to be phenomenally reliable and incredibly resistant — an 18 tramp steamer sailing across the oceans of the world to 20th century triumph.

Let's look at the specifications and the propulsion system which gave life to these exceptional ships. Liberty Ships were 441'6" long, with an extreme beam of 57', a summer load line draft of 27' 8 $\frac{7}{8}$ ", and a deadweight tonnage (wartime conditions) of 10,428. They were designed to carry just over 9,000 tons of cargo — with a full load of fuel, but they often carried more, with holds filled and a deckload of planes, tanks, trucks or locomotives. The Liberty Ship was a full scantling cargo vessel with a raked stem, flush deck and cruiser stern. She had five cargo holds, three forward and two aft of the machinery space. Cargo handling was by steam winches and booms stepped at the mast houses and rigged to three center-line masts.

Accommodations for officers were on the Boat Deck, with the exception of the Master, whose office and sleeping quarters were located on the Bridge Deck, aft of the Chart Room, starboard side, and the Radio Operator, whose quarters were on the same deck — convenient to the Radio Room, which was situated on the port side, directly aft of the

Wheel House. The Cadets room was also on the Bridge Deck, port side, between the Radio Operator's quarters and the Battery Room. The Armed Guard officer and the forward gun crews bunked in the midship house with Merchant Marine personnel, but the after gun crews were accommodated in the after deckhouse, directly above the steering engine and below the 5 inch gun. The average complement — Merchant Marine officers and crew plus U.S. Navy Armed Guard officer and crew — was generally less than 60 men.

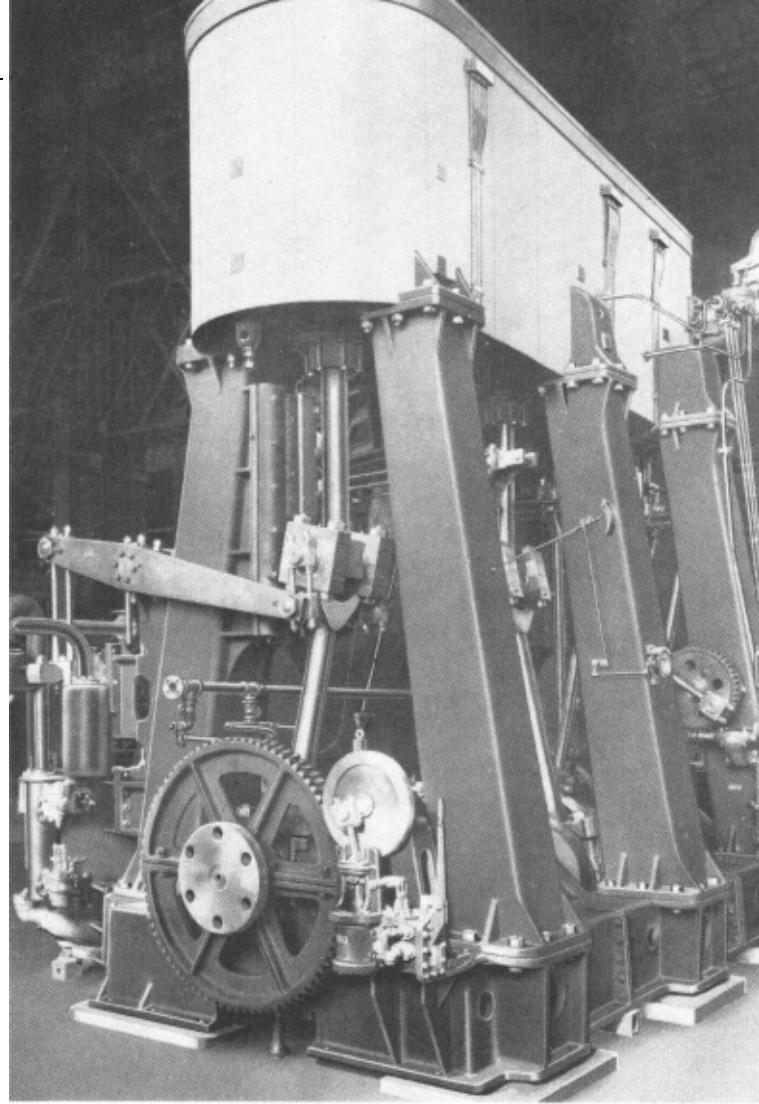
LIBERTY SHIP ENGINE MANUFACTURERS

Alabama Marine Engine Company	Birmingham, AL
The American Ship Building Company	Cleveland, OH
Clark Brothers Company, Inc.	Olean, NY
Ellicott Machine Corporation	Baltimore, MD
The Filer & Stowell Company	Milwaukee, WI
Harrisburg Machinery Corporation	Harrisburg, PA
General Machinery Corporation	Hamilton, OH
Joshua Hendy Iron Works	Sunnyvale, CA
National Transit Pump & Machine Co.	Oil City, PA
Oregon War Industries, Inc.	Portland, OR
Toledo Shipbuilding Company, Inc.	Toledo, OR
Vulcan Iron Works	Wilkes-Barre, PA
Williamette Iron & Steel Corp.	Portland, OR
Worthington Pump & Machinery Corp.	Harrison, NJ

The engine and hull were developed, as noted earlier, from British designs — some elements of which were over 60 years old in 1941. Yet, the only significant alteration to the propulsion machinery was the installation of watertube oil-fired boilers to replace the original coal-burning firetube Scotch boilers. The absence of coal bunkers enabled a superstructure alteration — permitting the use of a single structure amidship (rather than two houses).

The *SS Jeremiah O'Brien*'s engine was manufactured by General Machinery Corporation of Hamilton, Ohio, one of 14 American engine manufacturers participating in the Liberty Ship building program. Like that of her sister ships, it is a vertical reciprocating triple expansion steam engine of 2,500 IHP with cylinder diameters of 24½" — 37" — 70" and a stroke of 48", driving a single screw at 76 rpm for an average cruising speed of 11 knots.

Steam is produced by two oil-fired boilers, each with 4,852 square feet of heating surface, and is furnished at 220 pounds per square inch pressure and 440°F temperature at the throttle, exhausting into 26 inches of vacuum. The *O'Brien*'s boilers were manufactured in Dansville, New York by Foster Wheeler Corporation, one of nine manufacturers building identical boilers for the program. Fuel was Bunker "C" black oil, although almost any available fuel could be used. Today, the *SS Jeremiah O'Brien*,



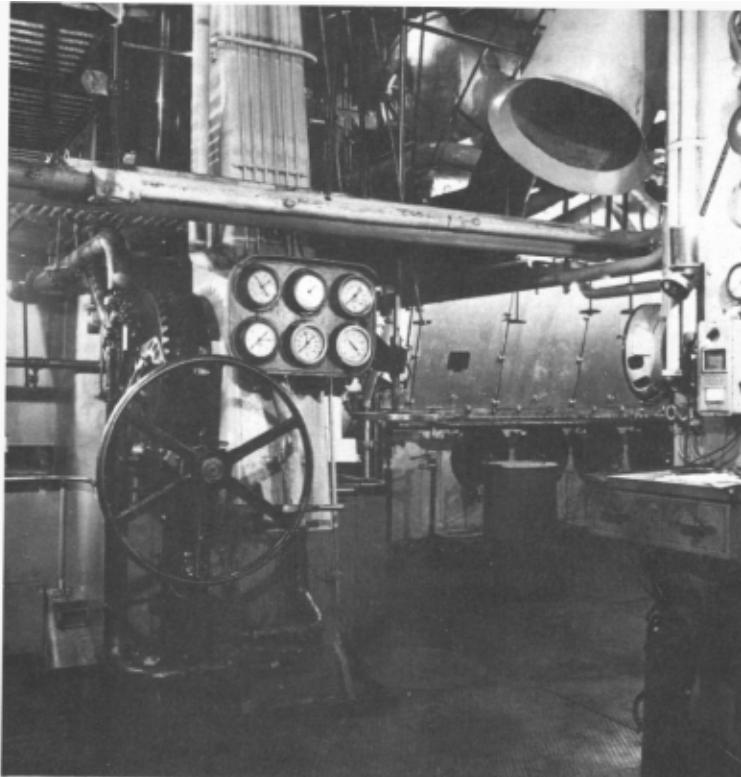
Operating side of engine aft to forward on the starboard side. Reproduced from Instructions for the Operation and Maintenance of . . . Vertical Triple Expansion Marine Engines . . . Hamilton, Ohio, 1942.

surviving on donated funds, services and materials, burns crankcase drainings and other variously assorted waste oils, in addition to any "pure" black oil which can be acquired by donation.

The simplicity of the Liberty Ship engine and her boilers made them economical to build, and also to operate and maintain, even by personnel with minimal experience. Electrical power was furnished by three reciprocating steam-powered generators developing a total of 60 kw. Electrical requirements were moderate during wartime service since the only

LIBERTY SHIP BOILER MANUFACTURERS

The Babcock & Wilcox Co.	Henry Vogt Machine Co.
Combustion Engineering Co., Inc.	Western Pipe & Steel Corp.
Edge Moor Iron Works, Inc.	Staples Engineering Co.
Foster Wheeler Corp.	Wickes Boiler Co.
Puget Sound Machinery Depot	



demands were for navigation and radio equipment, the refrigeration compressor, two fresh water pumps, the degaussing system, room fans and lighting.

Fresh water for boilers and drinking was provided by a high pressure salt water evaporator capable of desalination of 30 tons of sea water per day, at a cost of one barrel of fuel per ton of water. Fuel consumption at loaded draft was 170 barrels per day at 11 knots, giving 72 days range (or 19,000 nautical miles) with the vessel bunkered to capacity at departure.

Main engine control station, sighted from starboard side of the engine room; port boiler visible in the background to the right.

Photo: Russell Fraser

Preserving America's Last Unaltered Liberty Ship in Operating Condition

Commodore Thomas J. Patterson, Jr., now Deputy Superintendent of the U.S. Maritime Academy, Kings Point, New York, was the prime mover in the effort to save the *SS Jeremiah O'Brien* as an example of her class, as a memorial to the men and women — several million Americans — who built, operated, sailed, defended, repaired and supplied Liberty Ships during World War II, and as a symbol of national achievement and international cooperation.

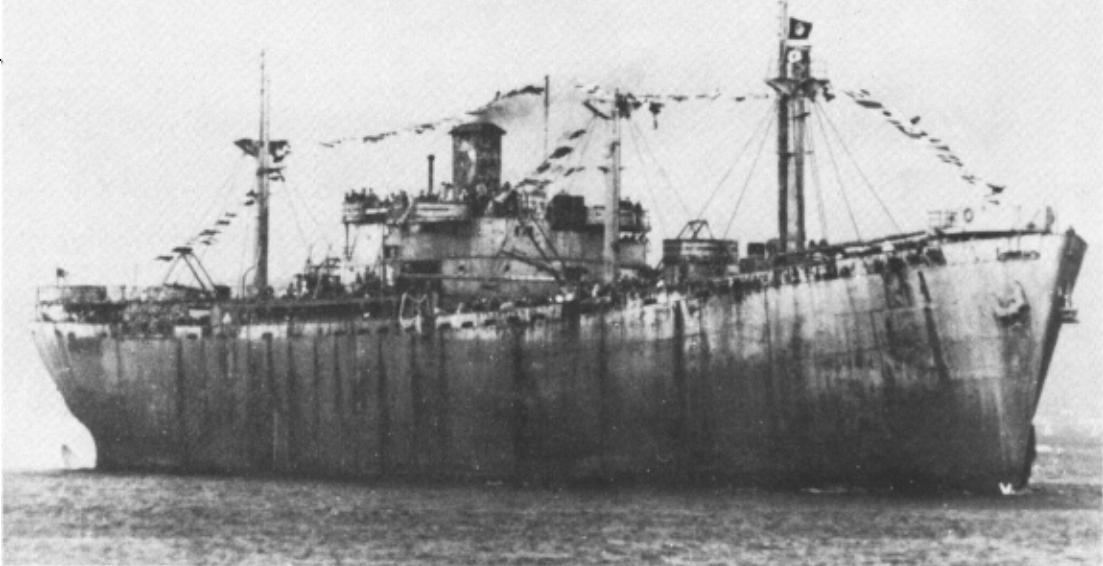
In 1966, while serving as Western Region Director of the Maritime Administration, Patterson inspected a number of Liberty Ships laid up in various National Defense Reserve Fleets. He determined that the *O'Brien*, then in mothballs at Suisun Bay, California, was the most suitable for preservation. She had never been altered from the original EC2-S-C1 design. And she was in excellent condition (which was a tribute to her wartime operator — Grace Line, Inc. and to the Suisun Bay Reserve Fleet, where she had already spent 20 years when Patterson selected her).

Over the following decade, he worked diligently to arrange for the *O'Brien's* release from the Reserve Fleet and to develop a mechanism for her restoration and continuing preservation. His efforts received exceptional support — from the Maritime Administration (successor to the U.S. Maritime Commission), from the Department of the Interior

and its service organization — the National Park Service, from the National Trust for Historic Preservation, from the maritime unions, steamship companies, ship chandlers and suppliers, from ship repair yards, and from hundreds of individuals who came forth to contribute their expertise, encouragement, materials and funds to the project.

In 1978, the National Liberty Ship Memorial, Inc. (NLSM), a California non-profit corporation, was formed to conduct the restoration, preservation and presentation to the public of the ship. In the same year, the *O'Brien* was declared a National Monument and placed on the National Register as an historic object. Many obstacles had been overcome and great progress made, but the NLSM then faced a task of unknown proportions: the reactivation of a vessel which had been inoperative for over 30 years. Dedicated volunteers worked on the ship at her Suisun Bay lay-up location. And despite the adverse conditions of a dead ship moored in a bay nearly a mile from shore with no water on board, minimal illumination, no telephone communication, no sanitary facilities, and nearly every surface coated with slippery preservative: Consul oil or Cosmoline, they brought the ship back to life. On 6 October 1979, the *SS Jeremiah O'Brien* sailed out of the Reserve Fleet under her own steam.

She then spent nearly eight months at Bethlehem Steel Shipyard, San Francisco, undergoing major



A day of triumph: hull and superstructure still coated with Consul oil, the *SS Jeremiah O'Brien* steams out of the mothball fleet, her engine turning for the first time in over 30 years. **Photo:** Keith Adams

exterior restoration and a variety of checks to all systems. On 21 May 1980, she departed the shipyard to sail San Francisco Bay on her first Annual Seamen's Memorial Cruise. That afternoon, she arrived at her home berth, Pier 3 East, Fort Mason, in the Golden Gate National Recreation Area. Since that day, she has benefited from over 120,000 hours of volunteer labor, devoted to the restoration — in painstaking detail — of the machinery spaces, galley, mess rooms, living quarters, wheel house, radio room and other internal areas, as well as continuing work on deck, and to the administration of the Memorial.

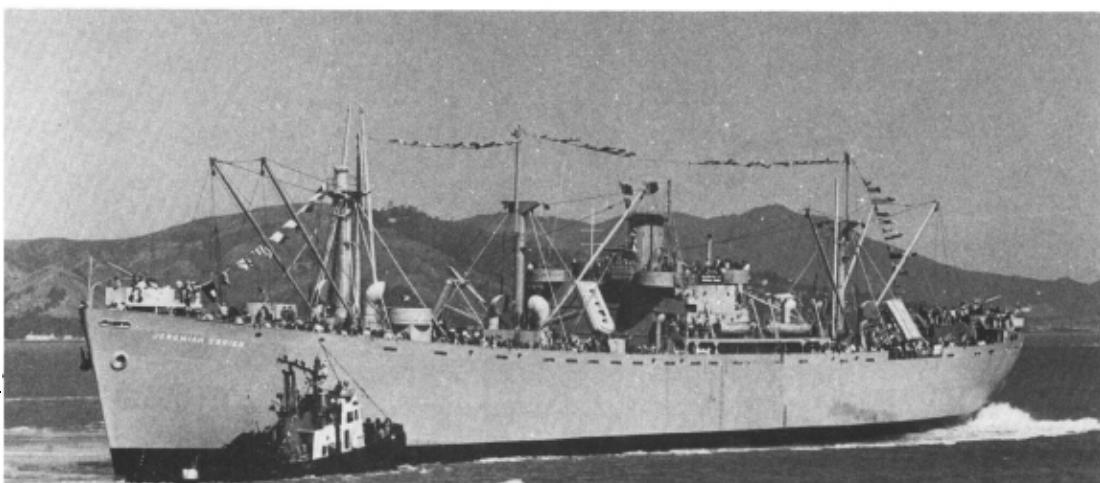
Today, the *SS Jeremiah O'Brien* is open to the public daily at Fort Mason and she sails San Francisco Bay each year in May, carrying some 700 passengers who wish to "ride history" — living history and living proof of the exceptional dependability and resilience of Liberty Ships.

The *SS Jeremiah O'Brien* is named after Captain Jeremiah O'Brien, of Machias, Maine, who led a

volunteer crew against the British in 1775, capturing the armed schooner *Margaretta* and achieving the first Yankee naval victory of the Revolutionary War. The *SS Jeremiah O'Brien*, Liberty Ship, upon assuming the Captain's name, also acquired a legacy of volunteer spirit which survives to this day. The crews which manned her during her years of wartime service were merchant seamen — civilian volunteers. Today, the continuing work of restoration, preservation and presentation to the public of this living maritime museum piece, and of the administration of the Memorial is carried on by volunteers, using donated funds and materials.

We are honored and delighted that The American Society of Mechanical Engineers has selected the *SS Jeremiah O'Brien*, America's last unaltered Liberty Ship in operating condition — on behalf of all American Liberties — for designation as a National Historic Mechanical Engineering Landmark. It is our fervent hope that the attention this tribute focuses on the ship will help KEEP THE LAST ONE LIVE.

SS Jeremiah O'Brien sailing San Francisco Bay on one of her annual May cruises. **Photo:** Donald Kearns



DESIGNATION PROGRAM SS JEREMIAH O'BRIEN—LIBERTY SHIP

*Tuesday, 18 September 1984
Pier 3 East, Fort Mason, San Francisco*

Welcome Aboard	<i>Harry E. Morgan Chief Engineer (volunteer) SS Jeremiah O'Brien</i>
Opening Remarks	<i>James N. Landis, P.E. Past President, ASME</i>
Invocation	<i>Rev. John P. Heaney Chaplain, Port of San Francisco Director, Apostleship of the Sea</i>
Welcome to the Designation Ceremony	<i>Donald R. Mullen, P.E. Chairman, San Francisco Section, ASME</i>
Introduction of Honored Guests	<i>R. B. Wilson, P.E. Vice President, Region IX, ASME</i>
The ASME Historic Landmarks Program	<i>Dr. Richard S. Hartenberg, P.E. National History and Heritage Committee, ASME</i>
The Liberty Ship Program	<i>Captain Ralph G. Wilson Master, SS Jeremiah O'Brien</i>
Presentation of the Commemorative Plaque	<i>George Kotnick, P.E. President, ASME</i>
Acceptance of the Plaque	<i>Thomas B. Crowley Chairman of the Board & Chief Executive Officer National Liberty Ship Memorial</i>
Closing Remarks	<i>James N. Landis, P.E. Past President, ASME</i>
<i>Music of the 40'S by The Richard A. Martini Band</i>	
<i>Reception following on board the SS Jeremiah O'Brien</i>	

NATIONAL HISTORIC MECHANICAL ENGINEERING LANDMARK
SS JEREMIAH O'BRIEN
FORT MASON, SAN FRANCISCO, CALIFORNIA
1943

THE SS JEREMIAH O'BRIEN, AN EMERGENCY CARGO VESSEL OF THE TYPE EC2-S-C1, BETTER KNOWN AS LIBERTY SHIP IS THE SOLE OPERATIVE SURVIVOR OF 2751 SHIPS. THE LARGEST FLEET OF SINGLE CLASS EVER BUILT. THE DESIGN STRESSED MINIMUM COST RAPIDITY OF CONSTRUCTION AND SIMPLICITY OF OPERATION HER ORIGINAL DESIGN AND CONFIGURATION HAVE NOT BEEN ALTERED.

SHE WAS BUILT IN 56 DAYS AT SOUTH PORTLAND MAINE BY THE NEW ENGLAND SHIPS BUILDING CORPORATION HER TRIPLE EXPANSION ENGINE OF 2500 HP DROVE THE 441 FOOT VESSEL CARRYING 9000 TONS OF CARGO AT 11 KNOTS THE SHIP CARRIED AMMUNITION GRAIN AND OTHER DRY CARGO FROM THEN UNITED STATES TO GREAT BRITAIN TOOK PART IN THE D DAY INVASION (1944) AND LATER VOYAGED TO PORTS IN SOUTH AMERICA, AUSTRALIA, INDIA AND THE PHILLIPINES

HER NAMES SAKE WAS JEREMIAH O'BRIAN OF MAINE WHO LED THE FIRST NAVAL ACTION AGAINST THE BRITISH IN 1775 CAPTURING TWO MERCHANTS SHIPS AND AN ARMED SCHOONER.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS — 1984

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The American Society of Mechanical Engineers (ASME) was founded in 1880 as an educational and technical society. ASME has consistently sought to provide an impetus for the continuing professional development of its individual members and advancement of the state-of-the-art of mechanical engineering. The principal goals and objectives of ASME are:

- To provide a forum for the development, exchange and dissemination of technical information, particularly on mechanical engineering
- To develop mechanical standards, codes, safety procedures and operating principles for industry
- To encourage the personal and professional development of practicing and student engineers
- To aid members of the engineering profession in maintaining a high level of ethical conduct.

The Society consists of more than 111,000 members, of whom some 20,000 are engineering students. ASME members are active in private engineering firms, corporations, academic and government service. A ten-member board governs the Society. Its headquarters are in New York City and it has five field offices — Chicago, Dallas, San Francisco, Danbury, CT and Burke, VA, plus a government relations office in Washington, DC.

THE HISTORY AND HERITAGE PROGRAM

The History and Heritage Landmark Program of the ASME began in September 1971. To implement and achieve the goals of the Landmark Program, ASME formed a History and Heritage Committee, composed

of mechanical engineers, historians of technology, and the curator of mechanical engineering of the Smithsonian Institution. The committee provides a public service by examining, noting, recording and acknowledging mechanical engineering achievements of particular significance.

LANDMARK DESIGNATION

The *SS Jeremiah O'Brien* is the 72nd National Historic Mechanical Engineering Landmark to be designated since the ASME program began. In addition, 17 International and eight Regional Landmarks have been recognized. Each represents a progressive step in the evolution of mechanical engineering, and each reflects its influence on society, either in its immediate locale, nationwide or throughout the world.

The Landmark Program illuminates our technological heritage and serves to encourage the preservation of the physical remains of historically important works. It provides an annotated roster for engineers, students, educators, historians and travelers and helps establish persistent reminders of where we have been and where we are going along the divergent paths of discovery.

ACKNOWLEDGEMENTS:

The San Francisco Section of the ASME gratefully acknowledges the efforts of all who participated in the landmark designation of the *SS Jeremiah O'Brien*. We wish to extend special thanks to Joanie Redington, the ship's Purser and Secretary of the National Liberty Ship Memorial, for assistance in planning the designation ceremony and reception, and for writing the brochure.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

George Kotnick, P.E.
President

Paul F. Allmendinger
Executive Director

R.B. Wilson, P.E.
Vice President, Region IX

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Dr. J. Paul Hartman, P.E.
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SS JEREMIAH O'BRIEN

Captain Ralph G. Wilson
Master

Harry E. Morgan
Chief Engineer

Captain John F. Paul
Chief Mate

John W. Booth
Port Steward

Joseph Teixeira
Chief Steward

Thomas R. Stand
Chief Radio Operator

Joanie Redington
Purser

Captain S.W. Galstan
(Maritime Administration)
Owner's Representative

NATIONAL LIBERTY SHIP MEMORIAL INC.

Thomas B. Crowley
Chairman of the Board & Chief Executive Officer

Captain Ralph G. Wilson
Acting Executive Director

Captain John Chiles
Budget Officer

John W. Borden
Treasurer

William E. Vaughan
Corporate Counsel

Joanie Redington
Secretary