



Normandy's Crucial Component

BY CRAIG L. SYMONDS

The Allies' ability to quickly build up forces on the beaches of Normandy would make or break the invasion of France. But gathering enough LSTs—the ships best able to land the soldiers, vehicles, and supplies—proved a frustrating puzzle to solve.

COURTESY OF ED HAMILTON

Vehicles and men stream out of LSTs and across Omaha Beach on 9 June 1944 in a painting by John Hamilton. With Germany heavily defending Normandy's ports, the iconic landing ships with bow doors enabled the Allies to land and build up forces along its beaches.

the predations of enemy U-boats, escort ships—destroyers, corvettes, and auxiliary aircraft carriers—were needed as well. The invasion itself required still more ships—ships of a quite specialized type—to transport the invaders and their equipment across the English Channel to the landing beaches, keep them continually supplied, and evacuate the wounded and the prisoners. And all of this had to be accomplished while still more ships—thousands of them—carried out a naval war against Japan halfway around the world.

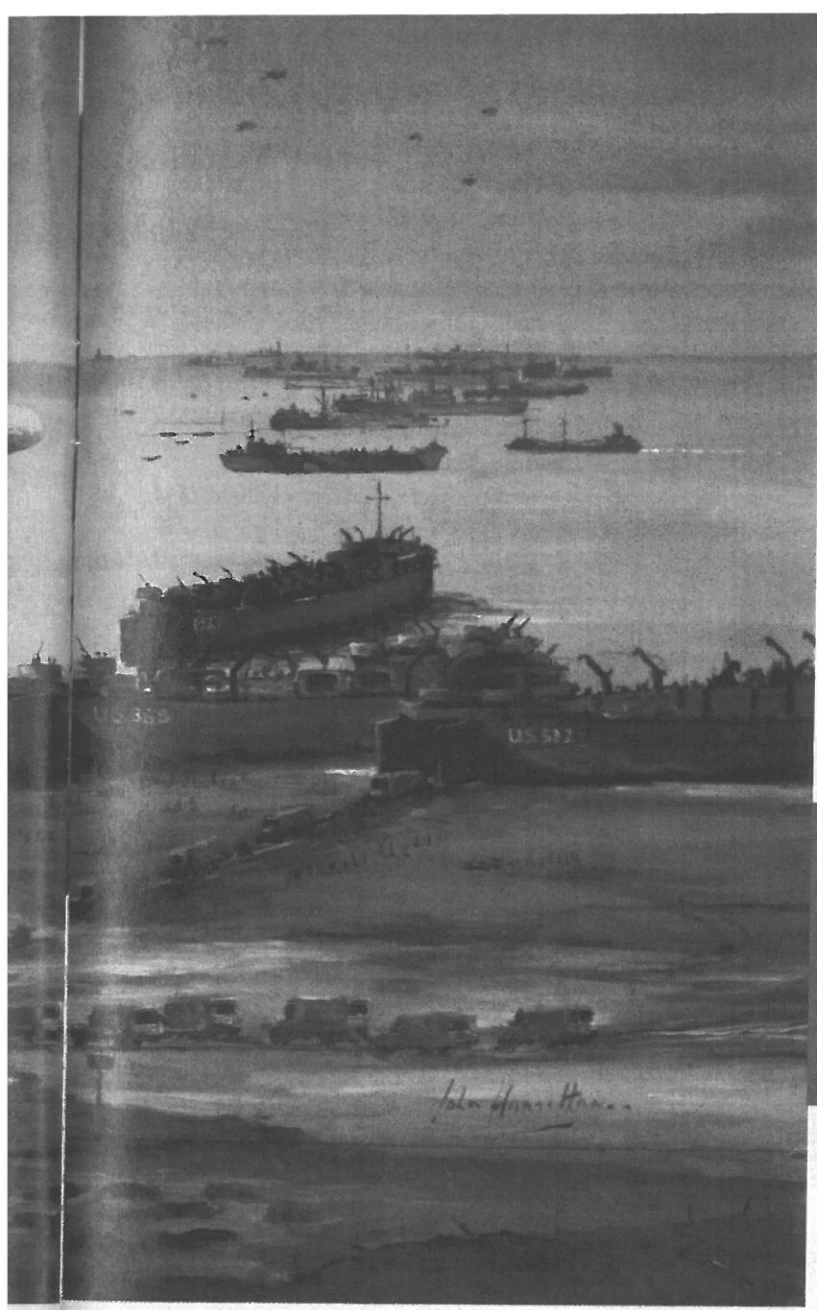
Of all the shipping demands that confounded the Allied planners, however, the one that eventually shouldered its way to the front, and that nearly derailed

the entire plan for the invasion, codenamed Neptune-Overlord, was the need for a vessel known as the landing ship, tank, or LST. Among the Navy's inventory of ships, it was the only vessel that could carry large numbers

This article and "The Navy Saved Our Hides" (p. 24) are excerpted from Craig Symonds' new book, *Neptune: The Allied Invasion of Europe and the D-Day Landings*.

of heavy trucks and tanks and land them on a hostile beach. Before the war was over, the United States would build more than a thousand of them, but in May 1943 when the conferees at Trident approved the plan for an invasion of Europe, only 241 LSTs had been built, and all but a handful were in the Pacific or the Mediterranean. The initial plan for a three-division assault on the Normandy coast called for 230 LSTs, and the expansion of the invasion from three to five divisions increased that number to more than 300.

The American industrial colossus was enormous, but it was not infinite. In the end, a variety of factors conspired to hinder both the production of LSTs and their concentration in British waters, and soon it became evident that this shortage was the Achilles' heel of the entire Allied invasion effort. Indeed, the history of the LST during World War II offers singular insight into both the friction of war and the confluence of strategy and logistics. As Prime Minister Winston Churchill put it in a letter to U.S. Army Chief of Staff General George Marshall, it was absurd that "the destinies of two great empires . . . seemed to be tied up in some god-damned things called LSTs."



The Allied invasion of German-occupied France in June 1944 was by far the largest amphibious assault in history, involving as it did more than 6,000 ships, 100,000 vehicles, and 1 million men. In retrospect, the sheer vastness of the operation seemed to make success all but inevitable. And yet, in May 1943 during the Trident Conference in Quebec when the Allied high command made the decision to execute the invasion a year hence, the shipping it would require simply did not exist.

After all, ships were needed to maintain the lifeline of supplies from the United States to both Britain and Russia, to transport a million or more American soldiers across the ocean, and to keep them supplied with mail and cigarettes, as well as to ferry the jeeps, trucks, tanks, bombs, bullets, fuel, and all the other tools of war from the United States to England. To guard these vessels from

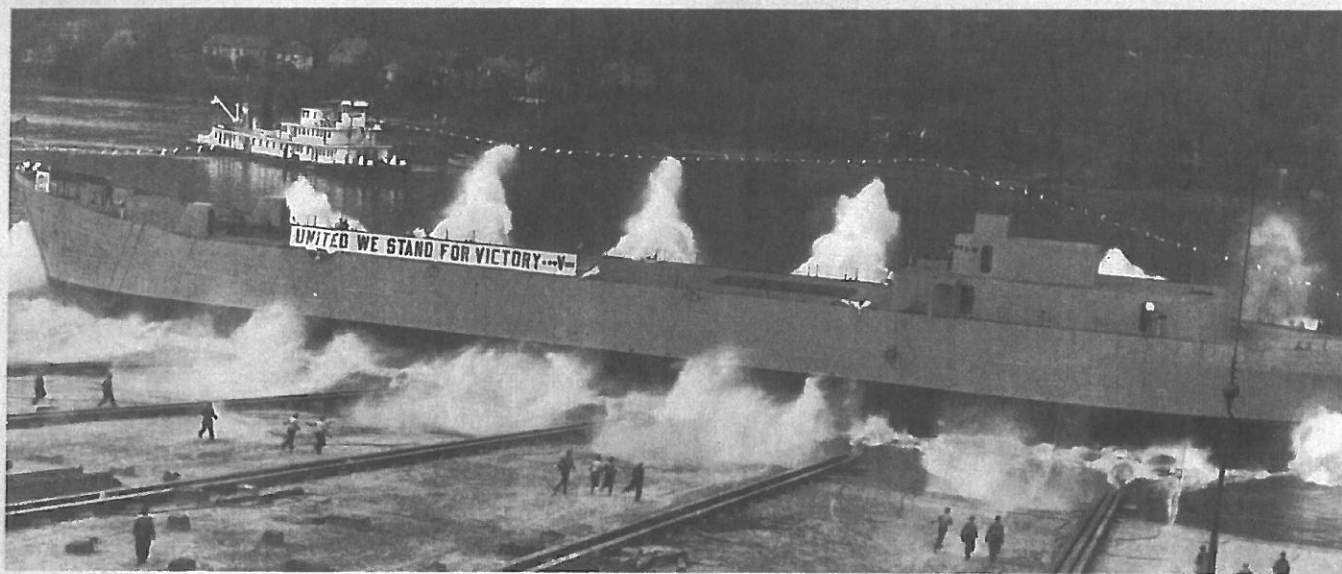
An Unloved Ship

Described by one authority as “a large, empty, self-propelled box,” an LST displaced 1,625 tons when empty and could carry 20 Sherman tanks, 30 heavy trucks, or 2,100 tons of cargo in her cavernous hold, plus as many as 40 light trucks or jeeps lashed to her upper deck. She also had bunk space for up to 350 soldiers. Because of her flat bottom, which gave the ship a draft of only 1½ feet forward when empty and 4 to 7 feet when fully loaded, she could steam right up onto a beach despite her great size and discharge her cargo through massive bow doors.

A case can be made that the LST was the most important ship of the Second World War, yet few loved or admired them. To begin with, they were very poor

open the welds that held the ship together, opening a seam, as one sailor put it, like a run in a woman's stocking.

Given these sailing characteristics, seasickness was endemic, and the LSTs were uncomfortable in other ways, too. To conserve space for the barn-like hold, the crew's quarters were squeezed into a small space aft under the fantail, and consisted of hinged bunks stacked three high. The ship's head was directly behind these bunks, and one veteran recalled that LSTs “stank of diesel oil, backed-up toilets, and vomit.” They did not even have names. Instead, the ungainly and unloved LSTs were distinguished only by their hull numbers. It was almost as if the Navy bureaucracy was ashamed of these ugly ducklings, and sought to deny them the distinction of a christening. And finally, LSTs were slow, seldom able



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A new LST—one of 147 produced by the Neville Island Shipyard below Pittsburgh—is launched sideways into the Ohio River early in 1943. Competition for raw materials and Allied decision-makers' lack of urgency meant that LST production never fully caught up with need.

sailers. With their blunt bows (to accommodate the big doors) and flat bottoms (to ensure shallow draft), they were, as one sailor put it, “shaped like a bathtub,” and they wallowed badly even in calm seas. In any kind of a mild chop, they would smack down heavily on each successive wave with a teeth-rattling thump. As a veteran recalled, “Some ships go over the waves; some of them go through the waves; some go under the waves; but an LST just clubs them to death.”

In an active sea, an LST also tended to “shimmy and vibrate,” and the torque exerted on the lengthy hull as it slipped precariously down a quartering wave was so powerful that observers on the bridge could see the hull actually twist. If the ship were loaded with a full cargo of jeeps and light trucks on her weather deck, the vehicles would rise and fall rhythmically as if they were driving in unison over a hilly countryside. On rare occasions, the movement of the ship's hull became so violent it ripped

to exceed ten knots, and crew members joked that “LST” actually stood for “Large Slow Target.” For all that, they were absolutely essential to any large-scale amphibious operation, and vital for Allied success at Normandy.

Building the LSTs

Though LSTs were full-sized, oceangoing ships with a length of 327 feet, 9 inches and a 50-foot beam, the majority of American LSTs were built inland, mostly along the Ohio River, at cities from Pittsburgh, Pennsylvania, to Evansville, Indiana. They were constructed on building ways parallel to the river and launched sideways, an event that generated an impressive wave that slapped up onto the opposite river bank. The first LST hit the water in Pittsburgh in October 1942, only weeks before the Operation Torch landings in North Africa.

Manned by a skeleton crew and placed in the charge of a river pilot, she made her way 1,500 miles down the Ohio

and Mississippi rivers on a nine-day journey. Many of the LSTs were formally commissioned in the town of Algiers, Louisiana, across the river from New Orleans. There they were equipped with boat davits to accommodate half a dozen or more small, 36-foot, landing craft officially designated LCVPs (landing craft, vehicle and personnel) but universally called Higgins boats after their manufacturer. Then, proudly bearing a commissioning pennant, the new LSTs steamed out the mouth of the great river and into the Gulf of Mexico. Some lingered for a week or two near Panama City, Florida, for a series of beaching exercises; others rounded Key West and headed up the Atlantic coast to the Navy's Amphibious Training Base at Little Creek, Virginia, where they were supplied with new officers and the rest of the crew.

The complement for an LST was 9 officers and 110 sailors, a larger number than on board a comparably sized cargo ship because of the need to man the landing ship's guns when at general quarters. Except for the LST's commander, usually a Navy lieutenant in his 20s, most of the officers were 90-day wonders who had come straight from civilian life and endured 13 weeks of midshipman training at one of several designated colleges before being sent directly to a ship. As one graduate of the program recalled: "we learned close order drill, plane identification and signal flag recognition. That was about it." As for the crew, a handful of petty officers brought critical experience, but most of the rest were teenagers straight from boot camp. One officer recollected that on board his ship: "The ages of our crew ranged from 17 to 22. Not one of them had ever seen the ocean."

The training in the Chesapeake Bay seldom lasted more than a few weeks. The officers and crew learned how to run the engines, operate the bow doors, and maneuver the ship while under way. They worked on emergency procedures, tactical maneuvering, precision anchoring, mooring alongside, and underway refueling. As on board all Navy ships, officers sought to keep the crew physically fit, though this occasionally proved problematic, and even humorous.

While the large open deck of an LST provided lots of room for calisthenics, the constant rolling of the ship made it something of an adventure. As the sailors lined up and began doing jumping jacks, the rolling ship moved beneath them so that after each jump, they landed a few inches away from where they had started. As the ship slowly rolled to starboard, the files of jumping men "moved slowly across the deck to the port rail, and

then, as the ship righted itself, they bounded slowly back to starboard."

Beaching exercises were especially nerve-racking. Navy men spent their whole lives trying to ensure that they did not run their ship aground, and here they were steaming directly toward the shore on purpose. It was so counterintuitive that during the first attempt, men on board instinctively grabbed onto whatever they could, anticipating a jarring collision, if not worse. Then, too, if the LST grounded on the beach at anything other than a fairly precise 90-degree angle, she was likely to slew off to one side, an effect called broaching, which meant she would end up sideways on the beach and probably require a tow to get off again.

Once an LST successfully pushed herself up onto a beach, her massive bow doors opened like a cupboard, a 23-foot bow ramp was lowered, and the tanks, trucks, and jeeps drove off onto the sand under their own power. Huge fans ventilated the cargo hold so that the exhaust from all those gasoline engines firing up at once did not asphyxiate the crew. After the hold was emptied, the vehicles on the upper deck could be unloaded. In early models of the LST, an elevator on the foredeck lowered them one-by-one down to the cargo hold. That proved time-consuming, however, and beginning with LST-491, laid down in July 1943, a ramp replaced the elevator so that the vehicles on the weather deck could simply drive down the ramp and out the bow doors.

Competition for Resources

The first LSTs were part of a large construction program authorized early in 1942 for an invasion of France in 1943. The decision to invade North Africa in the fall of 1942



NATIONAL ARCHIVES

Tanks and half-tracks most likely bound for a North African battlefield pack the 288-foot tank deck of an LST in February 1943. When the vehicles' engines were running, large shipboard ventilation fans would draw off their exhaust fumes to prevent asphyxiation.

made an Allied invasion of France the next year unlikely, and Chief of Naval Operations Admiral Ernest King argued that landing-craft construction should be scaled back in favor of building more escorts in order to ensure success in the Battle of the Atlantic. He proposed that any LSTs already under construction should be completed, but they should then "be allocated to that theater where they were most needed," by which he meant the Pacific.

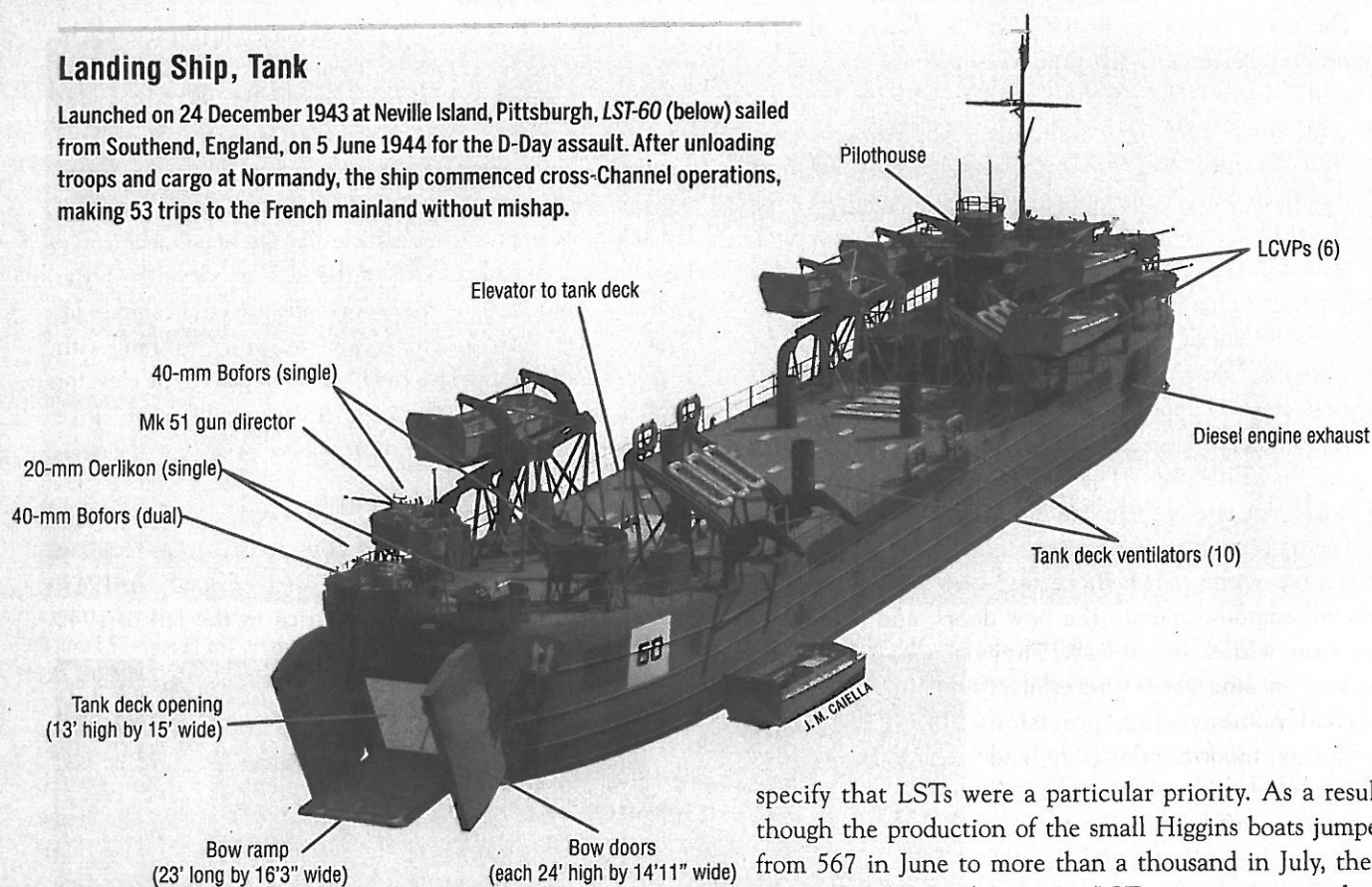
As a result, the contracts for all LSTs not yet laid down were canceled to allow for the construction of more destroyers and escort carriers for convoy protection. Whereas in the spring of 1942, 18 American shipyards had been engaged in the construction of LSTs, by September

ways. It is a complex puzzle involving tens of thousands of interconnected parts—an LST was made up of 30,000 separate components. To repurpose a shipyard meant that parts already fabricated for one kind of vessel had to be set aside, and the whole program restarted from the beginning of the logistical pipeline. As a result, some yards did not get fully back on line producing LSTs until March 1944, only two months before the planned invasion.

More perplexing was the evident lack of any apparent urgency on the part of the principal decision-makers in the immediate aftermath of the Quebec Conference. The Joint Chiefs did formally recommend a 25 percent increase in "landing craft" production, but that instruction did not

Landing Ship, Tank

Launched on 24 December 1943 at Neville Island, Pittsburgh, *LST-60* (below) sailed from Southend, England, on 5 June 1944 for the D-Day assault. After unloading troops and cargo at Normandy, the ship commenced cross-Channel operations, making 53 trips to the French mainland without mishap.



1943, only 8 were so employed, and consequently, by the end of 1942, the United States had produced a total of only 23 LSTs.

After the decision to invade France was confirmed at Quebec in May 1943, the Allies tried to rejuvenate the LST program. Four of the shipyards that had been retooled for destroyers were ordered to shift back again to accommodate LSTs. But retooling a shipyard was not, and is not, simply a matter of throwing a switch. Shipbuilding requires a particularly long gestation period that begins with the accumulation of raw materials, and then leads through steel mills, fabrication shops, machine shops, and assembly plants, before eventually arriving at the building

specify that LSTs were a particular priority. As a result, though the production of the small Higgins boats jumped from 567 in June to more than a thousand in July, there was no similar acceleration in LST construction—indeed, during those same months, LST production actually fell from 27 per month to 24. New orders for LSTs were not placed until 9 December, less than five months from the date scheduled for D-Day.

Another factor that affected productivity was the competition for raw materials. If shipbuilding was a major bottleneck in Allied strategic planning, steel plate was a major bottleneck in shipbuilding. Between 1940 and 1943, American steel mills increased production from 4 million tons a year to 13 million tons, a jump of more than 300 percent. In that same period, however, shipyard consumption of steel plate rose from 500,000 tons to 7½ million tons, an increase of 1,500 percent. Indeed, by 1943,

shipbuilding consumed more than half of all the steel plate rolled in the United States, and the principal consumer of that steel plate was the U.S. Maritime Commission, which produced the other U.S. ship with a legitimate claim to being called the most important vessel of the Second World War—the Liberty ship.

For much of the war, Liberty ships carried the munitions and supplies that kept Britain and Russia in the war and sustained Allied trade and operations worldwide. Before the war was over, American shipyards would turn out more than 2,700 of them. But Liberty ships were voracious consumers of steel plate, and that meant competition and rivalry with other procurement programs. That competition also involved machine tools, electric motors, welding rods, generators, reduction gears, bearings, pumps, and hundreds of other vital components. Despite America's role as the "Great Arsenal of Democracy" (President Franklin D. Roosevelt's term), it was a zero-sum game after all: One more Liberty ship might well mean one, two, or even three fewer LSTs.

The Mediterranean Puzzle

Finally, assembling a sufficient number of LSTs for the invasion of France was not simply a matter of production, it was also a question of distribution. The British chief of the Imperial General Staff, Alan Brooke, wrote in his diary that distributing LSTs was like "one of those awful jigsaw problems when it becomes very difficult to fit in all the right pieces." In fact, it was more like a slide puzzle: Vessels shifted from one theater to another necessarily left a vacuum somewhere else.

Besides those sent to the Pacific, 104 LSTs were in the Mediterranean to support operations there. The Neptune-Overlord plan called for 56 of these to return to England by January 1944 to join the rest of the armada being assembled for the cross-Channel operation, but Churchill had another idea.

With the Allied campaign in Italy bogged down, Churchill conceived of an end run around the German defensive line there by conducting an amphibious landing at Anzio, and to do that, he wanted to postpone the transfer of those 56 LSTs to Britain. He argued that because those ships and their crews were veterans of multiple

operations, they would not need additional training after they arrived in the United Kingdom, so a two-month delay in their transfer was unimportant. Of course that argument overlooked the fact that while the ships and their crews might be experienced, the troops they would carry were not, so it would be helpful, arguably even essential, to have the LSTs in England for training several months before they set out across the Channel for the invasion.

Churchill nevertheless won the argument, as he often did, and those 56 LSTs slotted for the Normandy invasion stayed in the Mediterranean to participate in the landings at Anzio on 22 January 1944. Alas, the troops who landed there soon became trapped in a coastal cul-de-sac, and the campaign in Italy bogged down again. Churchill acknowledged his



NATIONAL ARCHIVES

The Coast Guard-manned LST-381 takes aboard a load of German POWs at Anzio, Italy, in late January 1944. Gathering enough LSTs for the invasion of Normandy required transferring landing ships from the Mediterranean; LST-381 barely made it in time, arriving at Port Talbot, Wales, on 2 June.

disappointment in a particularly vivid sentence: "I had hoped that we were hurling a wild cat on to the shore, but all we got was a stranded whale." Stranded or not, the forces in the Anzio beachhead had to be supplied, and much of their supplies had to be carried in LSTs, which kept those ships imprisoned in the Mediterranean.

There was, however, another source of LSTs in the Mediterranean. Part of the initial Neptune-Overlord plan was a diversionary attack in southern France. At the Tehran Conference in November–December 1943, Joseph Stalin had expressed great enthusiasm for this diversion, and it was expanded into a full-scale two-division assault dubbed

Operation Anvil. Obviously, one way to obtain the needed LSTs for the Normandy invasion was to cancel Anvil and send the LSTs allocated for it to Britain.

Allied commander General Dwight Eisenhower resisted this solution. He knew that Stalin expected the landing, and he knew, too, that his mentor and boss George Marshall supported it. Eisenhower therefore tried to solve the slide puzzle by moving various pieces of it around. He proposed sending 20 LSTs from the Mediterranean to Britain in exchange for 6 American attack cargo ships (AKAs) equipped with boat davits for amphibious operations.

The Joint Chiefs in Washington offered a different solution: Send 26 LSTs from the Mediterranean to Britain in exchange for 26 new LSTs from America originally

pipeline, he would still be 15 LSTs short on D-Day. And that assumed there would be no attrition in the meantime. That such an assumption was unrealistic became evident almost at once when several LSTs were sunk by U-boats or damaged in training exercises. Such losses, unfortunate at any time, were near catastrophic now.

In the end, Eisenhower confessed to Marshall that it was simply not possible to conduct Neptune-Overlord without drawing upon "the landing craft hitherto hypothecated for a possible ANVIL." To drive the point home in a particularly vivid way, he told Marshall that without the vessels from the Mediterranean, there would be enough sealift at Normandy for only "the first three tides." After that, "we will have no repeat no LSTs reaching the beaches after the morning of



U.S. NAVAL INSTITUTE PHOTO ARCHIVE

In addition to unloading cargo and men directly on Normandy's beaches, LSTs also did so offshore, onto docks in man-made Mulberry harbors and 176-foot "Rhino" ferries. Above: LST-21, also crewed by Coast Guardsmen, disgorges vehicles onto a ferry off British-held Gold Beach.

slotted for the Pacific. Field Marshal Sir Henry "Jumbo" Wilson, the Allied commander in Italy, wondered why the new LSTs from America couldn't go directly to Britain so he could keep the 26 he had. The answer was that the new LSTs would not be available until late May or early June, which was obviously too late for Overlord, but as far as Wilson was concerned, that was too late for him, too, for it would leave him without any LSTs for nearly three months.

Eisenhower just could not make the numbers add up. Even if he counted every LST currently on hand, and raised the "serviceability" ratio from 85 percent to 95 percent, then added all the ships currently in the construction

D plus 1 until the morning of D plus 4." Though smaller landing craft would be available, the Allied landing force would be effectively stranded on the Normandy beaches for three days without any LSTs available for either major reinforcement or, if necessary, evacuation. The addition of 26 LSTs and 40 landing craft, infantry (LCIs) from the Mediterranean would give Eisenhower "some margin of safety as well as flexibility in the assault."

Overlord had already been delayed for a month in order to allow time to build more LSTs, and now Anvil was also postponed until August so that 26 of the LSTs in the Mediterranean could be sent to England for Overlord.

On 5 June, after a 24-hour delay to accommodate a summer gale, the Allied armada for the invasion of France assembled at "Area Zebra" in the English Channel south of the Isle of Wight. Despite the many difficulties the Allies had in assembling this vast armada, it was an awesome spectacle. Of all the memories the participants carried with them in the years afterward, the most pervasive was that of "thousands and thousands of ships of all classes stretched from horizon to horizon." Among them were 284 warships, and nearly 3,000 landing craft ranging in size from the huge attack transports to the tiny Higgins boats.

Supplying the Beach

Among the ships of that Allied armada were 311 LSTs. Yet crucial as they were, only a few of them participated in the initial landings that began at 0640 on 6 June. Because they were so scarce and so valuable, the Allied high command was unwilling to risk them in the initial assault. Those landings, after all, were only the first lap in a marathon race. The soldiers who valiantly seized the beaches, and those who followed them in the days and weeks that followed, had to be supplied with food and ammunition. For the invasion to succeed, the buildup of men and supplies on the Normandy beaches had to exceed the ability of the Germans to rush reinforcements to the threatened area, and to do that, the Allies had to bring ashore an unending torrent of equipment and supplies. Only the LSTs could do that.

Initially, the supply system struggled to keep up. In part this was because of the ferocious German resistance on Omaha Beach that delayed the moment when the LSTs were permitted to push up onto the shore to "dry out" through a tide cycle. The first of them did so on the other U.S. landing beach, Utah, on 7 June, and on Omaha Beach on 9 June. As a result, the preinvasion goal of 8,000 tons of supplies per day on Omaha was surpassed on 12 June when some 8,529 tons came ashore. By 15 June, the backlog of unloaded ships had been cleared, and the commander of the naval force off Omaha Beach, Rear Admiral John L. Hall, noted with pride, "all previous records for stores landed on the Force O beaches was broken on each successive day." In the five-day period from 12 to 16 June, the Allies landed a total of 75,383 men, 10,926 vehicles, and 66,571 tons of supplies on Omaha Beach alone, most of it from the LSTs.

The landing ships became even more crucial after a storm on 19 to 21 June wrecked the artificial harbor—the so-called Mulberry—off Omaha. The Allied high command had counted on the Mulberries to maintain the critical flow of supplies, and some feared that the loss of the Omaha one would prove disastrous. Yet even without it, the LSTs actually managed to increase the totals of men, equipment, and supplies brought ashore there. On

24 June, the daily tonnage topped 10,000 for the first time—more than when the Mulberry was in operation. On that one day, 22,630 men, 3,513 vehicles, and 10,974 tons of supplies landed on Omaha, all of it over the beach, and mostly by the LSTs.


Moreover, the landing ships were able to sustain these levels over the next several weeks. For nearly a month, British and American LSTs plied back and forth between Normandy and the Channel ports of Britain in an unending stream, carrying men, equipment, and supplies in one direction, and prisoners and wounded in the other. At ten knots, a trip from Spithead to Normandy and back took 18 hours, and most of the LSTs never paused in their work, making continual round trips, loading, steaming, and unloading without a respite as the following entry from one crewman's journal testifies:

Sunday: To France with American GI's and heavy equipment.

Monday: Back to Portland with prisoners.

Thursday: Back to France with American troops.

Sunday: To Southampton with prisoners.

All this confirmed what the Allies had known from the start—that the LSTs were an essential, indeed the critical, element of the entire Allied invasion. 

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