APUS Library Capstone Submission Form

This Capstone has been approved for submission to and review and publication by the APUS Library.

<table>
<thead>
<tr>
<th>Student Name [Last, First, MI] *</th>
<th>Lawson</th>
<th>William</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Number [e.g. INTL699] *</td>
<td>MLH699</td>
<td>Paper/Date [See Title pg.] 02/2017</td>
</tr>
<tr>
<td>Professor Name [Last, First, MI] *</td>
<td>Leatherwood, Jeffrey A.</td>
<td></td>
</tr>
<tr>
<td>Program Name *</td>
<td>Military History</td>
<td></td>
</tr>
<tr>
<td>Capstone Type *</td>
<td>Capstone-Thesis</td>
<td></td>
</tr>
<tr>
<td>Passed with Distinction * Y or N</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Security Sensitive Information * Y or N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>IRB Review Required * Y or N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Turnitin Check * Y or N</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

* Required

If YES, include IRB documents in submission attachments. All capstone papers must be checked via Turnitin.

Capstone Approval Document

The Capstone thesis/project for the master's degree submitted by the student listed above under this title *

The Army Way: American Joint Operations in Europe in World War II: A Doctrinal Examination

has been read by the undersigned. It is hereby recommended for acceptance by the faculty with credit to the amount of 3 semester hours.

<table>
<thead>
<tr>
<th>Program Representatives</th>
<th>Signatures</th>
<th>Date (mm/dd/yyyy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signed, 1st Reader [Capstone professor]</td>
<td>Jeffrey M. Leatherwood</td>
<td>02/15/2017</td>
</tr>
<tr>
<td>Signed, 2nd Reader (if required by program)</td>
<td>Stanley D.M. Carpenter</td>
<td>02/15/2017</td>
</tr>
<tr>
<td>Recommendation accepted on behalf of the program director *</td>
<td>Richard K. Hines</td>
<td>02/15/2017</td>
</tr>
<tr>
<td>Approved by academic dean *</td>
<td><a href="mailto:gglass@apus.edu">gglass@apus.edu</a></td>
<td>02/15/2017</td>
</tr>
</tbody>
</table>

* Required
The Army Way: American Joint Operations in Europe in World War II

A Doctrinal Examination

A Master Thesis

Submitted to the Faculty

Of

American Public University

By

William F. Lawson

In Partial Fulfillment of the

Requirements for the Degree

of

Master of Arts

January 2017

American Military University

Charles Town, WV
The author hereby grants the American Public University System the right to display these contents for educational purposes.

The author assumes total responsibility for meeting the requirements set by United States Copyright Law for the inclusion of any materials that are not the author’s creation or in the public domain.

© Copyright 2017 by William F. Lawson

All rights reserved.
Dedication

This work is dedicated to all the people who have faith in me, even when I don’t have faith in myself. You know who you are.
Acknowledgements

First, thanks to my children, Kara, Holly, and Will. I don’t know what I would do without you guys. Thanks to my parents, Bucky and Barbara. You never stopped encouraging me. To Sabrina. You know why. To my dear friend Wendy, who thinks I’m a much better writer than I actually am. To the late Dr. John Davis, who relit the spark, reminding me of the great satisfaction to be gained from the study of history. To Dr. Steve Sledge, who fanned the flame by demanding my very best work, and getting it. To Dr. Jeffrey Leatherwood, without whose well-timed advice and apparently endless patience I would not even be writing this. And to Charley, my best pal who is the secret to any academic success I may enjoy.

BL
# Table of Contents

Dedication..............................................................................................................................3  

Introduction..........................................................................................................................6  

Chapter 1: Mission Identification..........................................................................................10  

Chapter 2: Doctrinal Development.........................................................................................20  

Chapter 3: Strategic Realities...............................................................................................56  

Chapter 4: Landing Craft—Essential Tools of the Trade......................................................64  

Chapter 5: HUSKY and AVALANCHE.....................................................................................77  

Chapter 6: OVERLORD: The Ultimate Test.........................................................................102  

Afterword: Thinking About the Application of Amphibious Warfare Doctrine..................116  

Appendix: Landing Craft........................................................................................................118  

Bibliography..........................................................................................................................134
Introduction

The history of the Western Allies’ assault on Adolf Hitler’s Fortress Europe and the subsequent drive into the heart of the Third Reich is replete with great armies maneuvering on a grand scale. The American Third Army’s dash across France, the great airborne assault into Holland, and the crossing of the Rhine are all familiar to even the most casual student of the war. Perhaps even more familiar is the Anglo-American amphibious operation at Normandy, without which the aforementioned continental operations would never have taken place.

So important were the landings of 6 June, 1944, that it is difficult indeed to conceive of a significant contribution to the final defeat of Germany by the Western Allies had those landings failed or not taken place at all. Again, such a concept is not unfamiliar to students of the war. What is less commonly understood is the process by which the Western Allies achieved the capability to launch, arguably, the most complex military operation in history against a heavily-defended coastline with even a reasonable chance of success.

The road to Normandy is a twisting path which can literally be traced backward through centuries of warfare. Its more recent courses lead through the Pacific Ocean and the Mediterranean Sea, but the genesis may be found in the struggle to control regional and global trade.¹

Maritime theory deals with the projection and maintenance of sea power. More specifically, maritime nations seek to employ sea power to further their aims by ensuring the free flow of commerce along trade routes and the protection of the terminals of those routes. In time

of war, the protection of trade routes and terminals is combined with denying their use to the maritime assets of enemy nations.\textsuperscript{2} Denial of terminals and “fertile areas” of trade has often involved the introduction of land forces by way of amphibious landings to assault enemy ports or strategic straits to control the flow of trade or logistical assets.\textsuperscript{3}

Prior to the Twentieth Century, such operations generally involved landing troops on an undefended stretch of coastline within marching distance of the objective, which would then be assaulted from landward as well as facing possible bombardment from the sea. Even the first two decades of the Twentieth Century witnessed such operations when Japan moved against Seoul and Port Arthur in 1904 and Tsingtao in 1914.\textsuperscript{4} Improving technology and an evolving strategic situation soon rendered the prospect of an unopposed landing much more difficult.\textsuperscript{5}

The well-developed rail and road net of technologically-advanced Western Europe provided the ability to quickly reinforce threatened areas, making the landing of an amphibious force considerably more daunting than it had been in the past. A third dimension was added by the ever-increasing striking power of air combat units. Before the era of aerial reconnaissance and electronic communications, strategic surprise via a bold operational thrust was much easier to accomplish. The ability to launch such an operation has always been a question of whether an offensive force could be landed and reinforced before the enemy could react and drive it into the


\textsuperscript{3} Corbett, 252, 261.


\textsuperscript{5} Corbett, 261.
As with other endeavors, technology represented the proverbial double-edged sword, offering new obstacles as well as opportunities.

Such a statement reveals the nature of the modern amphibious operation in terms of its place in war. The belligerent who wishes to launch an amphibious operation must take into account the actions of the opposing power. While this accounting has always had its place in war, conditions in Europe after 1940-1941 moved the landing itself into the place of primary consideration, in contrast to being able to land relatively unopposed. Clausewitz famously wrote that “War…is always the collision of two living forces.” Technology and strategic reality moved that collision to the water’s edge. How that collision was managed and manipulated is the story which culminates on that June day on the beaches of Normandy.

This project examines the genesis, development, and application of the amphibious warfare doctrine as practiced by the United States in the European Theater of Operations during World War II. Special emphasis is provided to the development aspect so that the principles evolved may be applied to brief examinations of select operations, culminating with Operation OVERLORD on 6 June, 1944.

It is beyond the scope of this project to provide a narrative of any operation, such will only be provided when necessary for context and clarity. Only the first operation, the invasion of Sicily, is given any sort of narrative treatment. This is done to establish in the reader’s mind the applying amphibious warfare doctrine to a given operation in a critical way. A certain level of knowledge of World War II operational history is assumed on the part of the reader. It is

---

8 Ibid, 256.
recognized that this project is but the beginning of a process of inquiry, with all the potential roadblocks inherent in such an effort, and is not intended to be the last word on any given subject.
Chapter 1

Mission Identification

The United States

The story of American amphibious doctrine as practiced during the Second World War begins in the Pacific near the end of the Nineteenth Century. Japan’s rise as a power in the Far East created a new strategic situation for the United States. Following the acquisition of the Philippines and Guam in the Spanish-American War, the US military was tasked with defending these possessions against the new power in Asia. Given the distance and the maritime nature of the threat, the job fell primarily to the United States Navy.

Japan emerged from the First World War in possession of the former German colonial holdings in the Central Pacific, giving focus to the perceived threat to US interests in the Far East. It became clear that Japan would likely enjoy a superior strategic position in the Western Pacific, making the Philippines and Guam all but untenable and necessitating a naval campaign to recover them.¹

Admiral George Dewey made the case for the new mission in a 1905 report to the Secretary of the Navy:

[A]ll the war plans made by the General Board demand an advanced base of operations, the precise location, defenses, and time of occupation of which depend on the circumstances of the particular campaign. In some combined operations the plans prescribe that the advanced base shall be seized and held by the Navy and Marines.²

The idea was expanded upon in 1906 using the example of the Japanese advanced base at Masampho, Korea during the blockade of Port Arthur the previous year. Dewey emphasized the need for forward bases with resupply and repair facilities to support the fleet in a campaign far from North American shores. Advanced bases would not only have to be seized, they would necessarily have to be defended in such a way as to not restrict the operational capabilities of the battle fleet. Thus began the role of the US Marine Corps in advanced base operations. The role of the Marines was initially defensive in nature and spelled out in terms of holding the bases against enemy counterattacks.

The development of US amphibious capability began in earnest in 1921 when the terms of the Washington Naval Conference made it clear that the further fortification of US naval bases in the Pacific would be prohibited. As a result, any war with Japan would necessitate the seizure of forward bases by US forces in order to succor the Philippines and Guam, which were assumed, correctly, to be vulnerable.

The official US plan for war against Japan, War Plan ORANGE, dutifully took these new developments into account. For the first time, US planners focused on an opposed campaign across the Central Pacific, specifically through the Marshall, Caroline, Mariana, and Palau Island groups. Major General George Barnett, the Commandant of the Marine Corps, began to orient

---


4 Major Dion Williams, USMC, *Report on Men, Material, and Drills Required for Establishing Naval Advanced Base*, 2 November, 1909, (Box 52, File 769, Historical Amphibious Files, United States Marine Corps Archives, Quantico, VA).


6 United States Marine Corps, War Plans Division, OP-12C, *War Portfolio, 1921*, (Box 7, File 165 A, Historical Amphibious Files, United States Marine Corps Archives, Quantico, VA), 5; and Major Earl H. Ellis, USMC, *Operation Plan 712 J, Advance Base Operations in Micronesia*, (Box 7, File 165 A, Historical Amphibious Files, United States Marine Corps Archives, Quantico, VA), 2.
the direction of the Corps’ development along the axis provided by the latest iteration of ORANGE.

The Corps had been reorganized in 1920 into two expeditionary forces, each consisting of two infantry regiments with dedicated artillery, aviation, and support units. The West Coast Expeditionary Force was to support the Pacific Fleet and its East Coast twin supported operations in the Atlantic.⁷

Barnett’s successor, Major General John A. Lejeune, willingly took up the responsibility to develop the capability to execute the projected campaign. Sharing Barnett’s belief that the Marines’ primary function was to support the actions of the fleet, Lejeune took to the task with a will, seeing the opportunity to establish a clearly-defined mission for the Corps in an era of budget cuts and isolationism. While the Pacific Expeditionary Force began tentative work on its role in ORANGE, its eastern counterpart became the centerpiece of Lejeune’s public relations campaign on behalf of the Marine Corps.

Based at Quantico, Virginia, the eastern force also contained the core of what would become the Marine Corps Schools, where the troops learned trades along with their military training. Officers studied Marine Corps-specific topics under the direction of the newly-created Operations and Training Division, which quickly became the fount of Marine Corps efforts to contend with its projected wartime missions.⁸

Amphibious doctrine as practiced by US and European forces up to that point had emphasized landing troops and equipment in undefended areas to facilitate landward moves against enemy ports. A glance at a map of Japanese holdings in the Pacific quickly indicated that

---

⁸ Ibid, 322-323.
such tactics would not be feasible. Japan controlled the mandated islands of the Central Pacific, most of which were small atolls which would not permit unopposed landings or maneuver on the scale necessary to avoid coastal defenses. The need to move across the vast Pacific necessitated intermediate and forward bases. The nature of those possible bases dictated the requirement of the ability to land under fire and take them from the enemy.9

The task facing the Marines, as well as the Navy and Army, was daunting. The Gallipoli operation of 1915 seemed to indicate that the notion of launching an opposed amphibious landing was folly at best.10 Conventional wisdom worldwide was that only limited landings at night were plausible in the face of determined resistance. The nature of the campaigns of World War II, though still in the future, would demand the development of effective amphibious techniques organized into a sound doctrine. The results of the Marine Corps’ study of Gallipoli and the objectives of ORANGE did not coincide with world opinion.11 Launching a successful amphibious operation under fire would be difficult, but it could be done.

This conclusion had been reached by the Marines courtesy of Major Earl H. “Pete” Ellis. Ellis was a veteran of the Great War where he served as adjutant of the 4th Brigade (Marine) American Expeditionary Force. While in France, Ellis gained a reputation as a skilled and thorough planner. This fact was not lost on Lejeune, Ellis’ acquaintance and commander of the 2nd Division AEF, of which the 4th Brigade (Marine) was a part.12

---

9 Ellis, 11-15.
Determined to have a voice in the development of plans for the expected Pacific war, Lejeune dispatched Major Holland M. Smith and Colonel Ben H. Fuller in 1921 to the Navy War Plans Division and the planning staff of the Naval War College, respectively. Smith and Fuller quickly informed Lejeune that the Navy was moving forward with detailed plans under the umbrella of ORANGE and urged the commandant to order a concurrent Marine Corps plan from the Operations and Training Division at Quantico. Lejeune had already taken the initiative in this regard and turned to Pete Ellis to make it a reality.  

Ellis engaged in a manic seven months of superb staff work, reportedly surrounded by dozens of maps, intelligence estimates, and geographic surveys. The result was Operation Plan 712, *Advanced Base Operations in Micronesia*. This prescient study outlined the fundamental problems associated with assaulting island outposts in the Marshalls, Carolines, and Palaus as well as the basics of amphibious doctrine.  

Ellis stressed the importance of joint operations in support of task-oriented ground forces. The basic unit around which he built his doctrine was a landing regiment consisting of the following:

<table>
<thead>
<tr>
<th>Company</th>
<th>Officers and Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headquarters Company</td>
<td>125</td>
</tr>
<tr>
<td>Supply Company (including boatmen)</td>
<td>125</td>
</tr>
<tr>
<td>Gun Company (12 37 mm)</td>
<td>125</td>
</tr>
<tr>
<td>Gun Company (8 75mm)</td>
<td>125</td>
</tr>
<tr>
<td>Machine-Gun Company (30 guns)</td>
<td>125</td>
</tr>
<tr>
<td>3 Battalions riflemen (500 each, minimum)</td>
<td>1,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,000</strong></td>
</tr>
</tbody>
</table>

---

14 Ibid, 325-326.
Ellis determined that nine such regiments would be necessary for the reduction of the island groups in question.\textsuperscript{15} Such an estimate was problematic at the time, considering that the entire active-duty Marine Corps consisted of 22,990 officers and men.\textsuperscript{16}

The landing was to be made in three waves, ideally at dawn or shortly thereafter, directly contradicting the European “lessons” from Gallipoli. The organization and deployment of the landing force was laid out in great detail, from loading to reinforcement once it was ashore. Ellis discussed the importance of direct and indirect naval gunfire and air support for the landing force.\textsuperscript{17}

Also included was a detailed discussion of the nature of the islands in question and the need for up to date intelligence on tides, weather patterns, reef formations, and the geography of the islands themselves.\textsuperscript{18} Estimates of enemy defensive tactics and weapons as well as projected enemy fleet actions in regard to the defense of the islands and attempts to retake them rounded out the discussion of tactics.\textsuperscript{19}

Ellis concluded that the Marine Corps was particularly suited for such operations and should prepare itself accordingly. He had no illusions as to the precise nature of the undertaking:

To effect a landing under the sea and shore conditions obtaining and in the face of enemy resistance requires careful training and preparation, to say the least; and this along Marine Corps lines. It is not enough that the troops be skilled infantry men or artillery men of high morale: they must be skilled water men and jungle men who know it can be done. Marines with Marine training.\textsuperscript{20}

\textsuperscript{15} Ibid, 30.
\textsuperscript{16} United States Marine Corps, War Plans Division, OP-12C, War Portfolio, 1921, 2.
\textsuperscript{17} Ellis, 18-23.
\textsuperscript{18} Ibid, 2-11.
\textsuperscript{19} Ibid, 34-42.
\textsuperscript{20} Ibid, 16.
This extraordinary document was adopted in its entirety by Lejeune upon its receipt in mid-1921, forming the genesis of American amphibious doctrine as it would be practiced during the Second World War. Pete Ellis had pointed the way. The road to true amphibious capability would be long but the Marines would negotiate it over the next two decades.

Britain

The British path toward amphibious capability took a different route than that of the Americans. Despite several Great War successes, most notably at Zeebrugge in 1918, the specter of Gallipoli hung like a pall over British planners. The operation was studied in detail, but lessons proved difficult to derive due to negative connotations regarding inter-service cooperation, the reputation of the Royal Navy, interactions between the Allies themselves, and the political credibility of Winston Churchill. The only agreement that could be reached was that the operation had been disastrous. As a result, opinions on the lessons to be learned from its study ranged from the impossibility of making a large-scale opposed landing to the feeling that such an operation was so complex as to be impossible for which to adequately prepare in time of peace.

Strategic and organizational factors influenced British efforts as well. British strategists understandably placed less emphasis on amphibious capability, known as “combined operations,” than did the Americans. Interwar budgetary constraints, as well as the view that

---

21 Headquarters, United States Marine Corps Memorandum, 23 July, 1923. (Box 7, File 165 A, Historical Amphibious Files, United States Marine Corps Archives, Quantico, VA).
future continental operations would have the benefit of friendly French ports led to the investment of limited resources into higher priority projects such as armor and aviation.24

Amphibious operations were viewed as being primarily relegated to the Empire east of the Suez Canal, particularly as part of the defense of Hong Kong and Singapore. Being defensive in nature, such as counter landings in the rear of a besieging force, little effort was put into developing the capability to land under fire against determined opposition. In addition, the prospects of successfully defending those possessions appeared dubious in the face of Japanese expansion. The 1937 Japanese invasion of China heralded a full-blown Far East crisis, but the alarming rise of Nazi Germany ensured that British attention remained primarily on Europe.25

The term “combined operations” refers to the inter-service nature of any amphibious undertaking by the British. The US Navy, whose administration included the Marine Corps, could stage every facet of an amphibious exercise independently, including transport, escorts, naval gunfire, air support, logistics, and the landing force. The British could not do any such thing. The Royal Navy provided the transport, escorts, and gunfire support, but depended on the army for the landing force.26 The army, for its part, placed more emphasis on the modernization of its force through the mechanization of the infantry and the integration of armor and anti-armor doctrine. Combined operations were understandably relegated to the status of an afterthought as British planners began to focus on the looming continental war with Germany.27

To make matters worse, the Royal Air Force had gained control of naval aviation in the wake of its creation after the First World War, necessitating the integration of a third service into

---

24 Ibid, 54.
27 Millett, Assault from the Sea, 59, 63-64.
The need for air support in Combined Operations had been expressed as early as 1920, in Chapter XIII, Volume II of the *Field Service Regulations*, though tactical requirements were not discussed, other than the need to “maintain supremacy in the air.” Air supremacy was a consistent theme as the need to defend the British Isles against a German aerial onslaught became apparent. With resources limited, the RAF placed a low priority on close air support of an amphibious operation in the face of the dispute over strategic bombing and the effort to create the air defense system which would win the Battle of Britain in 1940.

The one organization which could have taken the lead, as had its American counterpart, was the Royal Marines. Just such a recommendation was put forward in 1923 by the Madden Committee, but lack of funding prevented the expansion which would have been required for the Marines to take on the added role. A similar suggestion was made in 1936 by Captain B.C. Watson, RN in a memorandum which eventually found its way to the Naval Chief of Staff, Admiral of the Fleet Sir Ernle Chatfield, who put it before the other Chiefs of Staff. Citing budget concerns, the suggestion was declined, along with a comment of disagreement regarding the creation of a specialized force along the lines of the US Marines. Thus, divergent priorities among the services, particularly the RAF, stymied practical amphibious efforts until the late 1930s.

This is not to say, however, that British planners ignored combined operations entirely. Good work was done in the staff schools of all the services, with the encouragement of the

---

28 Ibid, 60.
32 Clifford, 60-64.
Chiefs of Staff, resulting by 1938 in a useful doctrine expressed in several iterations of the *Combined Operations Manual*.\(^{33}\) As in the United States, the intellectual work was done and, when the time came, British planners had the staff procedures in place to quickly catch up. The difference was the practical application of that work in the form of exercises and doctrinal work before the war began. As a result, the American learning curve was less steep than that of the British.

Simply put, the US Navy and Marine Corps, and to a lesser extent the US Army, devoted the time and resources to develop a workable doctrine for making opposed amphibious landings. The British did not, for the reasons discussed. In short, the Americans saw a clear strategic imperative for the development of amphibious capability while the British need for such capability was less pronounced. As the Director of Military Operations and Intelligence, Major General R.H. Haining wrote in 1937 regarding training, as far as the War Office was concerned, “opposed landings were low in order of priority.”\(^{34}\)

---

\(^{33}\) Clifford, 30-57.

\(^{34}\) Ibid, 63-64.
Chapter 2
Doctrinal Development

The transition from philosophy to practicability began slowly. The Caribbean island of Culebra was the scene of the first steps toward amphibious capability when one battalion of the Eastern Expeditionary Force of the US Marine Corps practiced embarkation and debarkation exercises in the winter of 1922.¹ Two years later Culebra and the Panama Canal Zone witnessed the first large-scale landing exercises as part of a joint operation involving the Marines, Army, and Navy. Though the Fifth Marine Regiment made a successful landing in Panama as part of Fleet Problem Number 3, the subsequent Fleet Problem Number 4, an opposed landing on Culebra, was notable only for the deficiencies it revealed.²

First, the force ratio employed was grossly inadequate. The landing force was roughly equal in strength to the defenders. The commander of the expeditionary force, Brigadier General Eli K. Cole, determined that the attackers should have outnumbered the defenders at least three-to-one. This ratio would become the standard of wartime amphibious operations, achieved by the combination of concentration and interdiction to gain local superiority of force.

Second, the landing should not have been attempted at night. According to Cole, “chaos reigned.” Landing boats got lost in the dark, a problem compounded by the fact that the boat officers had not been informed as to the location of the landing beaches. There were not enough boats to begin with, prompting the need for return trips by boats which never found their

² Isley and Crowl, 31.
objectives in the first place. When troops were landed, they were often on the wrong beach and units were intermingled.³

The often-contentious debate over daylight versus night landings continued throughout the war, particularly in Europe. The Navy and Marine Corps preferred daylight landings, while the Army almost invariably wanted to land under the cover of darkness. Each approach had its merits and drawbacks. Night landings offered the opportunity to preserve tactical and sometimes operational surprise. There is no doubt that landing in darkness confused the enemy as to size, strength, and to a somewhat lesser degree, location of the operation.

The Army’s Field Manual 31-5, *Landing Operations on Hostile Shores* (FM 31-5), briefly emphasizes these elements while noting that daylight landings offer the enemy the opportunity for more effective communication and reaction due to faster and more accurate assessment of the attack. The initial edition of FM 31-5 was merely a copy of the Navy’s Fleet Training Publication 167, *Landing Operations Doctrine* (FTP-167), even down to the illustrations.⁴ Later editions omit some of the details of FTP-167, seemingly deemphasizing the advantages of daylight landings in favor of an initial assault landing under the cover of darkness. These omissions, combined with the statements made in the updated editions of FM 31-5, seem to indicate the Army’s preference for night landings, at least for the first wave.⁵

FTP-167, as noted, examines the issue in greater detail. While acknowledging certain advantages that accrued to night operations, long years of practical experience had emphasized the greater control exercised over daylight landings. The central position occupied by naval

---

³ Ibid, 30-31.
gunfire and aircraft in the preparatory and support roles were emphasized. These roles were best fulfilled by day.\(^6\) In addition, the Marines had learned that organization of the landing force in the approach and on the beach was paramount to success. Wartime operations consistently demonstrated the superiority of Navy shore parties to those of the Army in maintaining all-important momentum across the beaches.

To be fair, the secret to the Navy’s success should be credited to Marine General Holland M. Smith, who streamlined the separate Navy and Marine beach organizations into one, thereby eliminating duplication of effort and unifying the process under one command. A special battalion was added to each Marine Division for the purpose.\(^7\) The Navy and Army never achieved such harmony, though, by the time of the Normandy operation, they had learned to work fairly well together.

Regarding night operations, however, the tactical and operational realities of Europe differed greatly from those of the Pacific, and there was much to commend night landings in some cases. This issue will be revisited in a later chapter in regard to those operations.

A third deficiency which became apparent at Culebra was the determination that the simulated naval bombardment by the accompanying warships would have done no damage to enemy defenses or personnel deployed in reverse slope positions. The artillery and infantry so deployed would likely have made even a well-coordinated landing under wartime conditions impossible, as demonstrated by the simulated fire on the landing boats during the approach.

The utility and effectiveness of naval gunfire would evolve over time, with the main area of contention being the timing of the preparatory fire prior to the landing force arriving on the

---


\(^7\) Clifford, 236-238.
beach. As might be expected, the Navy and Marines reached an accord early on, but the Navy and Army disagreed fundamentally based on the experiences of each. There was, however, never any disagreement about the necessity of naval gunfire and the decisive role it played in every operation. This will likewise be discussed further in a later chapter.

Fourth, logistical measures were completely inadequate. The single troopship employed had been badly loaded. As a result, no food came ashore the first night, though a complete post exchange was completed within the first few hours. Medical supplies had been stowed at the bottom of the ship’s hold and were completely inaccessible during the most intensive combat stages of the landing. It took nine days for the medical personnel to receive all their supplies.8

This too would cause friction between Army and Navy commanders, the source of which can be attributed to the obviously different mission focus of each service and even between that of the Army and Marine Corps. Amphibious operations were a primary interest of the Navy and Marines, while the Army had different, and admittedly more pressing priorities during the interwar period. It would take hard wartime experience, addressed later in this work, to demonstrate to Army commanders what the Navy already knew about amphibious logistics and beachhead support.

Finally, the exercise marked the beginning of the recognition of the need for specialized landing craft. Standard ships’ boats were determined to be unsuitable for opposed landings due to the difficulty in debarkation onto the beach, handling problems in heavy surf, and the inability to self-retract from the beaches.9

---

8 Isely and Crowl, 31.
Several new craft were tested at Culebra, including the prototype of an amphibious tank designed by J. Walter Christie.\textsuperscript{10} None of the craft were deemed a success, but they started the process by which the rugged landing craft of the Second World War would be developed. The Christie amphibious tank, in particular, was the earliest forerunner of the amphibian tractor (LVT) that would carry so many Marines to the beaches in the coming conflict.\textsuperscript{11}

Fleet Problem Number 4 proved valuable because it illustrated beyond all doubt how much work needed to be done. Specific problem areas had been identified, allowing focused effort toward their solution. In addition to the lessons learned by the Marines, the Navy was presented with the sobering conclusion that it was not prepared to execute a basic function of ORANGE.

The commander of the naval attack force, Rear Admiral Montgomery M. Taylor, made two broad recommendations as a result of the exercise: “(a) the Navy should develop a doctrine on the seizure, defense and attack of naval advanced bases, (b) the Navy should undertake training for the solution of such problems…” Though the formulation of such a doctrine was still over a decade away, a beginning had been made.\textsuperscript{12}

The following year saw a Marine landing exercise on the island of Oahu, though nothing new was learned. The primary lesson of the exercise was the continued lack of suitable landing craft.\textsuperscript{13} The Oahu exercise was the last such endeavor for the Marines in the 1920s. Commitments of expeditionary forces to Haiti and Nicaragua curtailed practical efforts in the

\textsuperscript{10} Smith, 21.
\textsuperscript{11} Isley and Crowl, 31.
\textsuperscript{13} Headquarters, United States Navy, 2d Joint Army and Navy Exercise, Problem No. 3, Oahu, Hawaii, 1925, (Box 7, File 155, Historical Amphibious Files, United States Marine Corps Archive, Quantico, VA).
amphibious arena.\textsuperscript{14} Despite the change of course, however, progress was made that would advance the cause of amphibious capability.

The Marine Corps had long recognized the value of air operations in concert with forces on the ground. Marine aviation dated to 1916 and expanded throughout the interwar period. Pete Ellis had emphasized, albeit briefly, the necessity of air support for amphibious operations\textsuperscript{15} and the Marines moved ahead in the 1920s with efforts to develop the necessary skills for its implementation.

The utility of air observation of artillery fire had been proven over the battlefields of France, but the Marines saw it as even more important for amphibious operations. The relatively small area of the atolls and islands of the Pacific dictated a necessity for accuracy that had not existed on the Western Front. In addition, the limited ammunition capacity of supporting naval guns placed further emphasis on accuracy in the name of efficiency. Well-trained aerial observers would aid in the achievement of such accuracy.\textsuperscript{16}

By the time of America’s entry into the war in 1941, Navy and Marine pilots were trained in the art of spotting for naval gunfire. Army pilots were not but, again, the Army had more pressing training needs for its pilots. Only wartime experience would necessitate the training of Army Air Force units to spot for naval gunfire.\textsuperscript{17}

The Marines, more than any other American branch of service, also pioneered the techniques of close air support of ground troops. It was recognized that such support would be necessary to hit targets that could not be reached by naval gunfire or when targets presented

\textsuperscript{14} Millett, \textit{Semper Fidelis}, 327, 329.
\textsuperscript{15} Ellis, 22.
\textsuperscript{16} Isley and Crowl, 32.
themselves in close proximity to friendly troops. The concept of a final heavy air strike against beach defenses just ahead of the landing force was also developed during this time. Dive-bombing, so prevalent in World War II, was first attempted by a Marine pilot, Lieutenant L. H. M. Sanderson, in 1919, marking a unique contribution to aerial warfare by the Marines. By 1927, dive-bombing was considered routine for Marine aviators.  

Though the nature of Marine operations in Haiti and Nicaragua was not conducive to the furtherance of amphibious capability, Marine aviators were able to practice skills such as artillery spotting, observation of enemy movements and emplacements, and ground attack techniques in support of friendly troops. All Marine pilots were trained in ground warfare prior to earning their wings, thus facilitating understanding and unity of purpose between the men on the ground and those in the air.  

Marine aviators not assigned to the expeditionary forces practiced carrier operations with the fleet. It was determined that such skills would be necessary to deploy trained fliers during operations beyond the reach of land-based air. The Marines would push for the exclusive assignment of aircraft carriers to Marine authority to ensure proper support of landing forces, but resistance from the Navy precluded such assignments. Some Marine air units, however, would fly from Navy carriers during the Pacific War.  

Though Marine aviation did the best work in the realm of close air support, their efforts were hindered by vague definitions of what such support actually entailed and by the lack of effective communications doctrine between ground commanders and aviators. This remained a problem through most of the war until addressed during the Philippines campaign by Lt. Colonel

---

19 Isley and Crowl, 32-33.  
20 Ibid, 41.
Keith Barr McCutcheon, operations officer of Marine Air Group 24. McCutcheon’s system smoothed out the unnecessary layers of communication and eased the task of ground commanders in calling and spotting for air support.\textsuperscript{21} The problem of close air support was never satisfactorily resolved in Europe, as will be discussed in later chapters.\textsuperscript{22}

In 1927 the Joint Board, predecessor of the Joint Chiefs of Staff, undertook a study of the mission parameters of each service with an eye to establishing clear responsibilities. The ensuing report, \textit{Joint Action of the Army and Navy}, reaffirmed the Marine Corps in its traditional missions of service with the Navy and land operations with the Army. In addition, the Corps was assigned responsibility for “land operations in support of the fleet for the initial seizure and defense of advanced bases and for such limited auxiliary land operations as are essential to the prosecution of the naval campaign.”\textsuperscript{23}

The report did not clarify command responsibilities in joint actions, leaving the decision to the discretion of the president. The Navy traditionally held that any naval action should be commanded by the senior naval officer present, meaning that the Navy maintained command until the situation ashore was such that the ground forces commander should assume control. The response of the Navy to such ambiguity on the part of the Joint Board was to emphasize cooperation with the Marine Corps, which falls under naval administrative control, for the pursuit of its amphibious doctrine.

Since the Marines understood that their primary purpose was to support the actions of the fleet, it was a natural partnership. A subsequent \textit{Joint Action} report in 1933 did not clarify the command issues between naval and ground commanders which cropped up in amphibious

\textsuperscript{22} Clifford, 228.
operations well into the war. The problem of command delineation will be addressed in a later chapter. The Joint Board did direct that all landing operations would adhere to the same doctrine whether carried out by Marine or Army forces.  

**The Fleet Marine Force and Fleet Landing Exercises 1 and 2**

Upon the close of the Marine Corps’ commitment in Nicaragua in early 1932, planners returned to the task of amphibious capability. The primary roadblock at this time was funding. The Great Depression was in full swing and there was pressure to absorb much of the Corps, including its aviation component, into the Army to save money. Alarmed by such talk, the Marines threw themselves into the amphibious mission.

The Marine Corps Schools at Quantico led the way with a feverish effort to produce the definitive doctrinal work on the subject. The Marines based their work on the aforementioned *Joint Action Report* of 1933, which laid out a definition of amphibious warfare and discussed such topics as combat loading, beach selection, air support, naval gunfire, debarkation, ship-to-shore movement, and beach organization. Though useful, the report was long on generalizations and short on details, though it demonstrates that the Army and Navy were thinking about the complexities of amphibious warfare.

The Army, as noted, had higher priorities but the Navy was able to address the question by delegating it to the all-too-willing Marine Corps. The Marines went so far as to suspend instruction at the Marine Corps schools in November, 1933 to focus the efforts of the instructors and students on the formulation of the new doctrinal work. The result was the *Tentative*  

---

25 Ginther, 18-19.  
28 Clifford, 101-103.
Manual for Landing Operations, published in 1934 and accepted by the Commandant and the Chief of Naval operations in 1935. The Tentative Manual served as the playbook for the amphibious exercises of the 1930s.

Coinciding with the production of a clear mission and a doctrine to carry it out was the creation of the means to do so. In 1933, Commandant Ben H. Fuller and Assistant Commandant John H. Russell proposed to the Navy Department the discontinuance of the old expeditionary forces in favor of a new organization known as the Fleet Marine Force (FMF).

The impetus behind the organizational change was the need, as determined by Russell, of a permanent force of Marines to train with the fleet. Russell recognized that the continued existence of the expeditionary forces would result in their being diverted to efforts like Haiti, Nicaragua, or shore defense at home. Russell’s determination was based upon the growing realization by Marine and naval officers that any protracted maritime campaign would require the physical incorporation of a Marine Base Force into the fleet itself. A 1931 article by Lieutenant Commander E. W. Broadbent, USN stated that

It is the mission of the Marine Corps to support the Fleet. But likewise it will be the mission of some part of the fleet to support the Marine Corps landing force. When two forces of different arms have a mutual task, there must be mutual understanding, common thought, study, preparation, and training. With these, if the time ever comes when the Navy need more and better bases, the Navy and the Marines can take and hold them.

---

29 Ibid, 103-105.  
30 Isley and Crowl, 33.  
31 Colonel Richard M. Cutts, USMC to Colonel E.B. Miller, USMC, 23 September, 1932, (RG 127, NA).  
The new Fleet Marine Force would satisfy this requirement while reinforcing its distinct mission as articulated in the Joint Board report of 1927: advance base force and amphibious operations. The proposal was accepted and the Fleet Marine Force became a reality in December, 1933.33

The combination of the FMF and the new Tentative Manual allowed the Marines to begin testing its doctrinal theories. The Joint Action report of 1933 had allowed the Marines a great deal of room to work as it had refrained from stipulating specific operational concepts for advanced force and amphibious efforts. With its new intellectual and organizational institutions, the Corps was ready for the challenge.34

The Tentative Manual for Landing Operations established amphibious operations into six component parts: command relations; naval gunfire support; aerial support; ship-to-shore movement; securing the beachhead; and logistics. The latter part dealt with the loading and unloading of ships and distribution of supplies and equipment.35

Little space was given to command relations as it was understood that the Marine Corps operated within the administrative sphere of the Navy, which supposedly smoothed out any command conflicts. It was merely repeated that the senior naval officer present would command the operation.36 As noted earlier, the problems on this area would not become apparent until the commencement of actual wartime operations.

It must be noted that many of the concepts articulated in the Tentative Manual had been initially addressed by Major Ellis in 1921. If Ellis’ work served as the signpost toward

---

33 United States Department of the Navy, General Order No. 241, 7 December, 1933, The Fleet Marine Force, Establishment of, 1933, (Box 36, File 545, Historical Amphibious Files, United States Marine Corps Archives, Quantico, VA).
34 Isely and Crowl, 35.
35 United States Marine Corps Schools, Tentative Manual for Landing Operations, 1934 (Box 2, File 39, Historical Amphibious Files, Quantico, VA).
36 Ibid, 11.
amphibious capability, the *Tentative Manual* proved to be the road to the destination. By clearly expressing the problems to be solved before the achievement of true amphibious capability, the *Tentative Manual*, coupled with the efforts of the FMF, allowed those problems to be tested and addressed through trial and error.

The Fleet Landing Exercises (FLEX), staged each winter on the Caribbean island of Culebra from 1935 to 1940, were the primary means by which the tests were conducted by units of the Navy, Marines, and Army. As befitted the first tentative steps into a new doctrinal approach, FLEX 1 and 2 served primarily as experiments for new procedures and the application of existing equipment to those procedures. Areas of concentration included ship-to-shore movement, beach organization, naval gunfire, air support, landing craft, the employment of smoke, and beach defense techniques.

The critical nature of ship-to-shore movement had been apparent even before the practical exercises commenced. Ellis had emphasized as much in 1921.\(^{37}\) The essential elements of a successful ship-to-shore movement are organization, momentum, and concentration of force at the point of attack, i.e. the water’s edge. These three elements are interdependent. Proper organization facilitates the momentum of the landing and ensures the called-for concentration of force on the beach. Proper concentration of force allows the momentum of the landing to continue across the beach, thus allowing follow-up waves to land according to plan and preserving the organization. It is an ongoing process which can be disrupted by the failure of any individual element, which in turn jeopardizes the entire operation. This process is enabled by the crucial support of naval gunfire and air support, which will be addressed shortly.

\(^{37}\) Ellis, 16, 18-19.
FLEX 1 and 2 quickly demonstrated the necessity of equipping the landing force with enough boats to embark the assault force simultaneously, including the reserve. Momentum can only be maintained through the continuous landing of assault waves which are not subject to delays in embarking follow-up forces or bottlenecks caused by boat attrition. It was also determined early that the only way to materially affect the ground action on the beach during the landing phase was to commit the reserve force in a timely manner. If lift for the entire assault force could not be accomplished, the initial wave was subject to defeat in detail.  

This concept was extended to the fleet as well. FLEX 2 revealed the desirability of embarking a complete assault unit on a single transport ship so as to facilitate organization and ease of transit to the area of operations and to the target beach. Though constrained by budgetary concerns, it was apparent that additional transports would have to be acquired for the FMF to effectively accomplish its mission of supporting the fleet.

The maintenance of momentum is a recurring theme throughout the ship-to-shore exercises. It was noted that lighter-equipped troops disembarked more quickly and efficiently than those who were more heavily-encumbered. This led to a recommendation that the first wave carry only what was deemed necessary, while relegating heavier equipment to follow-up waves. The utility of offensive fire from assault boats in regard to suppression of beach defenses was noted and discussed, as well as the positive effect of such fire on the morale of the landing force.

---

39 Report of Rear Admiral Hayne Ellis, USN, to Commander-in-Chief, United States Fleet, 11 May, 1936, United States Navy Fleet Landing Exercise 2, 1936, (Box 6, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
40 Report of Commanding Officer, 5th Marine Regiment, 20 March, 1935; Extracts from Report of Captain Paul B. Kelly, USA, to Commanding General, Fort Monroe, VA, United States Navy Fleet Landing Exercise 1, 1935, (Box 4, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
In addition, FLEX 2 marks the point where recognition dawned as to the desirability of separate fire support boats in the assault waves. This recognition took the form of questioning whether the space and weight of assault guns and mortars was justified in a landing craft at the expense of troop capacity. Again, the question was momentum and the problem of balancing manpower and firepower was critical. Lack of funding would delay the solution to this question, but it emerged in its infancy in 1936.41

Finally, both exercises strongly recommended increased and constant training for boat crews. Landings were executed in daylight and at night.42 The night landings of FLEX 2 invariably led to confusion in assembling the boat waves and in the approach and landing phases. Boats landed in the wrong places or sometimes never landed at all. Units were intermingled and command broke down. As a result, momentum all but stopped. In several cases it was ruled that the landings would have failed. Even in daylight, boats sometimes missed their assigned beaches, though the confusion was nowhere near the level of the night landings.43 Still, it was determined that the ability to conduct night landings in an effort to achieve tactical surprise was essential and such exercises would continue in the future.

The problem of beach organization was a critical aspect of maintaining momentum in the landing. Men and equipment had to flow onto, across, and off the beach in such a way as to preserve unit integrity as they moved to their objectives while also creating space for the next wave. A critical aspect of maintaining this flow was the concept of combat loading of transports.

42 Ibid.
43 Report of Colonel Sherman Miles, USA on Fleet Landing Exercise No. 2, 18 March, 1936. United States Navy Fleet Landing Exercise 2, 1936, (Box 6, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
Combat loading was a lesson learned in 1924 and it was practiced and perfected in the FLEX operations. The concept dictated the necessity of loading the transport ships in such a way as to provide the supplies and equipment to the landing force in the order in which it would be needed. Such an endeavor required intimate knowledge of ships’ hold measurements and capacities as well as weight and volume of the material to be loaded. Supplies likely to be needed quickly, such as ammunition and medical implements, would be loaded near the top of the holds while less urgent material would be relegated to the bottom.44

The primary advance of FLEX 1 and 2 was the recognition of the early need for field medical facilities on the beach to care for the wounded. A system of ambulance boats was discussed though a shortage of craft always handicapped the concept.45 Wartime would see wounded soldiers and Marines being evacuated on returning landing craft.

It should also be noted that the aforementioned streamlining of shore party responsibility had not yet taken place. The eventual solution would be influenced by the friction between Navy beach masters and Marine shore parties during the early FLEX operations.46

It was clear from the beginning that a successful amphibious landing would require effective support from the big guns of the Navy. Small gains were made in this area in FLEX 1, with the primary lessons being that naval guns were especially effective when paired with aerial spotting and that reverse slope defenses presented a problem for the big guns of the fleet.47

Accuracy of fire was also a concern. Naval guns were generally less accurate than land-based artillery, primarily because the ship was in motion, even if only from the recoil, and could

---

44 Isely and Crowl, 43-44.
46 Ibid.
47 Report of T.B. White, Officer in Charge of Aerial Spotting to Commanding Officer, VO Squadron, 9th Marine Regiment, 4 March, 1935. United States Navy Fleet Exercise 1, 1935, (Box 4, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
not be precisely reset after each shot. Ellis had recommended that naval fire support be concentrated on the flanks of the landing force and it was determined that such an approach was advantageous. Range errors were far more prevalent than those of deflection. It was found that ships which were assigned to close support of the landing force were more accurate when firing from the flanks, creating less risk of short rounds falling on friendly troops.48

Commanders felt that naval gunfire ranked second only to air superiority in terms of prerequisites for success in amphibious operations49 and it received special focus the following year. Reverse slope defenses were a real concern and experiments were conducted with elevation and range of different caliber guns. The 12-inch guns of the participating battleships were able to reach reverse slopes which were not greater than the angle of fall for the shell, which could go as high as 36 degrees. The 8-inch guns of cruisers and the 4-inch guns of destroyers performed even better thanks to their higher angle of fire from shorter ranges.50

The qualifier for all this was that accurate reverse slope fire depended absolutely on accurate observation. Since it was extremely unlikely that ground observation would be possible in the early stages of a landing, the achievement and maintenance of air superiority over the landing area was essential in order to allow for aerial spotting.51

Useful results were also obtained regarding the effect of naval shelling on shore targets. It was found that naval armor-piercing rounds burrowed too deeply into the ground before exploding, causing minimal damage in counter-battery and anti-personnel missions. Surprisingly, the standard Army high-explosive shells returned similar findings. The shells buried themselves

48 Ellis, 22-23.
50 Report of Colonel Sherman Miles, USA, 18 March, 1936.
before exploding, causing the explosive force to be directed upward with very little lateral effect. These tests resulted in calls for quick fuses to maximize lateral damage and even selective fuses so as to provide greater flexibility and save space in ammunition magazines.52

It was also recognized that more realistic exercises were needed. Ships’ fire missions were tightly controlled, with targets clearly marked, reverse slope angles known, and ships firing from a stationary position. Recommendations were made to remove the markers for observers and gunners, withhold information on slope angles, and have the ships fire while underway, including at least one course change during fire missions.53 FLEX 3 would see these recommendations put into effect.

As noted earlier, air superiority was counted as the primary requisite for successful amphibious operations. Without command of the air, the assault fleet would likely never be able to approach the landing area, much less put the assault waves ashore. Little work on achieving air superiority was done during FLEX 1 other than the acknowledgement of its importance. Air operations instead focused on reconnaissance, spotting for naval gunfire, and communications.

Perhaps the most telling aspect of air operations in FLEX 1 was the realization that Marine aircraft were inadequate to perform the various missions to which they were assigned. In his report to the Commanding General, FMF, Major General Charles H. Lyman, Major James T. Moore stated that “It is my opinion that out airplanes are entirely unsuited for the use we put them to in this maneuver. If it is true that we are practicing in time of peace what we will probably be required to do in time of war, our present airplanes will not be satisfactory.”54 Moore

---

52 Ibid; Report of Colonel Sherman Miles, USA, 18 March, 1936.
53 Ibid.
went on to state that obsolete Marine aircraft were being put to the same use as modern mission specific Army and Navy planes. He made clear his belief that implying performance through the application of arbitrary type names to unsuitable aircraft was a dangerous mistake.\textsuperscript{55}

Moore’s contentions were echoed in Lt. Colonel Roy S. Geiger’s report on proposed changes to the \textit{Tentative Manual} in the wake of FLEX 2. Geiger, as commander of Aircraft One, the air unit participating in the exercises, recommended that the following sentences be added to the aviation section:

\begin{quote}
Pending the adoption by Naval Aviation of attack planes, and the organization of Marine Corps Attack Squadrons, it will be necessary to divert VF [fighter], VO [observation], and VB [bomber] units from their normal missions for ground straffing (sic) tasks. Therefore, additional units of those classes should be assigned the Air Force for attack missions.
\end{quote}

Later in the same report, he wrote that “Attack squadrons properly equipped for this work should be an integral part of Marine Corps Aviation.”\textsuperscript{56} As the Corps’ leading airman, Geiger’s words carried weight, though tight budgets continued to hamper efforts to outfit the FMF to carry out its mission.

Under Geiger’s leadership, the role of aviation in support of amphibious operations was clarified by its participation in FLEX 2. Geiger began to articulate the limitations of aerial observation in terms of submerged beach obstacles and the presence of chemical weapons. Likewise, Geiger acknowledged the difficulty in providing air support in a night landing against an alert hostile air force. The advantage in such a case would always lie with the defender, who could illuminate the assault fleet to facilitate attacks. At the same time, it would be all but impossible to detect hostile aircraft before they launched their attacks.

\textsuperscript{55} Ibid.
\textsuperscript{56} Report of Lt. Colonel Roy S. Geiger, USMC, to the Brigade Commander, First Marine Brigade, FMF, 6 March, 1936. United States Navy Fleet Landing Exercise 2, 1936, (Box 6, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
Finally, Geiger laid out a brief vision for what he believed the primary role of the attacking air force should be in support of landing operations. Air operations against the beach, he asserted, should be held to a minimum, and air assets should not be called upon to perform missions which could be accomplished by naval or Marine forces. This assertion was made in the name of efficiency and economy of force. The primary missions of the air arm should the achievement and maintenance of air superiority and interdiction attacks against enemy reserves and reinforcements, as those constituted the greatest threat to the success of the landing operations.57

As with naval gunfire, recommendations were made to inject more realism into the exercises by eliminating visible markers for observation planes and creating more challenging scenarios for the spotters.58 The goal was to train the pilots to spot enemy targets, communicate their locations, and guide naval gunfire onto it all on their own. Communications were key to this effort. These recommendations were implemented in 1937 at FLEX 3.

FLEX 1 quickly brought back the call for specialized landing craft. The Navy’s ships’ boats were inadequate in every way. They were slow, vulnerable to enemy fire, had poor handling characteristics in rough water and they tended to broach in heavy surf. Their high gunwales and lack of exit ramps made disembarkation slow and difficult and it was reckoned to be nearly impossible under fire. The boats were often unable to retract themselves from the beach when they did land successfully, forcing the assault troops to labor to free them. Again, such a situation would be more than problematic under fire.59 Both exercises proved that certain

57 Ibid.
pieces of equipment, such as 75mm pack howitzers, could be landed in ships’ boats, but conditions had to be very favorable, which was unlikely during wartime.\textsuperscript{60}

Light boat armor was tested both years with encouraging results. The armored boats consistently turned .30 caliber machine gun rounds and were partially resistant to .50 caliber fire. The problem was that the armor weighed down the boats and negatively impacted their already slow rate of speed and poor handling characteristics. So, while the armor tests were positive, the need for better boats became even more clear.\textsuperscript{61}

Also notable in FLEX 2 were the experimental landings over mangrove and coral formations. The landings into mangroves proceeded surprisingly smoothly, though it was noted that no account was taken as to possible enemy defenses. More problematic, for the purposes of wartime utility, were the attempts to cross coral reefs in ship’s boats. These efforts were unsuccessful, prompting a call for further tests, with permission to damage or even destroy the test boats in the process.\textsuperscript{62} These tests represented the next step on the path to the development of the amphibious tractor, whose lack in sufficient numbers at Tarawa was tragic and whose later employment saved the lives of countless soldiers and Marines on the atolls of the Pacific.

No test area was more contentious than the experiments with smoke. The positive and negative aspects of smoke on the battlefield have been well-known for centuries. The ability to lay one’s own smoke screen is a valuable tool for any commander who wishes to mask his movements and confuse his enemy.

\textsuperscript{60} Report of Colonel Sherman Miles, USA, 18 March, 1936.
\textsuperscript{61} Report of Commanding officer, 5\textsuperscript{th} Marine Regiment, 20 March, 1935; Report of RADM Hayne Ellis, USN, 11 May, 1936; Report of Colonel Sherman Miles, USA, 18 March, 1936.
\textsuperscript{62} Excerpts from Report on U.S. Fleet Landing Exercise Number two, undated;
Smoke was employed at various times during the FLEX operations to mask the landing force and the beach, usually by aircraft using smoke-generating tanks or smoke bombs. It was found that covering the landing force during the approach served to considerably lessen defending fire as well as masking the destination of the boats. On the other hand, the boats themselves tended to get mixed up and often landed in the wrong place.

Placing smoke on the beach again covered the landing force and confused the defenders, but it rendered supporting naval gunfire all but meaningless. In addition, there were not enough planes to lay an effective smoke screen and deliver the desired last-minute strike on the beach defenses just ahead of the first assault wave. The bright spot was that the landing boats didn’t get lost, although they still landed on the wrong beach at times.63

Questions were raised over the desirability of obscuring the beach at the cost of supporting fire. Indicative of the disagreements are statements made by participants in the exercise. Lt. Colonel H.S. Fassett, commander of the 1st Battalion, 10th Marines, wrote “I do not believe naval gun fire and air support alone to be quite as effective as smoke.”64 He did qualify his statement by saying they should be used in conjunction, but it had been demonstrated that smoke and fire support often worked at cross-purposes.

On the other hand, Lt. Colonel Charles F.B. Price, assigned to the battleship Wyoming, reported that

Smoke alone is of doubtful value in securing tactical success. As indicated above, it may be employed to hamper the enemy observation, slow down the service of his weapons and create uncertainty and confusion, but unless this can be

accomplished without any appreciable loss of efficiency in air support and naval gunfire its use is not indicated nor recommended.\textsuperscript{65}

To which General Lyman, Commanding General of the FMF, replied “I do not concur – it is my belief that the beach must be obscured or it is plain suicide for men to attempt to leave the boats.”\textsuperscript{66}

Lyman’s response is revealing in terms of the problem of maintaining the momentum of the landing force. The general unsuitability of the boats used in the exercises has been discussed and was well-known to Lyman. Lacking better options at the time, his insistence on smoke over the beach in light of the problems of unloading and retraction is understandable. Only more effective equipment which facilitated the doctrine would ease the problem of momentum at the water’s edge, thus providing more flexibility in terms of support.

The final aspect of landing operations studied in FLEX 1 and 2 was beach defense. While the new doctrine was clearly geared toward the offensive, there were good reasons to learn the techniques of the other side of the equation. First, it was not inconceivable that any advanced base seized by the Marines would not be subject to counter landings, especially in the Pacific. Pete Ellis himself had considered it of such importance that half of \textit{Advanced Base Operations in Micronesia} was dedicated to base defense.\textsuperscript{67} Second, a clear understanding of how an enemy might defend against a landing could only have a positive effect on the planning of any assault.

FLEX 1 and 2 primarily saw experiments with guns of various calibers against boats of the assault wave. Automated “free” boats were guided toward the beach, during which time they

\textsuperscript{65} Excerpt of Report of Lt. Colonel Charles F.B. Price, USMC, to the Commanding General, Fleet Marine Force, undated. United States Navy Fleet Landing Exercise Number 1, 1935, (Box 4, Exercises Collection, United States Marine Corps Archive, Quantico, VA).

\textsuperscript{66} Ibid. Emphasis part of original.

\textsuperscript{67} Ellis, 31-60.
were subjected to fire from .30 and .50 caliber machine guns, mortars, 37mm anti-tank guns, and a 75mm pack howitzer. This was also the time when the armored boats were tested.

The 37mm gun was found to be the most effective against landing craft, barring the occasional lucky shot from the .50 caliber machine gun. As noted earlier, the .30 caliber machine gun was ineffective and, while it made no direct hits, the near misses from the 75mm gun had negative effects on the boat. The mortar was completely ineffective against the moving boat and was recommended only for fire on the beach itself.68

**Sharpening the Spear: FLEX 3-6**

1937’s FLEX 3 featured activities similar to those of its two predecessors. As such it is only necessary to mention a few areas in which advances were made. The utility of an integrated plan for naval gunfire based on the infantry plan of action was explored to good effect. Essentially, the support fleet would have a fire plan in place, specifying the responsibilities for each ship or division of ships.69 This concept would eventually evolve into each major gunfire ship having its own fire control party ashore with the landing force, thus easing communications and maximizing the efficiency of their fires.

It was also determined that troops and light material could be embarked and unloaded in darkness with darkened ships; that neither radio nor visual communication may be employed in the hours of darkness if surprise were to be preserved for dawn landings; and that night landings were impracticable against any sort of defense.70 This determination is important in

---

70 Ibid.
understanding why the Navy and Marine Corps differed from the Army when it came to night landings.

The Navy and Marines placed a premium on the role of organization in the maintenance of momentum. This stemmed from their years of working together which led to their common understanding of and belief in their doctrine. The Marines also had a fundamental understanding of how naval gunfire worked and its effectiveness against shore targets. The Army, on the other hand, did not take part in all of the FLEX operations, and even then, only a small fraction of the officer corps had any real experience with amphibious operations. They could not realistically be expected to understand the intricacies of such a complex operation like the Marines did.

The Marines were confident that dawn landings could succeed, thus allowing them to stay as organized as possible in a combat landing. They did, however, continue to execute night landings as part of their training exercises. The Army, at least in the European Theater, was more apt to place their faith in establishing momentum across the beach through the achievement of tactical surprise in a night landing. As noted previously, night landings had much to commend them, especially in the operational environment which prevailed in Europe. It is difficult to say whether the Navy-Marine way would have been superior or not. It is worth noting, however, that the only major amphibious operation in Europe which took place in daylight, the invasion of Southern France, was the smoothest of the entire war. Of course, there were other factors involved in the success of that operation, which will be discussed in a later chapter.71

The preferred timing between the waves and sub waves of the assault force was determined in a general sense, along with the notion that, as far as possible, troops should train with the boat crews who would land them in a real operation. The use of airborne troops as part

71 The Normandy landings do not qualify as a true daylight operation, which will likewise be discussed later.
of an interdiction force was also discussed for the first time.\textsuperscript{72} In addition, experimental landing craft were tried and ship-to-shore movement was described as a “tactical operation of great import” as opposed to a “ferrying operation,” with all the implications of such an important distinction.\textsuperscript{73}

The size and scope of the supporting naval task force received attention in that it was acknowledged that resources should be allocated commensurate with the requirements of a given operation and that one size did not fit all. A seemingly simple acknowledgement, but important nonetheless from a planning standpoint. Troop organization was also addressed with introduction of the Battalion Combat Team (BCT) as the basic unit of the landing force. The BCT consisted of an infantry battalion supplemented by one battery of artillery. Allowances were made for unspecified auxiliary troops to be attached to the landing force based on operational requirements.\textsuperscript{74}

The primary benefit of FLEX 3 was not found in the exercises themselves, but rather in the realizations that emerged from them. In an extraordinary commentary on the exercises, Colonel C.J. Miller, commander of the 5\textsuperscript{th} Marine Regiment, opened the door to the expansion of the FLEX operations into true operational-level practical maneuvers. Miller stated that, while good work had been done up to that point, continued practice of technical issues laid out in a manual did nothing to improve the tactical knowledge of the participating forces.

\textsuperscript{72} Shannon, Observations of behalf of Marine Corps Schools.
\textsuperscript{73} Brigadier General James J. Meade, Commanding General, First Marine Brigade, Remarks on Fleet Landing Exercise Number Three, 19 February, 1937. United States Navy Fleet Landing Exercise 3, 1937, (Box 10, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
\textsuperscript{74} Major General D.C. McDougal, USMC to Commander, Scouting Force, Reports in Connection with U.S. Fleet Landing Exercise No. 3, 9 March, 1937. United States Navy Fleet Landing Exercise 3, 1937, (Box 10, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
Instead, the technical knowledge which had been gained must be tried and tested to the fullest of peacetime capability in order to ensure that it would lead to “truest sense doctrines” in order to avoid “disagreeable surprises in the future.” Miller went on to call for future exercises to be labeled and conducted as maneuvers, not just exercises, in which the attackers and defenders being represented with the entire affair tightly controlled by umpires “thoroughly versed in both the tactics of the defense of advanced bases and the landing attack.” Miller then gets right to the point of the entire endeavor: “Only in this manner can we broaden our scope of landing operations and determine to some degree the efficacy of the means placed at our disposal for getting us ashore against opposition.”

Miller went on to discuss the absolute necessity of learning and implementing the principles of defense into the maneuvers. While the effect of various weapons was important, the knowledge of how those weapons would be employed was more so. There was no excuse, he maintained, “for not thoroughly familiarizing ourselves with the tactical methods that will be employed by our most probable enemies.”

The quest for realism must also extend to the understanding and use of terrain, not only by ground forces but by gunner and spotters. Making gunnery exercises more challenging and realistic had been recommended after FLEX 2. Miller all but demanded it by proposing that each element of the operation, ground troops, gunners, spotters, understand terrain from the standpoint of each other in order to understand what support might be expected and provided.

Real meat was put into the idea of fire superiority. Its necessity had always been apparent, but Miller laid it out in such a way as to demonstrate how crucial it was to the concept of momentum:

We can only reasonably expect an advance from the water’s edge, when we have silenced the defender or placed in action the means necessary to attain this result.
This is the interpretation we must give to the rule: “gain fire superiority.” In this connection, it is interesting to note, that the landing attack has the inherent peculiarity, that it is the weakest at the water’s edge and gains only in strength as it progresses inland.

Miller emphasized this statement by acknowledging the effect of naval gunfire and artillery but going on to state that gunfire support was not enough to silence large numbers of machine guns, as had been proven in World War I. Only by the employment of tanks could fire superiority at the point of attack be attained. The argument for tanks was framed as providing direct fire and cover for the troops as they advanced across the beach, much as soldiers had done in 1917-1918.75

In addition, the central role of tanks in the expansion of the beachhead and the attainment of inland objectives could not be denied. A means for incorporating tanks into the landing force had to be found. Miller and others called strongly for the development of an amphibian tank and a serviceable tank lighter to land conventional armor.76

A final element of Miller’s discussion requires attention and demonstrates his fundamental understanding of the importance and dynamics of momentum. As per regulations, the first three FLEX operations saw assault troops advance across the landing beaches in long skirmish lines. Miller rightly pointed out the vulnerability of such a formation to machine gun fire, particularly from the flanks of a beach enclosed on three sides by high ground. He proposed scrapping the skirmish line in favor of “small groups of skirmishers, arranged in chains of


76 Ibid; Brigadier General James J. Meade, Commanding General, First Marine Brigade, Remarks on Fleet Landing Exercise Number Three, 19 February, 1937.
groups.” The flexibility and maneuverability of such groups is emphasized and is rightly characterized as being akin to “infiltration” tactics.\textsuperscript{77}

The test of war would validate Miller’s ideas. Units would eventually be stacked so that companies, or even platoons, of the same parent unit would land in successive waves to preserve the integrity and momentum of each unit. The leading formations, while landing on a broad front, would focus their energies toward forcing egress from the beach at predetermined points. A long skirmish line would not lend itself to such an endeavor. Infiltration tactics, ideally supported by tanks at the point of attack, were just the thing. Miller’s comments on this subject would prove especially prescient as to the experience of US soldiers on Omaha Beach seven years later.

Though some of his predictions, such as the certainty of chemical weapons being used, did not come to pass, Colonel Miller’s commentary is no less remarkable for it. It represents the bridge between the theory of the \textit{Tentative Manual} and the fearsome weapon that US amphibious capability would become in 1944.

The next year, a Marine Brigade and three regiments of the US Army took part in FLEX 4. The Army participated at the request of the Navy and they and the Marines took turns in the roles of landing force and defender.\textsuperscript{78} Insufficient landing craft were on hand to embark the entire force, so the Marines deferred to Army requirements due the latter’s lack of experience in landing operations.\textsuperscript{79}

\textsuperscript{77} Colonel C.J. Miller, USMC, \textit{Comments on Fleet Landing Exercise 3}, 26 February, 1937.
\textsuperscript{78} Millett, \textit{Assault from the Sea}, 76.
\textsuperscript{79} Brigadier General R.P. Williams, USMC to Rear Admiral A.W. Williams, USN, 28 February, 1938. United States Navy Fleet Landing Exercise 4, 1938, (Box 12, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
FLEX 4 witnessed the increased realism called for in the wake of FLEX 3. Prior to the arrival of the main force, two companies were transferred at sea from transports to destroyers and preceded the main force to Culebra. These two advance companies debarked close to the beach and conducted a surprise night landing in less than an hour, seizing their objectives before daylight. This exercise was meant to test the possibility of achieving tactical surprise against a lightly-defended target area and was judged a success. It was noted, however, that such a landing would not have the benefit of naval gunfire or air support during the assault phase.\footnote{80}{Ibid.}

It was noted during the normal daylight landings that the time required to embark the landing force and transport it to the beach afforded the defender time to move up reserves and strengthen defenses. This was not a new revelation, but it was used as justification for another call for faster and better landing craft.\footnote{81}{Ibid.} Three experimental boats were used in the exercise, type unknown. They performed well and were deemed a “great improvement” over the Navy boats that were used.\footnote{82}{Report of Senior Umpire White to the Commanding General, First Marine Brigade, 21 February, 1938. United States Navy Fleet Landing Exercise 4, (Box 13, Exercises Collection, United States Marine Corps Archive, Quantico, VA).}

While this notation served a purpose in this regard, it is also relevant to the application of US amphibious doctrine in the European Theater, as well as early operations in the Pacific. Continental operations had to achieve a fine balance between tactical and operational surprise and gunfire support. With the capability to marshal reinforcements beyond the range of naval gunfire, tactical surprise became even more important against the Germans and Italians than against the Japanese, who rarely had such an opportunity. This dilemma will be addressed in later chapters.
FLEX 4 also saw the first implementation of a tank lighter in the exercises. It met with mixed reviews, but it reinforced the belief that such a craft was not only desirable, but vital to the success of on opposed landing. The call for dedicated armed landing craft also grew louder in FLEX 4. The space and weight of extra guns on landing craft were increasingly seen as counterproductive when troop capacity had to be sacrificed. The desirability of armed landing craft was not disputed, but it was becoming more apparent that they should be weapons unto themselves which accompanied the landing force.83

Naval gunfire came in for its most searching tests to date, though the battleships were not allowed to fire from maximum range, eliciting complaints that the tests were not realistic enough. Longer ranges would have increased the angle of fall of the shells, thus allowing the truest test on reverse slope targets. The tests that were carried out were thorough and determined that newer high explosive rounds were much more effective than in previous exercises with an effective blast radius of twenty feet. It was also noted that armor piercing shells were still inadequate for counter battery and anti-personnel missions.

Somewhat ironically, the same report recommended that the Navy abandon “point target” fire due to the generally poor results in marksmanship, leading to unacceptable expenditures of ammunition for little return.84 While the Navy did indeed move to an “area neutralization” fire doctrine, the hardened defenses of Normandy required “point target” gunnery, for which the troops ashore were grateful.85 As it turned out, the armor piercing shell was just the thing for such missions.

83 Ibid.
84 Ibid.
85 Clifford, 225-226.
Air support was also addressed in conjunction with naval gunfire and ship-to-shore movement. It had long been agreed that the Navy’s big guns would pound the beach defenses ahead of the landing force, but that the barrage had to be lifted so as to not endanger the troops hitting the beach. This usually meant a two to five-minute period during the approach when there was no covering fire. This gap was filled by arming landing craft to fire on the beach during the immediate approach, but practice had shown that a well-timed airstrike during the final run to the beach could confuse and disrupt enemy defenses for as long as fifteen minutes.

Extra effort was put into the planning of the timing of this strike with the crossing of the line of departure by the assault waves. It was noted that even a small time discrepancy could result in the first wave having to approach the beach without the benefit of covering fire other than what it could generate itself. This problem would manifest itself during the war at Tarawa and at Omaha Beach in Normandy.

FLEX 4 witnessed the first employment of tanks against the landing force by the defenders, with eye-opening results. The landing force was not told about the tanks beforehand and the assault troops were driven back and to the left of the beach, with the tanks in pursuit. The assault troops were pushed off the beach entirely and into a swamp. It was estimated that, had the tanks had infantry support, the entire assault wave would have been wiped out. The tanks then withdrew, where they were subjected to air attack, but the message was clear: the assault waves must have sufficient direct fire support on the beach and air support in the interdiction role was critical to the process of isolating the beachhead when it was at its most vulnerable.

---

86 Report of Colonel S.M. Harrington to the Commanding General, First Marine Brigade, 25 February, 1938. United States Navy Fleet Landing Exercise 4, 1938, (Box 12, Exercises Collection, United States Marine Corps Archive, Quantico, VA); Report of Senior Umpire Blue to the Commanding General, First Marine Brigade, 26 February, 1938. United States Navy Fleet Landing Exercise 4, 1938, (Box 13, Exercises Collection, United States Marine Corps Archive, Quantico, VA).

87 Ibid; Report of Senior Umpire Blue, 26 February, 1938.
The issue of smoke was raised again and, though the results were similar to earlier exercises, the consensus seems to be that smoke is as disadvantageous to the attacking force as to the defender. More importantly, it was noted that the aircraft delivering the smoke would better employed in the attack role in support of the landing force.88

An important distinction was raised as to the nature of the exercise, due to the participation of US Army units. One of the Senior Umpires of the operation noted in his report that

This problem, it is believed, was a simulated Joint Landing Operation. It is so defined as it is not believed that the seizure of territory for the purpose of establishing a naval base calls for a Joint Operation of the Army and Navy…The Fleet Marine Force was established as an integral part of the Fleet to provide with a means of reaching out and securing naval bases or denying the enemy naval bases at the outset of war thereby securing an initial advantage. Joint Army and Navy Landing Operations are operations undertaken to provide an extensive beachhead in enemy territory in order that the Army can land unopposed large numbers of troops and supplies for further operations inland.89

This statement goes right to the heart of the differences in doctrinal application between operations in the Pacific and on the European Continent. The report goes on to state that exercises simulating a Joint Operation should also entail the differences in orders and staff dynamics which would be necessary in such an operation in order to maximize the experience gained.90 Quite a prescient statement in February, 1938.

FLEX 5 and 6 served to hone the doctrine which was now laid out in Navy Fleet Training Publication 167, Landing Operations Doctrine, which was the successor document to the Marines’ Tentative Manual for Landing Operations. Much had been accomplished since FLEX 1, but there was plenty left to do.

89 Report of Senior Umpire Blue, 26 February, 1938.
90 Ibid.
FLEX 5 marked the first employment of ship’s fire control parties going ashore to spot for gunfire. The results were favorable indeed, with delays reduced to a minimum thanks to radio communications and a direct link between ground commanders and gunnery officers through the fire control parties. This marked the first real step toward the Navy fire control units who performed such valuable wartime service.

More data was collected in support of neutralization fire as opposed to point target fire. Live fire was directed at concrete emplacements, stretches of wire on the beach, and underwater obstacles. The effect on these targets was “not notable,” though it was felt that enemy morale would be affected to a high degree.

The night landing from destroyers was expanded to include an entire BCT, complete with 75mm pack howitzer battery and a complete unit of fire. The landing was again successful, with the landing of the artillery and ammunition deemed especially positive. Gone were the confusing and time-consuming ship-to-shore movements of the first three FLEX operations. The technique was there. All it lacked now was boats, of which there still were not enough and whose crews still required more training.91

On the positive side, several experimental boat types were tested, including the Higgins Boat, with mixed results. Weight issues were a problem and recommendations were made for the testing of plywood boats to alleviate the problem, something that Higgins would do successfully.92 The development of the Higgins Boat is discussed later in this chapter.

92 Report of Major G.E. Monson, USMC on Fleet Landing Exercise 5 on behalf of Marine Corps Schools, 1939. United States Navy Fleet Landing Exercise 5, 1939, (Box 16, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
Medical exercises were an ongoing feature of the FLEX operations and FLEX 5 saw the landing of a medical company, complete with ambulance, as part of a reinforced battalion. The company simulated combat medical procedures and evacuations from the beach using ambulance boats. Again, the exercises were successful.93 Though it may seem redundant to mention the medical exercises, the care of wounded was a primary contributor to beach congestion and the loss of momentum. Efficient medical procedures were critical, not only for the men who were wounded, but for the success of the landing as a whole.

Finally FLEX 5 was the first to use aerial photography as part of its reconnaissance exercises and a beginning was made in contouring, from which beach gradients could be estimated, from those photos.94 Again, this is significant because of the lack of accurate charts and maps once the war began. The landing in North Africa made extensive use of a collection of holiday photographs to make estimates of beach characteristics because so few charts and photos existed.95 Though the British Admiralty was able to draw on past information for Sicily, proper intelligence on beach gradients, using this technique, was not achieved in the Mediterranean until the Salerno operation in the fall of 1943, for reasons which will be discussed.96

FLEX 6 is notable in that no less an authority than Marine General Holland M. Smith declared it “the most advanced and realistic attempted to date.” Smith also noted that, thanks to the outbreak of war in Europe, the operation took on a new urgency.97

---

94 Ibid.
96 Morison, History, Volume IX, 22-23.
The progress made in the area of landing craft was also evident at FLEX 6. For the first time, positive comments were the norm as the Higgins Eureka Boat surged ahead of the competition with its superior handling characteristics and speed. Debarkation remained a problem as the forward exit ramp was still in the future, but real progress had been made toward effective ship-to-shore movement.98

The final exercise at Culebra, in October, 1940, was notable for the testing of the Roebling Alligator, an amphibious tractor design which tested favorably. Though a few improvements were necessary, the alligator became the basis for the Landing Vehicle, Tracked for which the Marines had been striving for several years. By the end of the war, over 15,000 LVTs were manufactured, most for employment in the Pacific, where they became an essential cog in the amphibious machine.99

**War Ready**

The FLEX operations served as the laboratory by which the principles expressed in the *Tentative Manual for Landing Operations*, which, as noted earlier, became FTP-167. FTP-167 was the amphibious manual with which US forces went to war in 1941. As a testament to the thoroughness of its development, there were only three changes to FTP-167 during the war. The update of May, 1941 reflected the material advances since 1938 and those of August, 1942 and August, 1943 were informational, not doctrinal, revisions.100 Certain refinements were obviously necessary once the doctrine was put to the test of war, but those refinements were based on demands presented by individual operations, to which any doctrine is subject lest it become mere dogma.

---

98 Report of Senior Umpire to Commanding General, First Marine Brigade, February, 1940. United States Navy Fleet Exercise 6, 1940, (Box 18, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
99 Clifford, 121-123.
100 Clifford, 167.
FTP-167 represented years of work, dating back to the initial plan of Pete Ellis in 1921, encompassing nine major practical exercises and countless smaller ones. The philosophy represented by FTP-167 was that amphibious operations against defended beaches would be extraordinarily difficult, but it could be done. No other nation entered the war with a comparable amphibious doctrine or the capability for its execution. The tools were still in development, as will be discussed in the next chapter, but the Navy and Marine Corps knew what to do with them once they became available.

The Army, for reasons already addressed, was behind the game. They would eventually catch up, but they never became the specialists that the naval services were, and understandably so. Still, the work done by the Navy and Marines had advanced the Army’s learning curve literally by years, which soon proved fortuitous.

Thanks to this extraordinary effort, the United States was equipped with what would become a true strategic level doctrine without which it is difficult to see how the war could have been prosecuted successfully. There is no doubt that a similar doctrine could and would have been developed during the war, but the cost would have been gallons of American blood.
Chapter 3
Strategic Realities

The shocking events of May and June, 1940, which saw the fall of France and the Low Countries and the expulsion of Great Britain from Western Europe, imposed a new and unexpected strategic situation on US planners. US strategy before this time consisted of a hodgepodge of scenarios, known as the Rainbow plans, drawn up by military planners dealing with various contingencies.1 There was, however, no unified global strategy thanks to the traditional reluctance of civil authorities to commit to long-term military plans. Army and Navy planners were forced to deal with a series of possibilities with little or no political guidance as to prioritization or policy directives.2

Even after the German defeat of France, disputes remained as to US strategy moving forward. The initial reaction of many in the Army was to concentrate on hemispheric, or even continental, defense in the face of imminent British defeat and German threats to Latin America.3 Army Chief of Staff George C. Marshall quickly overcame such calls, being aware of the threat to US economic interests were Europe to fall under Nazi hegemony.4

Navy response was more measured, primarily due to the traditional naval orientation to the Pacific and its responsibilities under the embattled but still influential Plan ORANGE.5 The Navy’s Pacific bent, however, had been based largely on leaving responsibility for the Atlantic to

1 “Joint Army and Navy Basic War Plans, Rainbow Nos. 1,2,3,4, and 5.”05/11/1939, (RG-225 M-1421, Roll 11-0031, NA).
3 Ibid, 24-25.
the British and French. By the summer of 1940, this state of affairs was threatened and the Navy began looking to the possibility of securing the Atlantic itself.

The problem was that the Navy of 1940 was very much a one-ocean entity. The ambitious naval building program had only been approved by Congress in June. Many months would pass before it impacted deployment capabilities, requiring naval planners to make hard decisions regarding allocation of forces. Having long considered Japan as their most likely adversary, the new threat in the Atlantic prompted the Navy to call for a defensive strategy in the Pacific and the avoidance of the war with Japan that seemed to be brewing.

Unfortunately for naval planners, President Franklin D. Roosevelt insisted on deterrence of Japanese aggression through economic sanctions coupled with a strong fleet presence at Pearl Harbor. Navy and Army commanders had long opposed the fleet’s exposed position in Hawaii, but were unable to move the president on the matter. Roosevelt, for his part, saw the looming crisis as a global phenomenon which could not be subjected to a compartmented strategic approach. Yet he was unwilling to lay out his vision to his service chiefs, thus committing himself and the country to something he still hoped to avoid entirely.

The strategic conundrum was eventually clarified by Admiral Harold E. Stark, the Chief of Naval Operations. In late October, 1940, Stark sat down to lay out the strategic realities as he saw them. Working all day and into the night, Stark produced what came to be known as the Plan

---

7 Ibid, 270.
8 Stoler, 36.
10 Ibid, 36-37.
Dog Memorandum which he refined over the next ten days through discussions with his staff. This remarkable document became the basis for US strategy in the Second World War.

In its finished form, Plan Dog was directed at civilian leaders as well as the military. It based its argument on the fact that US security was dependent upon a strong Great Britain. The Royal Navy was needed to serve as a bulwark against Continental threats and American economic interests needed the British Empire for trade. Without that trade, American industry could not produce the armaments needed to fight the Germans, which Stark believed would eventually happen. Therefore, American interests would be damaged, perhaps fatally, were Britain to fall. Forestalling a British defeat was rated second in importance only to hemispheric defense and was stated as a corollary to that top priority.

Stark did qualify these statements by saying that any aid to Britain would be guided solely by American interests and not by any motivation to preserve the British Empire for its own sake. This stipulation was a manifestation of the American fear of manipulation by the British which persisted throughout the war, particularly in the disagreements over operations in the Mediterranean.

Plan Dog was accepted by the Department of the Navy, though the Army was still a bit suspicious, due to Stark’s inclusion as a major national objective the “diminution of the offensive military power of Japan, with a view to the retention of our economic and political interests in the Far East.” Still, it eventually went to the president, who approved it in principle, if not wholeheartedly, preferring, as always, to keep his options open.\footnote{Ibid, 29-37.}

\footnote{\text{Ibid, 29-37.}}
Even without a full-fledged presidential endorsement, Plan Dog set US planners on a Germany-first course and led to the first official staff conference between US and British officers early in 1941. These talks led to the ABC-1 Plan, which was the first to lay out priorities as to how the war would be fought, if and when the US became an active belligerent. Perhaps even more importantly, Stark’s memorandum represented Roosevelt’s success in imposing a global vision on his planners with himself being forced to provide policy guidance along strategic lines. Plan Dog was not only an important step in military planning, it also brought about a major step in civil-military cooperation in the United States.

It is worth noting, however, that the Department of State was not especially complicit in this new cooperation. Secretary of State Cordell Hull had been approached for his approval of Plan Dog before it was forwarded to President Roosevelt. Hull, while approving of the tenets of the memorandum, refused to give his official sanction on the grounds of separation of political and military spheres of influence. In this he echoed previous Secretaries of State, notably Charles Evans Hughes in the early 1920s. Ironically, Hull’s reserve resulted in greater access for the military as the Chiefs of Staff were granted direct access to the president in the wake of the memorandum’s acceptance.

Former US Army Chief Historian Maurice Matloff characterizes the decision to defeat Germany first as “the most significant and controlling decision in Anglo-American policies of

---

13 Ibid, 36-37.
14 Ibid, 35.
16 Ibid, 79.
the Second World War.” The question, in 1940-41, was how to go about making that decision a reality. The answer to that question is multi-layered and complex. It would be folly to suggest that any single operational doctrine held the key to ultimate victory. It can, however, be asserted that part of the answer lay with the capability to land significant ground forces on the Continent, at a time and place of the Allies’ choosing, with a reasonable chance of success. The doctrine developed by the US Marine Corps to assault defended coastlines filled that requirement.

**Global Strategy and Amphibious Warfare**

Even before Pete Ellis, planners had thought about the place of amphibious operations in the strategic realm. Amphibious capability was a linchpin of the old ORANGE plan, which had been the catalyst for its development. The awareness of operational commanders as to the strategic importance of amphibious operations had not faded.

In his remarks at the critique of Fleet Landing Exercise 3 in March, 1937, Marine Brigadier General James J. Meade stated that

> The geographical location of the United States is such that, unless we adopt a purely defensive attitude, our fleet will have to cross a wide expanse of seas before it can force a decisive action on the naval forces of any foreign nation. To cross such seas and protect our lines of communication will require bases in the theatre of operations and additional bases along the lines of communication. It will be necessary to have and occupy certain locations in other areas in order to deny them to the enemy. For example, our commercial lanes will have to be protected, and bases will have to be located along these lanes.\(^{18}\)

---


Meade’s statement demonstrates the strategic necessity for amphibious capability by a maritime nation, particularly a nation so uniquely located as the United States. Three years later, however, the strategic implications of a workable amphibious doctrine, and the ability to execute it, had become much larger. The doctrine which had been developed to facilitate a naval campaign across the Central Pacific had become the key to reentering the European Continent, with all the implications of scale and scope which that new mission implied.

In the wake of Pearl Harbor and the adoption of the “Germany first” strategy, the possession of a workable doctrine geared to executing opposed landings was a vital part of the initial American strategy of an early attack across the English Channel. US planners were faced with the strategic reality of a two-front war, as well as the political pressure created by a populace inflamed by a population eager for revenge against Japan. Naturally, and in keeping with Stark’s admonition to put American interests first, an effort was made to find a way to come to grips with the Germans in such a way as to end the war as soon as possible. That meant large-scale ground operations in Northwestern Europe.\(^\text{19}\)

Accordingly, US planners pushed for a cross-Channel operation as early as the spring of 1942, using the British plan for a contingency operation known as SLEDGEHAMMER as its basis. The disputes over the timing and scope of the invasion of France are well-known and beyond the scope of this work. It will suffice to say that British notions of such operation, even into 1944, were limited to two basic scenarios: an

\(^{19}\) Matloff, 684-685.
effort to relieve pressure on the Soviet Union in the face of an imminent defeat on the Eastern Front; or an opportunistic mopping-up operation in the event of a German collapse in the West.20

The view on the western side of the Atlantic was very different. From the beginning, the Americans wanted a major operation to force a decisive campaign against the Germans in Western Europe. Such an approach was fully in line with American concepts of concentration and decisive action. Both the British and Americans recognized the necessity of relieving the pressure on the Soviets. To the Americans’ way of thinking, direct action seemed the simplest way to accomplish that goal while also moving to end the war as quickly and cheaply as possible.21

Without the capability to execute such an operation, such talk would have been speculative at best. As it turned out, logistical realities, the problems associated with rapid mobilization, and a dispute over whether SLEDGEHAMMER should be in response to German success against the Soviets, or vice-versa, caused the plan to be set aside.22 Whether the operation could have been mounted so early is still open to debate, but the basic doctrine with which it would have been executed did indeed exist, providing some legitimacy for its being considered at all.

It has been noted that both the British and Americans had worked out principles for amphibious operations in response to the perceived need for such capability. As such, Allied operations in the European Theater of War featured elements of both, as was to be

20 Gordon Harrison, United States Army in World War II, the European Theater of Operations, Cross-Channel Attack (Washington: Center of Military History, United States Army, 1951), 11-13; Matloff, 685.
21 Harrison, 11-12; Matloff, 685-686.
22 Harrison, 17-18.
expected in coalition warfare. It bears repeating, however, that only the Americans had emphasized the need to land against determined opposition and worked diligently to develop that capability.23 Whether employed in the eventual invasion of France, or in the peripheral operation in the Mediterranean, that capability was paramount to the ability to mount those operations.

The potential of the Western Allies to land anywhere from Norway to the Balkans forced the Germans to defend the entire coastline and provide reserves to respond against any landing. Obviously, some areas were strategically and tactically more advantageous than others, and the German deployments reflected that, especially in 1944, but forces sorely needed elsewhere were tied down by the threat of an Allied landing. The tactical doctrine developed in the 1930s as part of the strategic vision for the Pacific had taken on strategic characteristics in Europe as well.24

24 Ibid, 92-93.
Chapter 4
Landing Craft – Essential Tools of the Trade

Momentum across the beach toward inland objectives is the basic function of a successful amphibious operation. Momentum is difficult to establish and maintain, and often moves in fits and starts as this most complex of military endeavors progresses. Opposed landing operations are so intricate that every opportunity to facilitate and build momentum must be seized and exploited, lest the enemy be afforded his own opportunity to push the landing back into the sea.

The ship-to-shore movement is one of the primary building blocks of momentum. Troops and equipment must be embarked and landed in an orderly and timely manner while also maintaining their ability to carry the fight to the defenders from the moment they step onto the beach. The extensive nature with which this process is dealt in FTP-167 makes its importance apparent, but such had been evident from the first experiments conducted in the 1920s.

As noted in a previous chapter, an early lesson from Fleet Problem Number 4 at Culebra in 1924 was that transports had to be “combat” or “tactically” loaded to ensure the landing force had needed supplies and equipment in the likely order in which they would be required. Ships’ holds could not be stuffed to full capacity in the name of saving space, but rather loaded in such a way as to provide such essentials as ammunition and medical supplies early in the operations. Some space was obviously wasted, but the necessity for this compromise was clear. By mid-

---


1944, logisticians had become experts at combat loading, to the point that supplies were often preloaded onto the trucks that would carry them to the beach.

Another crucial element in the ship-to-shore movement is the landing craft.³ It is difficult to overstate the critical nature of appropriate landing craft to the maintenance of momentum, which had been recognized early on. Pete Ellis suggested in 1921 that assault troops be towed to the beach on barges by armed powered craft.⁴ Fleet Problem Number 4 in 1924 demonstrated how ill-suited standard Navy boats were for the job; a recurring theme throughout the FLEX operations of the 1930s.⁵

The performance criteria for such craft were specific and demanding. First, they had to be seaworthy. Operating against hostile beaches, the craft were not guaranteed the protection of a breakwater during their approach and must therefore be capable of reliable handling in rough seas. Second, they had to combine shallow draft with heavy lift capacity. Third, they had to be able to efficiently disembark troops, equipment, or cargo directly onto the beach. This last meant that the craft had to be able drive themselves onto the beach while still maintaining the capability to retract themselves effectively once they were unloaded. Finally, the craft had to be rugged enough to handle heavy surf, debris-strewn water, and possible enemy fire while remaining operational.⁶

³ This chapter does not attempt to detail every type of landing craft employed by the Allies during the course of World War II. For reasons of space and brevity, the discussion is limited to the most prominent models. Diagrams, photographs, and specifications may be found in the Appendix.
⁴ Major Earl H. Ellis, USMC, Operation Plan 712 J, Advance Base Operations in Micronesia, (Box 7, File 165 A, Historical Amphibious Files, United States Marine Corps Archives, Quantico, VA), 21-22.
⁵ Isely and Crowl, 31.
Size and speed were also important. Craft had to be able to fit on the davits of cargo ships or be nested on deck, while being large enough to carry the required loads. Speed was essential to minimize the opportunity of the defender to recover from the preparatory bombardment and fire on the approaching assault wave. Standard ships’ boats were capable of seven to eight knots in calm seas. That rate of speed could not be maintained in heavy swell or surf.\(^7\)

1938 saw three experimental boats take part in FLEX 4\(^8\) and eleven were evaluated the next year as part of FLEX 5. Of these, two designs were deemed acceptable in terms of weight, capacity, and performance. The first was a design submitted by the Navy’s Bureau of Construction and Repair (later the Bureau of Ships) and built at the Luders Marine Construction Company in Stamford, Connecticut. The second was the product of Higgins Industries in New Orleans, Louisiana.\(^9\)

Higgins Industries was the company of longtime boat-builder Andrew Jackson Higgins. Higgins had entered his Eureka shallow draft work boat in a contest sponsored by the Navy in 1936. The Eureka was designed for use in the swamps and bayous of Louisiana and already featured many of the requirements for an amphibious landing craft. It was stable, powerful, operated well in shallow water, and could even traverse sand bars and small spits of land when


\(^8\) Report of Senior Umpire (White) to Commanding General, First Marine Brigade, Fleet Marine Force, 21 February, 1938, United States Navy Fleet Landing Exercise 4, 1938, (Box 13, Exercises Collection, United States Marine Corps Archive, Quantico, VA).

\(^9\) Reports on FLEX 5, undated, United States Navy Fleet Landing Exercise 5, 1939, (Box 16, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
underway. In addition, it could retract itself efficiently from being grounded and was of extraordinarily robust construction.10

FLEX 5 witnessed the first operational tests by the Marines and the Navy. In 1941 Higgins adapted his design, now known as the Landing Craft Personnel (LCP), to include a bow ramp to allow for easier discharge onto a beach, which design became that backbone of the Allied amphibious forces, the Landing Craft, Vehicle, Personnel (LCVP). At the same time, Higgins won a contest between his design for a tank lighter and one offered by the Bureau of Ships. This craft became known as the Landing Craft Mechanized, of which five versions were eventually produced. (LCM 2-6).11 As a testament to the efficiency of Higgins and his staff, the LCM prototype was designed and ready to be tested in a mere sixty-one hours.12 This craft should not be confused with the British boat of the same designation which it eventually superseded.13

Higgins endured long battles with the Navy bureaucracy, particularly the Bureau of Ships, which was determined to see its own boats adopted over the clearly superior Higgins designs.14 The LCVP had, in fact, come about thanks to Bureau of Ships intransigence. Marine Captain Victor H. Krulak, while observing Japanese amphibious operations at the mouth of the Yangtze River in 1937, had taken a photograph of a landing craft which used a bow ramp to discharge men and vehicles onto the beach. He had dutifully dispatched the photograph, along

12 Strahan, 64.
13 United States Division of Naval Intelligence, Allied Landing Craft of World War II (Annapolis: Naval Institute Press, 1985). This publication was originally produced as a classified document by the US Division of Naval Intelligence in 1944. It does not contain page numbers.
14 Senior Umpire’s Report, February, 1940, United States Navy Fleet Landing Exercise 6, 1940, (Box 18, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
with a report, to the Bureau. Upon his return from China in 1939, Krulak found his report in a Bureau file with the notation that it had originated with “some nut out in China.”

Following the landing exercises of 1941, Marine General Holland M. Smith, in the hope that just such a modification to the Higgins LCP could be “an answer to the Marine prayer,” sent Krulak to New Orleans with the photograph. Higgins undertook the challenge, at his own expense, and on 26 May, 1941, the prototype LCVP was successfully tested.

Higgins’ struggles with the Bureau of Ships would continue until March, 1943 when a Bureau-designed landing craft failed in an exercise, costing the lives of nineteen men. Higgins had criticized the design as unsound and his LCVP had beaten it soundly in a head-to-head competition. Under pressure from the Navy and Marine Corps, the Bureau of Ships finally relinquished its less-than-effective hold on the design of small boats.

Two longtime goals of the Marine Corps were the development of a craft capable of crossing coral and an amphibious tank. FLEX 2 had demonstrated the difficulties of crossing coral and it became clear that boats would not be able to do so without causing unacceptable damage to themselves. The answer to the problem lay with inventor Donald Roebling, whose father John, a wealthy financier, offered funding for the design and development of a tracked swamp vehicle for use in the rescue of hurricane victims in 1932. Known as the Roebling “Alligator,” the vehicle went through several evolutions before coming to the notice of the Navy and Marine Corps in late 1937.

---

16 Strahan, 57-58.
17 Strahan, 162-163.
18 Excerpts from Report on U.S. Fleet Landing Exercise Number Two, undated. United States Navy Fleet Landing Exercise 2, 1936, (Box 6, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
By this time, the Alligator could make just over eight miles per hour in the water and eighteen to twenty on land. This prototype was scheduled to be tested at FLEX 5, but lack of funding required the prioritization of landing craft, cancelling the planned test. Undaunted, Roebling built a new, lighter model with better speed and handling characteristics, as well as better ground clearance. This new model served as the basis for the prototype tested by the Navy Bureau of Ships and the Marines in late 1940.

Further tests in early 1941 resulted in the acceptance of the model, to be built of steel rather than aluminum at the request of the Marines. The result was the Landing Vehicle, Tracked Model 1 (LVT-1). The LVT-1 and its successor model, the LVT-2, were initially employed at Guadalcanal as cargo carriers.\(^\text{19}\) The first tactical use was at Tarawa, where 125 LVT-2 carried assault troops across the infamous reef to the island of Betio. The vehicles performed admirably, the only problem being that there were not enough of them, resulting in heavy casualties as Marines had to wade hundreds of yards to the beach under heavy fire.\(^\text{20}\) By war’s end, over eighteen thousand amphibian tractors, “amtracs,” were built in the United States.\(^\text{21}\)

The first attempt at an amphibious tank was made in 1923, with the Marines taking a look at a design by armored vehicle designer J. Walter Christie. The Christie Amphibious Tank was tested at Culebra in 1924, but found to be unsuitable.\(^\text{22}\) Calls for such a vehicle renewed in the aftermath of FLEX 3 in 1937, as it became apparent that the landing force would need extra fire


\(^{21}\) Millett, 84-85.

\(^{22}\) Ibid, 84.
support during the final run to the beach after the lifting of the naval bombardment. Despite the pleas of several senior officers, no real effort was made due to lack of funding.\textsuperscript{23}

The first work on an armed amphibian was begun in 1940, with the addition of light armor and guns to the LVT. Accepted in November, this was the beginning of the Landing Vehicle, Tracked, Armored (LVT (A)), of which there were three models: The turreted LVT (A) (1) was equipped with a 37mm main gun and three .30 caliber machine guns; the LVT (A) (2) was a cargo carrier without the turret but retaining the machine guns; and the LVT (A) (4) was a turreted model featuring a 75mm howitzer and a .50 caliber machine gun.\textsuperscript{24} The LVT (A) (1) made its combat debut in the Marshalls Campaign of 1944\textsuperscript{25} and the LVT (A) (4) later in the year in the Marianas.\textsuperscript{26} The LVT was not deployed extensively to Europe, though it was used by the British in the landings in the Scheldt Estuary around Walcherin, Belgium in November, 1944\textsuperscript{27} and the crossing of Italy’s Lake Commacchio in early 1945.\textsuperscript{28}

The other application of an amphibious tanks, with a more dubious result, was the “Dual Drive” (DD) tank used at Normandy. The DD Tanks were ordinary M-4 Shermans adapted with


\textsuperscript{24} United States Division of Naval Intelligence, \textit{Allied Landing Craft of World War II}.


\textsuperscript{27} Bernard Ireland, \textit{An Illustrated History of Amphibious Warfare Vessels} (London: Southwater, 2014), 64-65.

\textsuperscript{28} Clifford, 123.
twin propellers and fitted with detachable canvas skirts which allowed them to float. The idea was that they would swim ashore with the assault waves. Unfortunately, the DDs could not handle heavy seas and many sank on their way to the beach, especially off Omaha, where the currents were strongest.

The final American landing craft requiring attention is the DUKW. Known as the “Duck” by US troops, this two and a half-ton amphibious truck was developed by the US Army. It was capable of crossing reefs and could handle loads up to five thousand pounds. It first saw service in the Sicily landings, where it also demonstrated its usefulness as an artillery carrier. From Sicily in Europe, and the Marshalls Campaign in the Pacific, fleets of DUKWs served as the primary logistical carrier for amphibious operations.

On the far side of the Atlantic, the fall of France had thrust the importance of combined operations to the forefront. If the British had any hope of returning to the Continent, a workable capability would have to be developed sooner rather than later. Some practical work had begun in July, 1938 with the establishment of the Inter-Service Training and Development Centre (ISTDC) under the command of Captain L.E.H. Maund, RN. Maund had experience in combined operations and had observed Japanese landing operations the previous year at Shanghai first-hand. The ISTDC was a true combined command, with representatives from the Army, the Royal Navy, the Royal Air Force, and the Royal Marines.

---

31 The precise origin of the designation “DUKW” is unknown, though the best evidence shows it to be a combination of manufacturing codes based on its characteristics. Isely and Crowl, 16n.
32 United States Division of Naval Intelligence, *Allied Landing Craft of World War II*.
34 Isely and Crowl, 16-17.
36 Clifford, 71-72.
Apart from very profitable experimentation with landing operations, a primary function of the ISTDC was the development of landing craft. After the ignominious evacuation from Dunkirk in 1940, Maund’s program to develop specialized craft such as the Landing Craft Assault (LCA) and the Landing Craft Mechanized (LCM) were provided with more funding and resources. The LCA and LCM were small craft designed respectively to carry infantry and vehicles onto a hostile beach. Though serviceable, both models were superseded by the Higgins LCP, LCVP, and LCM, but not before their employment in the Norwegian Campaign and assorted small raids along the Channel Coast.\(^{37}\)

Upon becoming Prime Minister in May, 1940, Churchill, long an advocate of amphibious capability, ordered the development of larger craft capable of landing troops and equipment directly onto a beachhead without the need to capture a port. The result was the Landing Craft Tank (LCT) and the ocean-going Landing Ship Tank (LST).\(^{38}\) The LCT saw multiple generations and proved a capable support ship when armed with guns and rockets in addition to it landing duties. The rocket-equipped LCT (R) was perhaps the most effective counter to mined beaches later in the war.

The entire production run of LST was undertaken in American shipyards and the second generation LST (2) became a workhorse for amphibious operations throughout the war, capable of carrying tanks, vehicles, and supplies right to the beach.\(^{39}\) The centrality of the LST to the success of landing operations cannot be overstated. Beach and hydrography characteristics at Sicily were such that special pontoon bridges were developed to unload the ships if they could not approach the beach.

---

37 Maund, 49-50, 62-63; United States Division of Naval Intelligence, *Allied Landing Craft of World War II*.  
38 Millett, 80-81.  
39 United States Division of Naval Intelligence, *Allied Landing Craft of World War II*.  

72
The plan for Operation NEPTUNE, the amphibious portion of Operation OVERLORD, declared that “the LSTs are the most valuable ships employed in the subsequent phases of the operation,” meaning after the beach had been secured by the assault waves.\(^{40}\) The versatile LST could be unloaded in a variety of ways: by beaching; over a pier; by the aforementioned pontoon bridges or ferries of various types; or by what was known as “drying out.” Drying out consisted of beaching the ship for the period required to unload it completely, which could take up to fourteen hours and involved leaving it “high and dry” during the process, hence the term.\(^ {41}\) The NEPTUNE plan warned that drying out should not be done except in case of emergency, and then only on the three central beaches of the five-division front, due to prolonged exposure to enemy attack and the necessary removal of the ship in question from the logistical chain for such a long period of time.\(^ {42}\) Such an emergency did arise and the LST came through.\(^ {43}\)

Another British-inspired design was the Landing Ship, Dock (LSD). Author Bernard Fergusson attributes it to Captain Tom Hussey, RN, who had succeeded Maund at the ISTDC in 1940. Fergusson claims Hussey based the idea on a type of barge transporter used on the Danube.\(^ {44}\) Military historian Allan R. Millett, on the other hand, claims the design was inspired by a Japanese landing ship known as the *Shinsu-maru*, whose operations in Shanghai had been witnessed by American and British observers, including Maund. Millett employs Fergusson as a source, so the issue is murky, but the similarities between the *Shinsu-maru* and the LSD cannot be denied. The *Shinsu-maru* was equipped with a well deck from which landing boats could

\(^{40}\) Christopher D. Yung, *Gators of Neptune, Naval Amphibious Planning for the Normandy Invasion* (Annapolis: Naval Institute Press, 2006), 137.


\(^{42}\) Yung, 137.

\(^{43}\) Ibid, 200.

depart directly. It could also unload vehicles and cargo directly onto a pier. The LSD was essentially an updated *Shinsu-maru*, of which the United States eventually built twenty-six, with one being transferred to the Royal Navy, who had also adapted two Channel ferries to a well deck configuration.45

One further British craft requires mention. The Landing Craft, Infantry, Large (LCI) (L) was initially envisioned as a large raiding craft. Capable of traversing the ocean under its own power, the LCI (L) could carry up to two hundred embarked troops for up to forty-eight hours, landing them directly on the beach via ramps on either side of the bow. In the spring of 1942, Admiral Lord Louis Mountbatten, commander of Combined Operations Headquarters (COHQ), discussed the idea with US Army Chief of Staff George C. Marshall. Marshall accepted the design and the LCI (L) proved to be a vital contributor to amphibious operations from mid-1943 through the end of the war.46

By the outbreak of war, the doctrine to execute an opposed amphibious landing existed, as did the recognition of the necessity of specialized landing craft. The problem was that the development of such craft was in its infancy. The late start toward the design and development of suitable landing craft meant that there would be chronic shortages throughout the war. The Allies struggled to establish production priorities and the needs of amphibious forces in the Pacific and Mediterranean competed directly with the buildup and deployment of craft for the invasion of France.

The first Higgins-built LCPs were not ordered until September, 1940 and the first major contracts were not let until spring of 1942. The first British LCT was delivered in November, 1940 and though development was rapid, the workhorse fourth generation LCT (4) was not

45 Millett, 81-83. United States Division of Naval Intelligence, *Allied Landing Craft of World War II.*
46 Fergusson, 118, 149-150.
ordered in large numbers until December, 1941. The spring of 1942 saw the beginning of mass production of landing craft in the United States, including the entire production run of the LST (2), the model which had been accepted by the British Admiralty and the US Navy.47

Though production began in earnest, it was not without its problems. As noted, the US Navy Bureau of Ships would continue its obfuscation for another year while small boat manufacturers and major shipyards tooled up to produce the new designs. There was fierce competition for resources, especially steel, wood, and marine engines. With the Battle of the Atlantic still raging and the Navy trying to expand its fleet of escorts as well as carriers and capital ships for the Pacific, landing craft were left off the President’s list of “must have” programs for 1943.48

There was also a severe shortage of trained operators for the new craft. The Navy and Coast Guard established special training programs but there was a lack of experience even among the cadre. Andrew Higgins stepped in again. At the request of the Navy and Marine Corps, he had established the Higgins Boat Operators and Marine Engine Maintenance School in New Orleans in July, 1941. The school was fully funded by Higgins Enterprises.49

By mid-1942, Higgins had trained over two thousand Navy, Marine, and Coast Guard personnel, but the demand was insatiable. In June, the school was transferred to the Amphibian Command of the United States Engineers in order to accommodate Army students as well. Even this was not enough, so Higgins helped the Navy establish its own schools throughout the country which were more accessible to the naval bases themselves. Most of the instructors were graduates of the original Higgins school in New Orleans.50

47 Harrison, 60-61.
48 Ibid, 62.
49 Strahan, 90-91.
50 Ibid, 128-129.
By mid-1944, the Marine and Army units in the Pacific had become an amphibious warfare machine. This was due in large part to the honing of the original doctrine through hard lessons, but it was no coincidence that the availability of landing craft after Normandy eased the process and gave those commanders more options. 4,126 landing craft of all types were employed at Normandy. After the invasion of Southern France, two months later, the vast majority of landing craft production could be diverted to the Pacific, where their impact was felt in the massive operations in the Philippines, at Iwo Jima, and at Okinawa.

The success of the landing craft of World War II is a testament not only to the crews who piloted them and the troops who “hit the beach” from their ramps. Without the designers, engineers, and craftsmen who created them as well as the visionaries who determined the need for them in the first place, the landings which allowed the Allies to strike back at the Axis would have been significantly delayed at the very least. Though they never fired a shot during the war, the people responsible for the existence and eventual deployment of the landing craft were in their own way just as vital to eventual victory as those who did.

In a postwar interview, historian Stephen Ambrose was asked by Dwight D. Eisenhower whether he had ever met Andrew Higgins. When Ambrose said that he had not, Eisenhower replied, “That’s too bad. He is the man who won the war for us. If Higgins had not designed and built those LCVPs, we never could have landed over an open beach. The whole strategy of the war would have been different.” Perhaps Eisenhower exaggerated but, if so, it may have been only slightly.

---


Chapter 5
HUSKY and AVALANCHE

Operation HUSKY – July, 1943

Operation HUSKY was the Allied invasion of Sicily in July, 1943.¹ HUSKY marked the first Allied amphibious landings on the European Continent with the intent of launching major offensive operations inland. This distinction is important in terms of the nature of earlier landings, as well as the concurrent operations in the Pacific. 1940-42 had seen the employment of the British raiding concept along the coast of France, most notably at Dieppe. The landings in the Pacific were essentially the realization of the Marines’ assault doctrine aimed at the seizure of advanced bases to further the naval campaign.

The ultimate operational aims of Sicily were similar to the November, 1942 landings in North Africa: to establish significant ground forces ashore to trap elements of the German and Italian armies and defeat them. The execution, however, was different thanks to dissimilar operational conditions. Despite lessons learned at Dieppe², the North African landings (Operation TORCH) had assaulted port cities, with mixed success.


² The Dieppe Raid, though repulsed with heavy casualties, had produced several important lessons, including the hazardous nature of assaulting defended ports; the need for air superiority and support; the crucial nature of fire support from offshore, including heavy naval guns; the difficulty and essential nature of landing tanks for direct fire support; the importance of landing force and beach organization; and the effectiveness of beach obstacles. These lessons would particularly impact the invasion of Normandy but were still being digested by the time of TORCH. Taken from Bernard Fergusson, The Watery Maze, The Story of Combined Operations (New York: Holt, Rinehart, and Winston, 1961), 182-185.
Ill-advised _coup de main_ were attempted at the ports of Oran and Algiers against superior enemy firepower, with the force at Oran having the extra disadvantage of an alert enemy, resulting in disaster for the American landing party aboard British destroyers.\(^3\) Similar efforts against the smaller ports of Arzeu, east of Oran\(^4\), and Safi, in Morocco\(^5\), succeeded, though their success against any kind of determined opposition is at least questionable.

The ports in North Africa were important targets due to the lack of nearby Allied bases from which to support the landings. Thanks to the ultimate success of TORCH and the successive ground operations in Libya and Tunisia, the need for such port facilities was not as acute. The fact that Allied operations never again directly targeted a port can be attributed primarily to the relatively close proximity to supporting bases and improved logistical capabilities, but the experiences of Dieppe, Algiers, and Oran were not forgotten.\(^6\)

The TORCH landings had also been carried out against uncertain French opposition with little means for moving reserves for an effective counterattack. As a result, they could be spread out in order to make the most of the opportunity to gain possession of multiple ports at the outset. Sicily offered no such opportunities. The relatively small area of the island was defended by German and Italian troops arrayed in depth. Though a plan for concentric landings was formulated, for logistical reasons, as well as the objections of General Bernard Montgomery, it

---


\(^5\) Tomblin, 40-46.

was eventually scrapped for a concentrated effort on the southeastern coast in which the landings were mutually supporting.\textsuperscript{7}

Shifting logistical priorities directed the initial efforts of the operation toward the capture of airfields from which to advance land-based air assets. The need for air superiority was recognized as paramount to the operation’s success and, coupled with the lack of naval air support, local air bases held the key to its establishment.\textsuperscript{8} Air superiority and support had been a constant theme throughout the FLEX operations, though the differences in its achievement between the naval services and the Army would become apparent in the skies over Sicily.

This theme first manifested itself during the initial planning sessions. Air Chief Marshal Sir Arthur Tedder, commander-in-chief of Allied air operations in the Mediterranean, insisted that his air forces would be used in the strategic role against enemy air concentrations and airfields.\textsuperscript{9} Tedder was echoed by his American deputy, Lt. General Carl A. Spaatz.\textsuperscript{10}

Vice Admiral H. Kent Hewitt, commander of the Western Naval Task Force, the American wing of the operation, dispatched an aide to ask Spaatz for control over a dedicated air support group or the assignment of an Army Air Force officer to his flagship who had the power to call for close air support. Hewitt’s request was refused by Spaatz, who said that shore targets were the responsibility of the Navy and that there would be no need for local air superiority since all the Axis planes would be destroyed or driven away by the time of the landings.\textsuperscript{11}

\textsuperscript{7} Ibid, 18-19.
\textsuperscript{8} Ibid, 18.
\textsuperscript{9} Tomblin, 138-139.
\textsuperscript{10} Ibid, 16-17.
\textsuperscript{11} Ibid, 16.
US Navy escort carriers were in the Atlantic and Mediterranean during the planning for HUSKY and the operation itself, but they were slated for anti-submarine duties. Hewitt felt that he could not remove them from that vital task with the availability of land-based air, even unwilling land-based air. Lt. General George S. Patton, recalling the superior performance of the Navy support craft in Morocco, pleaded with Hewitt to change his mind, saying “You can get your Navy planes to do anything you want, but we can’t get the Air Force to do a goddam thing!”

There was a division of air assets into “strategic” and “tactical” elements. These were the Northwest African Strategic Air Force and the Northwest Tactical Air Force. The latter contained the XII Air Support Command, which, theoretically, was to provide close air support to the Army and Navy. The uneasiness of Hewitt and Patton stemmed from the unwillingness of the top air commanders to provide a firm commitment of the tactical element to support the landing force. Hewitt and Patton were told that flexibility needed to be maintained in case tactical assets were needed to reinforce strategic assets. There was no mention of the latter reinforcing the former.

The attitude taken by Tedder and Spaatz demonstrates the lack of work done during the interwar period by both the British and American air arms in regard to close air support in general and amphibious operations in particular. While the US Navy and Marine Corps aviators spent much of their energy in learning to support ground troops, especially in the amphibious

---

12 Ibid, 22.
13 Ibid, 22.
role\textsuperscript{14}, their counterparts in the Army focused on strategic bombing.\textsuperscript{15} They simply lacked a fundamental understanding of the tactical requirements of an opposed landing, nor were they trained for such a mission. It is not the intention of this project to disparage that mission, but to demonstrate probably the most difficult aspect of the transition of the naval services’ amphibious doctrine to the European Theater, where the Army controlled the air arm. The detrimental effect of this state of affairs would become evident during the HUSKY landings.

Another shortcoming of the Air Force regarding amphibious operations was in the area of reconnaissance. Marine and Navy pilots had been trained in aerial photography and the estimation of beach gradients and other characteristics.\textsuperscript{16} The US Army and British pilots had not. Again, it was not the fault of the pilots, nor of the US Army or Royal Air Force.\textsuperscript{17} The need for such skills had not been foreseen and, if they had, would have carried a very low priority. No one had expected an amphibious war in Europe, and many of the capabilities to execute such a war had to be learned as the campaign progressed. This was one such capability.

Fortunately, the British Admiralty possessed much of the needed information and the lack of aerial estimation was not heavily felt, if at all. The Air Force took positive steps to correct this situation as the Mediterranean Campaign moved forward. Improvements were seen by the


\textsuperscript{16} Report of Brigadier General R.P. Williams, USMC to the Commanding General, Fleet Marine Force, undated. United States Navy Fleet Landing Exercise 5, 1939, (Box 16, Exercises Collection, United States Marine Corps Archive, Quantico, VA).

\textsuperscript{17} Morison, \textit{Sicily-Salerno-Anzio}, 23.
time of the landing at Salerno later in the year and the problem was eliminated by the time of the operation in Southern France in August, 1944.\textsuperscript{18}

A major difference between the approaches of the Marines and the Army was the latter’s preference for night landings. Landing under the cover of darkness had been examined and exercised by the Navy and Marines every year since 1935 and there was much to commend it. Night landings offered the possibility of tactical surprise, potentially allowing the landing force to establish a beachhead before the enemy could react effectively. Landing at night limited enemy intelligence and communications as to the size, scope, and location of the operations, thus hindering his response. Darkness also offered at least partial concealment from artillery and air attacks.\textsuperscript{19}

On the negative side of the ledger, landing at night with the aim of achieving tactical surprise took away the benefits of a naval preparatory bombardment and minimized any support from that quarter should it become necessary before daylight. The potency of air support was likewise affected. Night landings had been shown to create more confusion among boat crews trying to find the proper beaches, thus negatively affecting the momentum of the landing. Finally, it had been determined that the naval support force was particularly vulnerable to enemy air attack at night.\textsuperscript{20}

That the Army preferred a night landing is hardly surprising, especially considering the somewhat subtle changes to FM 31-5 in 1941.\textsuperscript{21} The difference in mission objectives played a

\textsuperscript{18} Ibid, 23.
\textsuperscript{20} Ibid, 26-27.
role as well. As noted, the Army had to establish a permanent position ashore in the face of substantial enemy strength echeloned in depth. The ability of the Germans and Italians to move up strong reserves from beyond the range of naval gunfire was significant.

In many cases, soldiers and Marines in the Pacific never extended their mission past the reach of those reassuring muzzles. The Army in Europe had to establish their beachhead quickly and move on to their inland objectives. Only then would it be possible to execute the massive buildup that came in their wake. A night landing gave them a jump on that mission before enemy forces could react. Still, the relative unfamiliarity of Army officers with established tenets of amphibious doctrine was made apparent by their insistence to Hewitt that naval gunfire was not suitable for land bombardment. It is not particularly surprising that Army commanders felt this way, given the significant omissions in the 1941 version of FM 31-5\textsuperscript{22} and their own lack of training with naval gunfire.

HUSKY marked several “firsts” for amphibious operations in the European Theater. The operation saw the first widespread use of the new DUKW amphibious truck and the soon-to-be ubiquitous LCVP developed by Andrew Higgins.\textsuperscript{23} The presence of “false” beaches, essentially large sandbars, off the Sicilian coast necessitated the creation of pontoon bridges over which to land vehicles. These obstacles were nothing of the sort for the DUKWs and LCVPs, but the larger craft, especially the vital LSTs, could not negotiate them.


\textsuperscript{23} Morison, Sicily-Salerno-Anzio, 31-32.
LSTs were needed to land tanks in the needed quantity and the DUKWs would have been swamped had it attempted to ferry them. The solution was the creation of modular pontoon causeways which extended from the forward hold of each LST. They were extended to the beach or another craft, forming a bridge to the beach. Except where destroyed by enemy fire, the pontoon causeways performed well and were critical to the overall success of HUSKY.24

Finally, unlike the hastily-mounted efforts of TORCH, the landings on Sicily were carried out by the experienced and well-trained troops of the 1st and 3rd Infantry Divisions25 and the 45th infantry Division, which had received extensive amphibious training at Lake Bizerta on the Tunisian coast.26 The full-dress rehearsals were important to the success of the landings and were a prelude to similar exercises carried out before the landings in Normandy and Southern France the next year.

Before looking at the landings more closely, it should be noted that neither strategic nor operational surprise was achieved. In reality it was hardly possible that it could be, given the massing of Allied shipping and resources, as well the ability of German Field Marshal Albert Kesselring to read a map. Operation MINCEMEAT, the legendary attempt to misdirect the Germans as to the location of the landings, succeeded in confusing Adolf Hitler and his intelligence apparatus in Berlin, resulting in troop movements from France and Yugoslavia to Greece and Sardinia. Its lone, though welcome, effect on HUSKY was the interruption of German minelaying operations off the southern coast of Italy. There was no influence on troop dispositions on or in support of the island.27

24 Tomblin, 133.
25 Who had been inexperienced and poorly trained before TORCH.
26 Morison, Sicily-Salerno-Anzio, 32.
27 Tomblin, 140.
The American Western Naval Task Force executed a three-pronged landing in the Gulf of Gela just west of Sicily’s southern tip. Sandy beaches were available for the landings and the terrain behind the beaches was flat coastal plain dissected by three rivers which flowed into the gulf. Each landing area featured a main north-south road across the plain and through the mountains beyond, offering egress from the beachhead and access to the interior. Those same roads also offered opportunities for the Germans and Italians to move their reserves toward the beachhead efficiently.

The westernmost landing, near the town of Licata, was carried out by JOSS Force, commanded by Rear Admiral R.L. Connolly, whose landing element was the 3rd Infantry Division. Tactical surprise was achieved, not least because of the storm which had raged throughout the previous day and whose effects were still tapering off. The storm had provided good cover for the approach of the naval element, but the high winds and rough seas had an impact on the movement ashore.

The ship-to-shore movement at Licata was carried out efficiently, in spite of the weather. Several control craft, who were to mark the way to the beaches for the landing craft, were late getting to their stations, but the increased boat crew training at Bizerta paid off. The surf was too heavy for the LSTs to beach, but the smaller craft, including the LCVPs, LCIs, and LCTs, handled it as well as could be expected, though several broached as they landed. The first waves were lightly equipped and established good momentum across the beach from the start.

---

28 Tomblin, 167-168.  
29 Morison, Sicily-Salerno-Anzio, 71.  
30 Tomblin, 182-184.
The force came under intermittent fire during the approach, but the defenses of the beach were not strongly held. Many of the Italian soldiers surrendered as soon as they encountered the first wave. A force of Rangers landed all but unopposed at 0300 and moved to occupy Licata itself. Only with the dawn did resistance increase as enemy gunners began to find the range.31

As the sun rose, the years of work on naval gunfire support became evident, as did its absolutely vital role in an opposed landing. As day broke, twenty-one LCTs slated to land on Beach Red, near the Torre de Gaffi, a prominent rock formation with a stone tower, were late, having been held up by rough seas. Italian artillery was beginning to find the range and the troops ashore had little in the way of support since the tardy LCTs had most of their tanks and vehicles.

Momentum had slowed considerably thanks to the lack of direct supporting fire. The destroyer Buck and cruiser Brooklyn were called in and, by 0715, the enemy shelling had stopped. The LCTs landed unmolested by 0800. Another mishap occurred when a group of LCTs destined for Beach Yellow lost its way, ending up at Gela, though the situation was soon remedied.32

All resistance at Licata was overcome before 0930. The LSTs were unloaded by pontoons attached to waiting LCTs which took the vehicles ashore. The landing force easily pushed past its first day’s objectives. Cooperation between the Navy and Army was excellent thanks to the positive effects of the extensive rehearsals.33

31 Ibid, 184-190.
32 Morison, Sicily-Salerno-Anzio, 83-84.
33 Ibid, 89-91.
The landing of JOSS Force went about as well as could be expected, but it must be noted that resistance was light and disorganized. A few scattered air attacks came in but they were not concentrated and posed no threat to the success of the operation, which was fortunate as there had been no friendly air cover. Ship-to-shore movement was a vast improvement over what had passed for such in the TORCH landings, even with the bad weather. The light resistance helped here too, as the late LCTs on Beach Red could have been disastrous in the face of determined opposition.

The most positive element of the landing had been the performance of the gunfire support. While resistance was light, they were efficient and accurate when called for support. It was only the beginning of the validation of the interwar work put in by the Navy in this area.

To the east of JOSS Force was the operating area of DIME Force, centered on the town of Gela. DIME Force was commanded by Rear Admiral John L. Hall and the landing force consisted of elements of the 1st Infantry Division. DIME Force encountered the most determined defense of the three American landings. As might be expected, heavy resistance tended to expose doctrinal and execution flaws much more readily than had the light resistance encountered by JOSS Force.34

The operations at Gela marked the first large-scale deployment of Allied paratroops and the first operational night drop by either side. Elements of the 82nd Airborne Division parachuted in behind the Gela beaches as an interdiction force in light of the proximity of German armored

34 Ibid, 92-93.
units and their relative ease of access to the beachhead. The success of the airborne troops foreshadowed their much greater employment in the Normandy operation.

Despite heavy seas, the initial landings at Gela went smoothly, with no enemy fire until twenty minutes after the 0245 H-Hour. That the landing force proceeded seven miles from the unloading point to the beach with few mishaps is a testament to the improved training of the boat crews, as well as the increasing competence in the ship-to-shore movement phase. The FLEX exercises had regularly featured ship-to-shore distances of less than a mile, which had been one of the criticisms leveled against the way they had been conducted. For relatively inexperienced boat crews to navigate that distance in heavy seas speaks well of their training and of the navigational aids, in the form of beacon craft, employed by the Navy.

Two problems were encountered in the first wave, but they were significant. The first was the landing of the 4th Ranger Battalion, which had beached at the foot of the cliff upon which rested the town of Gela. The goal of this thrust was the capture and control of the long pier which jutted out into the gulf, as there was no harbor to service the town. Landing at 0315, the Rangers disembarked onto a mined beach which reconnaissance had failed to detect. The Rangers suffered significant casualties but managed to surprise the town and had it under control by 0800. Unfortunately, the Italians were able to blow up parts of the pier before the Rangers landed, rendering it unusable for several days.

The second instance involved the landing of a battalion DUKWs carrying supplies from LSTs. The beaches had been sown with anti-vehicle mines, causing heavy casualties among the

---

36 Tomblin, 175.
37 Ibid, 174; Morison, Sicily-Salerno-Anzio, 97.
DUKWs and the trucks and bulldozers they landed. \(^{38}\) Doctrine called for the suppression and attempted neutralization of land mines on the beach by means of the preparatory bombardment by gunfire support ships. \(^{39}\) Once the first wave was within one thousand yards of the beach, the gunfire should be lifted, upon which airstrikes were to be directed at the remaining beach defenses, including suspected mines. \(^{40}\)

The Army’s insistence on forgoing the preparatory bombardment, coupled with the almost complete lack of close air support, meant that the mines at Gela could not be neutralized until after the landing force had been forced to negotiate them. It is recognized that no amount of preparatory fire could completely neutralize an extensive minefield but, at Gela, there was no opportunity at all. Tactical surprise was achieved, but there was also a cost.

Naval gunfire once again proved effective in silencing shore defenses once the troops were ashore. Navy fire control parties as well as Army artillery spotters performed good service in directing the fire of the big guns afloat. Impressive foresight had been shown during the planning and training phases of the operation in that the Army spotters worked with the ships fire control officers, enabling them to call for fire independently of their naval counterparts. Likewise, Navy controllers were able to call for fire from Army artillery units. \(^{41}\)

While the Army’s decision to dispense with the preparatory bombardment in the name of surprise is defensible, the air plan is not. Paragraph 620 (General Support) of Section V (Aerial

---


\(^{40}\) Ibid, 156-157.

Operations During Approach to the Beach) of the chapter on air operation in FTP-167 is worth quoting in its entirety:

General support furnished by fighting squadrons during the period when the small boats are en route from transport to beach is of utmost importance. The vulnerability of troops and supplies makes it imperative that protection against aerial attack during this period be positive and continuous. Fighting planes should operate to destroy or neutralize all enemy aircraft encountered and to furnish protection to friendly aviation operating in the general area. Fighting units assigned this mission patrol the transport and beach areas to protect the boat groups and friendly air operations from air attacks.42

In addition, paragraph 188 (General Support) of Section IV (Air Operations During Approach to Beach) of the chapter on aviation in the Army’s FM 31-5 says on the same subject: “The vulnerability of troops and supplies during the period when small boats are en route to shore makes it imperative that protection against air attack be positive and continuous at this time. Pursuit airplanes should operate to destroy or neutralize enemy aircraft and to protect friendly aviation operating in the area.”43 The Army manual is, as always, less detailed than FTP-167, but the intent is clear. There was no excuse for leaving the landing area all but uncovered on 10 and 11 July, which is exactly what happened.

German air attacks on D-Day sank one destroyer, exploded an unloading LST, and shot down several Navy seaplanes acting as spotters for the naval guns. There were five documented air attacks on the Gela beachhead on 10 July. The attack that destroyed LST-313 was by a single

Messerschmitt fighter carrying bombs who got in and out unhampered by any air defense but what the ships themselves could provide.\textsuperscript{44}

Admiral Hewitt had been granted his request for Air Force controllers who could call for support. Unfortunately, they had no authority over the aircraft they called, and the system by which their calls were taken rendered them moot anyway. Any call from the controllers was routed through Northwest Tactical Air Force command in Tunisia, where it was decided whether or not planes could be spared. The decisions were based on estimates from Admiral Hewitt to his superior, Admiral Sir Andrew Cunningham, which were forwarded to Tedder. These estimates were usually hours old at best, meaning that any decisions based upon them were faulty. If planes were sent, they had to fly from Malta. There was little point in the whole exercise. There was an occasional combat air patrol (CAP) over the area, never more than a handful of planes, but the force was without protection most of the time.\textsuperscript{45}

Beach congestion reared its ugly head at Gela as well. The Army shore parties were poorly-trained and led. They failed to help unload the landing craft on the beach, leaving the Navy boat crews to unload themselves, delaying the landing of successive waves of troops and supplies. Navy beach parties were more efficient, but were often not allowed to do their jobs by Army officers who, lacking an understanding of beach operations, disrupted the activities of the junior naval officers who commanded the beach parties.

This state of affairs was worsened by the nature of the beaches themselves. The sand was too soft to bear vehicles, prompting the need for steel mats to be laid on the beach exits. This

\textsuperscript{44} Tomblin, 180-182.
created significant bottlenecks as needed supplies and vehicles could not get off the beach. Many landing craft simply returned to their ships still fully loaded.

So inefficient were the beach operations, that many officers began to wonder if the beachhead could be held once the enemy counterattacked. This was a legitimate concern as the force reserve was unable to be landed on D-Day, as General Patton wanted. Beach congestion was recognized as a dangerous obstacle to the concept of momentum. After the initial waves, momentum slowed to a near-standstill at Gela.\textsuperscript{46}

The expected counterattack had been ordered before daylight. The situation at the beachhead was perilous due to the inability to move significant numbers of tanks and support vehicles off the beach. Italian armor, joined by the German Hermann Goering Panzer Division, was ordered south. The paratroops of the 82\textsuperscript{nd} Airborne had been scattered over dozens of miles in their drop the previous night, but enough units had rallied to offer and effective defense against the enemy armor. They slowed the Goering Division down until it could be attacked by naval gunfire.

That left the Italians. Over thirty tanks moved toward the American at Gela on D-Day. There was little in the way of friendly armor to stop them. Naval gunfire had the answer. Though it is unlikely that the Italians would have inflicted major damage on the beachhead in this attack, they never got a chance, thanks to the accurate fire called in by Army and Navy spotters. The only tanks to reach their objective were driven out of the town of Gela by the Rangers.\textsuperscript{47}

\textsuperscript{46} Ibid, 107-109.
\textsuperscript{47} Tomblin, 177-178.
D plus one saw a resumption of air attacks, with no defense to be had from the air force, resulting in several hits on the ships and one sinking. The more pressing matter was the fact that the seaplanes, who had no fighter support, could not get aloft to spot for the big guns of their ships. As a result, the Hermann Goering Division was not detected until it made contact with US troops north of Gela. There were still precious few US tanks available and an entire regimental combat team’s complement of anti-tank guns had been lost with LST-313 the previous day.

The worth of naval gunfire was proved here, as the ground spotters called in fire on the enemy tanks. It was bad enough for a while that Patton ordered the Navy advanced base personnel up to the lines to fight. Despite being able to close with American troops on the beachhead’s perimeter, the panzers were stopped cold and forced to retreat. The guns searched them out as far along their line of retreat as they could reach. To be fair, the divisional artillery also played a significant role, but without the Navy’s guns, it is entirely possible that the panzers would have penetrated to the beaches. Almost incredibly, no American troops fell victim to “friendly fire.” The Navy and Marines’ reliance on the power and reach of naval gunfire was confirmed at Gela.

German sources revealed that the Hermann Goering Division lost over 600 men and between 40 and 50 tanks, around fifty percent of its armored strength. So effective was the fire, that General Dwight D. Eisenhower himself wrote that naval gunfire was

So devastating in its effectiveness as to dispose finally of any doubts that naval guns are suitable for shore bombardment. Modern guns in cruisers and destroyers are of high angle, capable of ranging on reverse slopes and on targets inland. The fire power of vessels assigned to gunfire support exceeded that of the

---

49 Ibid, 110-117.  
50 Ibid, 117-118.
artillery landed in the assaults, and the mobility of the ships permitted a greater concentration of fire than artillery could achieve in the initial stages.51

The easternmost of the American beaches on Sicily were focused on the town of Scoglitti. The landing force, known as CENT Force, was commanded by Rear Admiral Alan G. Kirk. The landing element was the 45th Infantry Division. The town itself boasted a modest harbor but the landing area had been chosen because of its proximity to the Comiso and Biscari airfields. The landings at Scoglitti were more problematic due to the inexplicable replacement of half the force’s trained ensigns and coxswains just before embarkation with men just out of boot camp.52

Naval gunfire was employed to good effect just before H-Hour when flares from the defenders lit up the beach. Admiral Kirk decided that surprise had obviously been lost and ordered the preplanned fires on known enemy gun and machine gun emplacements. The first wave landed fifteen minutes later, their morale boosted by the preparatory fire.53

Ship-to-shore movement suffered from the combination of poorly-trained crews, few landmarks, high seas, and strong winds. Some boats groups landed miles from their target beaches. Others were lost on the rocks that dotted the shore. as many as two hundred landing craft were wrecked or broached, hampering the efforts to land the follow-up waves after daylight.54

Beach congestion was again a problem due to the soft sand and inefficient shore parties. The Army shore parties at Scoglitti were so bad that their commander, a Lt. Colonel, was court-

51 Ibid, 118.
52 Ibid, 126-128.
53 Ibid, 130.
54 Ibid, 138-140.
martialed. One beach was so thoroughly blocked that Admiral Kirk closed it to further landings. The wrecked landing craft just added to the confusion.\textsuperscript{55}

CENT Force suffered from the same lack of air cover that JOSS and DIME Forces had. On the night of 11-12 July, they were subjected to a large German air attack upon the heels of which came a fleet of American transports carrying more of the 82\textsuperscript{nd} Airborne Division. The drop was laid on at the last minute and the word had not been communicated to all the Allied ships. Jumpy in the wake of the German air attack, CENT Force opened up on the transports, shooting many down. Eisenhower and Patton were incensed, and both men took a personal interest in the matter.\textsuperscript{56} Poor planning and communication were obviously responsible, but some felt that the air planners should share responsibility. Admiral Kirk seemed to think so when he wrote this regarding the incident:

No control over fighter patrol was delegated to the CENT Attack Force. No bombers were on call. No fighter protection to spotting planes was provided…At no time was the Force informed concerning the degree of air control exercised by our forces and as to what…enemy attack might be expected…The air battle was separate and foreign, apparently unconcerned about the situation in the CENT Area.\textsuperscript{57}

On the ground, events played out in a similar fashion as at Gela. The eastern arm of the Hermann Goering Division had descended upon the Scoglitti beachhead. There, despite the paucity of tank support, the 45\textsuperscript{th} stopped them with the help of some paratroopers, artillery and accurate naval gunfire.\textsuperscript{58}

\begin{footnotes}
\item[55] Ibid, 139-140.
\item[56] Tomblin 199-201.
\item[57] Morison, \textit{Sicily-Salerno-Anzio}, 142.
\item[58] Ibid, 145-146.
\end{footnotes}
HUSKY, despite the brief brush with disaster at Gela, was as successful as might be expected. In a perfect world the landings would have been properly supported and the retreat of the Germans cut off at Messina. Any student of war knows how fleeting such instances really are. For every Cannae there are likely a dozen Antietams. Still, the conquest of Sicily was a concrete step in the right direction, strategically and doctrinally.

HUSKY demonstrated once and for all the prowess of well-directed naval gunfire in support of landing operations and its essential place in amphibious doctrine. The critical nature of training and control in the ship-to-shore movement was also proven. Had the problems at Gela and Scoglitti obtained at Omaha Beach a year later, it is difficult to see how the landing could have succeeded. As a natural progression, the importance beach organization to the maintenance of momentum was established. Had the beaches been better managed, the Army might have been in a better position to meet the counterattacks of 11 July. Cooperation between the Army and Navy had been paramount to success on Sicily. Rivalry still existed, but both services recognized how each depended on the other in an amphibious campaign and acted accordingly and with mutual respect.

The shortcomings of the air campaign have been discussed, but it must be emphasized that the view taken is from the standpoint of amphibious doctrine and the needs of the landing force as determined by its practitioners. The Air Forces largely accomplished the goals they set for themselves. Air operations were constant in pursuit of those goals and the German and Italian air forces came out much the worse for it.59

59 Ibid, 16.
The fact remains, however, that the landing forces were put at undue risk for the first two days of the operation, a fact not lost on senior commanders. Though the intricacies of close air support were never fully addressed in the European Theater, definite strides were made to correct the problems, and the Air Force cooperated a bit more after HUSKY, even if only reluctantly.

Sicily was a validation of the concepts developed by the naval services in the interwar period. Those concepts required some adjustment to the strategic and operational conditions of Europe. As the campaign progressed, they would require more fine tuning. The next step in the that process would come on the coast of Italy proper, at Salerno.

**Operation AVALANCHE – September, 1943**

Operation AVALANCHE, the invasion of the Italian mainland in the Gulf of Salerno, was the major follow-up operation in the wake of the Sicilian Campaign. British General Bernard Montgomery had launched his British Eighth Army across the Straits of Messina on 3 September in order to draw Axis forces south, away from the proposed landing area. Unfortunately, Montgomery’s delay after being authorized to move in late July, gave German Field Marshal Albert Kesselring time to reconstitute his forces and position them to meet the landing he suspected further up the Italian boot.\(^{60}\)

The primary goal of AVALANCHE was to open the port of Naples to support a drive on Rome. As it was now considered impractical, and unnecessary, to directly assault the port, the Gulf of Salerno, just to the south, offered suitable landing beaches, easily supported from Sicily. There was road access to Naples, but it was through an easily-defended mountain pass. The landing would be conducted by the Allied Fifth Army under US Lt. General Mark Clark. Fifth

\(^{60}\) Ibid, 233-234.
Army consisted of the US VI Corps and the British X Corps. The American divisions involved were the 36th and 45th Infantry in the assault echelon, with the 3rd and 34th Infantry in reserve. Vice Admiral H. Kent Hewitt once again commanded the naval forces and the Southern Attack Force, containing the US elements of the operation, by Rear Admiral John L. Hall.61

Salerno was far enough from Sicily that land based fighters could only spend a few minutes over the beachhead, but Eisenhower, learning the lesson from HUSKY, insisted on adequate air support for the operation. This insistence extended to his personal direction to the Northwest African Air Force to cooperate with the other services. He had also managed to secure the services of five Royal Navy aircraft carriers cover the landings. The air plan called for constant daylight patrols with fighters stacked between 6,000 and 20,000 feet. The entire landing area was to be cordoned off. If the Air Force had not yet come around to the idea of supporting amphibious operations, the Supreme Commander had.62

The conditions obtaining for AVALANCHE differed from HUSKY primarily in one way. Where the landings on Sicily were opposed, there was at least a chance to obtain tactical surprise and the beaches themselves were not heavily defended. The greatest danger to the landings came from enemy counterattacks. The problems encountered by American forces were largely of their own making, particularly the failure to provide adequate air cover and the poor training of half the boat crews. Had the beaches been strongly contested, those inadequacies may not have been surmountable.

Salerno represents the conditions that might have been. The beaches were strongly defended by an alert enemy. The German defenders were arrayed in depth, were well-trained and

---

61 Ibid, 246-247.
well-led. The capability for counterattack existed even more so than on Sicily. The terrain surrounding the area of operations favored the defense in its efforts to contain the beachhead.\textsuperscript{63}

On the other hand, improvements had been made by US forces in the interim. Positive strides were made in ship-to-shore movement through the continued training of boat crews. New confidence existed in the effectiveness of naval gunfire in support of ground operations on the part of all services. Its effects could be planned for, providing more flexibility for ground commanders who found themselves in need of support. Hard lessons had been learned about the necessity of air cover for the landing force and close air support of the troops ashore. Those lessons were acted upon, even if those actions were sometimes against the will of the airmen.

Some shortcomings of HUSKY, however, had not been satisfactorily addressed. The problem of beach congestion continued to plague American landings. The training of the Army shore parties was truly appalling, leaving a gaping hole in the process of moving men and equipment across the beach.\textsuperscript{64} The concept of momentum was critical to a landing under fire. Ineffective beach organization was the primary obstacle to the maintenance of momentum in American landings.

Another problem, which is baffling at Salerno, was the continued refusal of Army commanders to allow the Navy to deliver a preparatory bombardment ahead of the landings. As at Sicily, the reason given was the chance of attaining tactical surprise, which really made no sense considering the British beaches to the north received a pre-landing bombardment.\textsuperscript{65} All signs pointed to the German defenders being alert to the landings at Salerno. The Navy knew it,

\textsuperscript{63} Tomblin, 242.
\textsuperscript{64} Morison, \textit{Sicily-Salerno-Anzio}, 269.
\textsuperscript{65} Ibid, 244.
but the Army could not, or would not. One of the cardinal rules of American amphibious
discipline was local fire superiority, either by volume or maneuver. The Army refused to see the
overwhelming potential, represented by the big guns of the Navy, for the former, as well as the
increasing impossibility to affect the latter.

A narrative of the landings at Salerno is not necessary to make these assertions. The
discussion of HUSKY illustrates the wisdom of those doctrinal elements and their application to
the tactical problem of establishing a viable beachhead against determined opposition. It is true
that the Army had not yet experienced resistance to a landing on the scale of what was
envisioned by the Marines.

As far back as Pete Ellis, who predicted that the entire affair would be decided “on the
beach,” the Marines had planned to land under heavy fire and harbored no illusions about the
difficulty of such an undertaking. The Army was new to the game, but was experienced enough
by Salerno to understand the necessity of superior firepower at the point of attack in an operation
restricted to such a short frontage in the face of an enemy so well-arrayed as the Germans were.

They did not and the landings at Salerno were far more difficult than they needed to be.
Accounts of the first five days of the operation return to a single conclusion: had it not been for
the effectiveness of naval gunfire and air support, it is doubtful that the landing force could have
stayed ashore in the face of the German counterattacks. It is, however, mere speculation to state
that a preparatory bombardment and better beach organization would have changed this
situation.

66 Major Earl H. Ellis, USMC, Operation Plan 712 J, Advance Base Force Operations in Micronesia, (Box 7,
File 165 A, Historical Amphibious Files, United States Marine Corps Archives, Quantico, VA), 16.
67 Morison, Sicily-Salerno-Anzio, 294.
What can be said is that, had the Navy been allowed to shell the beach, as they were trained to do, the landings would have had initial momentum. The bombardment would have been even more effective if coupled with the last-minute airstrike called for in FTP-167.68 Had this initial momentum been combined with a more efficient beach operation, that momentum would have continued. Had the momentum continued, far more tanks, vehicles, artillery, and men would have been landed and been better organized and equipped to meet the German attacks. Naval gunfire would still have played a role in blunting those attacks, but it may not have had to be the final arbiter. Again, speculation, but much would have to change before the planned invasion of France and the test of Hitler’s Atlantic Wall.

---

Chapter 6

OVERLORD – The Ultimate Test

Operation OVERLORD, the invasion of Normandy\(^1\), is rightly held up as the amphibious operation by which all others are measured. Though Operation HUSKY was actually a larger operation in terms of the forces employed in the assault,\(^2\) OVERLORD had far more riding on it. It was the culmination of years of effort and planning. Every experience, every decision, every operation since mid-1942 had the specter of what would become OVERLORD hanging over it. OVERLORD was the most strategically-important operation mounted by the Western Allies in the Second World War. It is difficult to see how victory in the West could have been achieved in its absence.

This paramount endeavor was not conceived haphazardly, nor were the capabilities which made it possible. Every bit of know-how accumulated from the work of Pete Ellis; the first tentative steps made at Culebra; the FLEX operations; C. J. Miller; Holland Smith; Andrew Higgins; L.E.H. Maund; Lord Louis Mountbatten; H. Kent Hewitt; Dieppe; TORCH, HUSKY, AVALANCHE; and countless others made it possible for the operation of 6 June, 1944 to take place. Without those experiences, it is questionable whether an attempt could even be made.

OVERLORD was built around two basic principles: concentration and surprise. The need for both was so critical that, if either one had not been achieved, it is quite possible that the entire operation would have failed. These prerequisites were necessitated by the ability of the German


defenders to move mobile reserves from the interior or other stretches of the coast to attack the beachhead with overwhelming armored might.

Fleet Training Publication 167 states that

Operations involving landings against opposition are among the most difficult of military operations, and superiority of force, particularly at the point of landing, is essential to success. b. Numbers alone cannot afford the required superiority. There must also be that effectiveness which is obtained by proper organization, equipment, and training of the naval and marine forces involved, not only for the special operation of landing but also for the conduct of the subsequent advance inland from the shore line where decisions will have to be made and executed under the stress of battle to meet conditions that are more adverse than those ordinarily prevailing in a purely land attack.3

This was the conclusion after years of experimentation. That same experimentation, however, had led to the understanding that amphibious operations, by their very nature, are weakest at that same point of attack. The words of Colonel C.J. Miller from FLEX 3 bear repeating:

We can only reasonably expect an advance from the water’s edge, when we have silenced the defender or placed in action the means necessary to attain this result. This is the interpretation we must give to the rule: “gain fire superiority.” In this connection, it is interesting to note, that the landing attack has the inherent peculiarity, that it is the weakest at the water’s edge and gains only in strength as it progresses inland.4

Miller’s words were true in 1937 and they were still true seven years later. But the fact that the landing force is weakest at the water’s edge required that the means for gaining superiority at that point had to come from somewhere else. That somewhere else was naval gunfire, close air support, artillery, direct fire from support boats and tanks, and deception. The

---

effort to develop those means had been in the works for over two decades by the time of OVERLORD and they would all be employed in its execution.

Naval gunfire had proved its indispensability in the Mediterranean Campaign. The shells of the big guns acted as force multipliers of the first order. Their range was unparalleled and the manipulation of their fire had been tuned to a fine art over the previous two years. Of course, the naval services had known this all along. They just had to figure out the best way to go about it, and they did. Naval gunfire and concentration at the point of attack through the use of surprise provided the local fire superiority called for by Miller.

By the time of OVERLORD, the Army had reluctantly learned the value of the preparatory naval bombardment. They still did not appreciate the full scope of its contribution to the landing operation, as would be demonstrated at Omaha Beach, but they had learned to trust the Navy gunners, without whom they would have been thrown off at least one beach. The Army had also accepted the need for close support on the approach to the beach. This role was filled by the prescribed airstrike against the beach just prior to the landings and the armed assault craft that accompanied the initial waves to the beach.

The necessity of air support and superiority over the beachhead had been demonstrated in the Mediterranean. For OVERLORD, air support took on a true strategic aspect in terms of interdiction efforts. Not only did the Air Forces have to rule the skies over the beachhead and provide support to the ground troops, they had to prevent, or at least significantly slow, the movement of enemy units from outside the operational area. This effort began months before the
landings. Enemy-controlled rail junctions, marshaling yards, and communications were targeted with the goal of disrupting his ability to shift forces quickly in reaction to the landing.⁵

As was to be expected, certain senior commanders balked at the diversion of resources from the campaign against German industry, but they were held to this requirement. Another mission for the strategic air forces was the destruction of the German Luftwaffe through attacks on airplane factories and the ball bearing industry. This was more to the liking of the airmen, though General Carl Spaatz insisted on attacking the German oil industry as well.⁶

Fire support ashore had been addressed by the development of reliable landing craft capable of handling tanks and artillery. The LCT, LST, and DUKW had proved their great worth many times over. It was recognized, however, that there is no such thing as too much fire support. Calls for an amphibious tank had been around for years. The first had been tested at Culebra in 1924.⁷ The FLEX exercises regularly lamented the lack of such a vehicle. The call was answered in time for OVERLORD with the advent of the Dual Drive Tank (DD), a waterproofed Sherman fitted with a propeller and a canvas skirt to make it float.⁸

Deception was taken to a new level in the preparation for the Normandy landings. Aware that the Germans had overestimated the number of Allied Divisions in Britain, planners worked out a scheme to show them what they thought they already saw. Knowing the high regard of the Germans for General George Patton, the Allies created the a “dummy” army around him, complete with fake tanks, encampments, and signals traffic. Patton’s “army” was kept in Britain

---

⁶ Ibid, 223-224.
⁸ Harrison, 192n.
after the landings to hold the attention of the Germans, who expected Patton to land at the Pas de Calais.

This deception kept the entire German Fifteenth Army away from the beachhead for over a month, by which time the lodgment was fairly secure.\(^9\) Deception played a primary role in the ability of the Allies to preserve surprise, the other requirement for success. Though the Germans expected a landing, they did not know where or when, so operational and tactical surprise were achieved at Normandy.

The ship-to-shore movement took on a larger dimension with regard to OVERLORD. Minesweepers had always been employed to clear assembly area and approach lanes. They were an integral part of the staging of a landing. The close proximity of the target to the embarkation ports in the British Isles added a new dimension. Not only did the minesweepers have to clear the operations area, but they had to clear lanes along the Channel Coast of Britain as well as a passage to the invasion beaches. Systems for covering the required area had to be developed. The lanes had to be marked and the ships themselves, in the final stages, had to operate right under the guns of the German defenders. Without this vital capability, the invasion force could not have gotten anywhere near the beaches.\(^{10}\)

Logistics had come a long way since the beginning of the war. Combat loading was a top priority. The understanding of logistics had also reached a point where operations were planned based on the capacity of the logistical system to support them. OVERLORD is a case in point.

---

\(^9\) Harrison, 351.

When formulating what became the final plan in early 1944, British General Sir Frederick Morgan employed the number of landing craft likely to be available, adjusted the number based on serviceability rates, calculated the lift capacity, and plugged in the number of troops and vehicles which could be landed at Normandy on the target date. The fact that Morgan’s calculations were so accurate as to be nearly perfect speaks volumes about how far logisticians had come. Logistics, in the form of lift, were the primary determining factor regarding the size and scope of OVERLORD.11

The massive “Mulberry” artificial harbors were also a testament to the new way of thinking. Experience had shown the folly of assaulting a defended port. When the need for a port to support the build-up phase came up in conversation among the planning staff, British Commodore John Hughes-Hallett replied, “Well, all I can say is, if we can’t capture a port we must take one with us.” He brought in a plan for just such a project the next day.

Two were built, one for American use, the other for the British.12 Though Mulberry (A) was destroyed off Omaha Beach by a storm on 16 June, Mulberry (B), in the British sector, remained operational for months. The Mulberries decreased the landing time for an LST by over ninety percent as opposed to the time required to unload on the beach.13

The necessity of logistical capabilities on such a large scale can be explained by the fact that the landings were but the initial operation in a Continental campaign. Though the tactical principles to get the troops ashore and keep them there had essentially worked out at Culebra in the 1930s, the scope of OVERLORD dwarfed everything else. HUSKY had employed more

11 Harrison, 170-171.
13 Ibid, 165-166.
troops, but its objectives were much more limited. The ultimate goal of the landing of 6 June, 1944 was nothing less than the final defeat of Nazi Germany. With that in mind, an examination of the doctrinal principles employed to begin that campaign are in order.

**Utah Beach**

Utah Beach was a late addition to the OVERLORD plan. The landing area was located on the east coast of the Cotentin Peninsula and formed the western extremity of the Normandy beachhead. The port of Cherbourg was located at the tip of the Cotentin and the need to take that port as soon as possible was identified.\(^{14}\) The landing was executed by the 4\(^{th}\) Infantry Division.

The landing at Utah was nearly textbook, thanks to lack of resistance and the fact that there were few beach obstacles. The defending troops were static units possessing no mobility and were nowhere near the level of a frontline fighting force. The primary defense of Utah was a significant concentration of offshore mines, particularly on a sandbar known as the Cardonnet Bank. Several craft were claimed by mines crossing that obstacle, but the landing did not suffer.\(^{15}\)

The Germans also relied on the flooded fields behind the beach, which created easily defended bottlenecks on the causeways crossing them. Artillery was placed behind the flooding which could range the beach or close the causeways as needed. This defense was effectively neutralized by the airdrop of the 101\(^{st}\) Airborne Division on the night of 5-6 June.\(^{16}\)

The airborne operation served two primary functions. The 101\(^{st}\) took away the ability of the Germans to defend the causeways from Utah. The 82\(^{nd}\), whose drop zones were to the west,
were to serve as an interdiction force to seize important crossroads and deny their use to enemy reinforcements. The airborne troops were scattered, as was the norm in night drops, but they fulfilled their mission and caused great confusion among the Germans as to the location and nature of the attack.17

The only misstep at Utah actually turned out to be fortuitous. Thanks to the belief that the emplacements on Pointe du Hoc had real guns in them, the landing craft had to traverse eleven miles of sea before landing. Smoke and dust on the beach from supporting naval gunfire confused the boat crews and the lead elements of the 4th Infantry landed 2000 yards south of their target beach. Deputy Division Commander Theodore Roosevelt, Jr. decided to begin operations from where he was instead of re-embarking. He directed the follow-up waves to where he was and started his troops inland.

This mistake, as well as Roosevelt’s decision to stay spared the 4th Infantry casualties. The target beach was defended by artillery and had more obstacle emplaced that did the actual landing spot. From a doctrine standpoint, this incident once again called into question the desirability of using smoke on the beaches, even though its presence was not intentional. Nevertheless, naval gunfire at Utah, as always, was effective.18

There is really little else to say about operations on Utah. The ship-to-shore movement was efficient if a little off target. Follow-up waves landed smoothly and momentum was maintained across the beach, with an assist from the Navy and the paratroopers. It should also be noted that the Air Force accomplished its mission admirably.

17 Ibid, 90-91.
18 Ibid, 100-103.
Omaha Beach

Omaha Beach is justly famous for being the opposite of Utah. Omaha was heavily defended by veteran troops and sown thickly with beach obstacles, many of which were mined. The bluffs behind the beach were fortified with bunkers and pillboxes and the bluffs themselves enclosed the beach on three sides. The beach could only be exited by a series of draws protected by German strongpoints and there were no paratroopers to attack them from the rear.19

The problems at Omaha began before the operation ever started. US amphibious doctrine consisted of two basic methods of assaulting a defended beach. The first was a daylight landing preceded by a powerful naval bombardment and opportunistic airstrikes just prior to the boats hitting the beach. This was the method employed by the Marines in the Pacific and it worked well. A primary benefit of this approach was that it tended to demolish beach obstacles and explode mines before the troops landed.

The other method, preferred by the Army in Europe, was to land under cover of darkness in an attempt to gain tactical surprise. The disadvantages of this approach have been addressed, but one disadvantage was especially prevalent at Omaha. The Army preferred to not have a preparatory bombardment in the interest of surprise. The lack of such a bombardment meant that the beach obstacles would have to be removed by hand.

The Army relented, to a degree, agreeing to a short bombardment but still hoping to get ashore before the Germans could react. It was also agreed that the last minute airstrike would go

---

in just ahead of the troops. Unfortunately, low cloud cover caused the bombers to overshoot their marks and the bombs landed harmlessly behind the beach.\textsuperscript{20}

The doctrinal problem lies with the timing of the landing. The compromise meant that not enough time was allotted for the bombardment to have the desired effect, nor was there time enough for the beach obstacles to be cleared by teams assigned to do so. The plan was hampered by the refusal of Montgomery and Bradley to stagger the landing times at various beaches. Omaha was by far the most heavily defended and required the most attention.

One of two solutions should have existed. H-Hour could have been moved up, giving the Navy UDT frogmen, Army Engineers, and Explosive Ordnance Disposal (EOD) specialists more than the allotted 25 minutes to clear sixteen lanes through the obstacles. On the other side, H-Hour could be pushed back to after daylight, allowing the Navy to lay fire on the obstacles, along with rockets from the support craft. Either method would have been preferable to the one that was implemented.

As it was, the teams ended up working mostly in daylight in full view of an alerted enemy. Such jobs cannot be performed effectively under heavy fire. The failure to accomplish their mission, through no fault of their own, halted any chance at momentum across Omaha Beach. This plan for the removal of beach obstacles went against all established doctrine and was recognized as such before and after the operation. Unfortunately, the commanders who had the power to change it, were not among those who saw it ahead of time.\textsuperscript{21}

\textsuperscript{20} Morison, 124.
\textsuperscript{21} Lewis, 787-807.
The anti-obstacle teams did manage to clear five large and three partial lanes before the tide came in but it cost them heavily and limited the frontage through which the landing craft could pass. This contributed to the bunching problem and the resultant breakdown in organization. The lanes did not get cleared and marked until the afternoon ebbtide.

Belief that the enemy gun emplacements on Pointe du Hoc were a threat led to the embarkation area being eleven miles offshore.\textsuperscript{22} It is difficult to criticize this decision in light of the cause, but there is room for criticism of the ship-to-shore movement phase nonetheless. The Navy employed small patrol craft as control vessels to mark the approach lanes for the landing craft and guide them in. It was a proven method which had been used for some time. The problem at Omaha was that the control vessels had not taken part in any of the training exercises and had learned of their mission too late for any real training to be done.

The line of departure for the landing craft was correctly marked 4000 yards off the beach. The control vessels, however, failed to account for the eastward drift caused by wind and current. This displacement threw off the approach lanes for the landing craft, causing many to miss their beach as they landed too far east. The result was that the craft bunched up as they landed, losing organization and providing targets for enfilade fire from enemy units who had nothing to their front.\textsuperscript{23}

Adding to the confusion were the subsequent waves, which arrived on time but often had nowhere to go, having been blown off course and faced with congested or even nonexistent lanes. Momentum slowed further as many had to be guided through lanes or were redirected altogether. At this point, wave organization broke down as sub waves began to stack up.

\textsuperscript{22} Morison, 119.
\textsuperscript{23} Morison, 135-136.
Congestion was bad by 0830 that the Navy beach master signaled the control vessels to suspend the landing of vehicles.

Rough seas prevented most of the artillery, carried by DUKWs, from landing. By the end of D-Day only five batteries had been landed on Omaha and only one of those was able to go into action. Naval gunfire, as always, filled the gap.

The guns of the Navy swung into action early, though many of the destroyers who moved in close had no contact with their fire-control parties. Many of the fire-control teams had become casualties or their equipment had been destroyed. These destroyers did good work, moving in close to lend badly-needed direct fire support against enemy gun emplacements and strongpoints. Fire was also directed at the beach exits, which were blocked by obstacles.

Aerial spotting was available behind the beaches and was put to good use by the heavier guns of the cruisers and battleships. The bigger ships fired at enemy reinforcements and gun emplacements behind the beaches, though the battleships Texas and Arkansas helped with the direct fire mission by firing on the Vierville exit and German batteries around Port-en-Bessin respectively. The fire of Texas was especially helpful in opening the Vierville exit.24

As at Salerno, aerial spotters were equipped with Mustangs and Spitfires, thus improving their survivability. It had finally been agreed that seaplanes could not survive above heavily-defended target areas. These spotters performed good service over all five landing beaches.25

The stout defenses at Omaha exposed the doctrinal shortcomings of the operation. According to Samuel Eliot Morison, the defenses at Omaha were the most extensive and

---

24 Morison, 142-149.
25 Morison, 148.
complete of any in World War II, to include Iwo Jima and Okinawa. The state of these defenses was known, for the most part to Allied planners and commander well in advance.

Curiously, Bradley cited his assignment of the veteran 1st Infantry Division to the assault as the operations saving grace. He said he believed that less-seasoned men would have broken down, dooming the landing.

It is hard to dispute this assertion because the 1st Infantry did indeed perform well and the benefits of employing veteran troops are self-evident. Historian Adrian Lewis points out, however, that Bradley’s logic breaks down when one looks at the other units employed on 6 June. The 29th Infantry Division was a green National Guard outfit with no combat experience whatsoever, but was assigned to the first wave at Omaha along with the 1st. The 29th performed about as well as might be expected under the circumstances, but not to the level of the Big Red One. Likewise, the assignment of the 4th Infantry to Utah. The 4th had no combat experience, yet was given the task of spearheading half of the American assault. There is no intent here to demean Bradley and, with the impossibility of obtaining clarification, one may put his comment down to hindsight, but the question remains. One wonders what Pete Ellis would have thought.

Despite the obstacles, and thanks once again to the Navy’s guns, momentum was regained by late afternoon, but the cost had been heavy. The problems at Omaha remain a point of contention seventy-plus years later. The failure to employ proven doctrine and the lack of training for even some elements of the most strategically-important operation of the war is difficult to excuse.

---

26 Ibid, 115.
27 Lewis, 802n.
Perhaps the Army really did not believe in the doctrine, as it seems they may not have. Or perhaps, as pointed out by Lewis, they believed that an operation of such scope could not be executed by a mere tactical doctrine based on a prescribed process for assaulting a defended island. Whatever the answer, it likely lies in the neighborhood of the admittedly different mission of the Army and how the Army perceived itself. Acceptance of such a process was easy for the Marines. They were an assault force with straightforward objectives. The mission of the Army was more complex, and perhaps the amphibious assault role was simply seen as a means to the end goal of launching a large-scale maneuver campaign on the Continent. If so, the bloodletting at Omaha opened the door to that goal.
Afterword

Thinking About the Application of Amphibious Warfare Doctrine

At the end of this project, it is difficult to reconcile the intent with the final product. The initial goal was to document how the tactical process developed by the US Marine Corps and Navy during the 1920s and 1930s transitioned into a war-winning capability in the European Theater of Operations. Based upon the research and background reading done over the last nine months, such a conclusion is far from clear.

That the Marines and Navy remained true to their doctrine, with great success, is beyond doubt. By the end of the war in the Pacific, the Marine Corps was an amphibious machine. By the time of Iwo Jima and Okinawa, the Japanese didn’t even bother trying to defend the beach. Elsewhere in this work, the Marines of that era are referred to as an “assault force par excellence.” The fact is that they were what they decided to make themselves over the course of two decades.

Near the end of the last chapter, the question is posed as to what Pete Ellis might have thought. Of course, there is no way to know, but he might just wonder why a force with the myriad missions of the Army was trying to execute the specialist doctrine for whose creation he is given credit. The goal was to show how the Army adopted the doctrine of the Marines and adapted it to Europe. It is now believed, if anything, that what was shown was how the Army did no such thing.

The different missions of the Army and Marines were discussed several times in the project. Perhaps that difference is the key after all. The Army had no need of a specialized assault force. The Navy did. It just so happened that the Navy’s force was
somewhat preoccupied while the war against Hitler raged. In a perfect scenario, maybe
the First and Second Marine Divisions storm ashore at Omaha and Utah beaches,
carrying everything before them in a furious hail of steel and lead. Then the Army moves
in and expands the beachhead. The Marines move on to their next target. According to
some, that’s exactly what happened in some instances in the Pacific. Perhaps there really
is a difference between “amphibious operations” and “joint operations” after all.

It is difficult to imagine, though, the learning curve the Army might have faced
had they been left to their own devices. They had shown little interest in landing
operations before 1940. They had participated in some of the FLEX exercises, but it had
been at the Navy’s request. There seems to be little doubt that the Army benefited from
the work done by the Marines, but there also little doubt that they did it not the right way;
not the wrong way; they did it the Army way.
Appendix

Landing Craft

AGC  AMPHIBIOUS FORCE, FLAGSHIP
U.S. Navy equivalent to the British LSH. These ships serve as central headquarters for landings’ operations, are readily distinguished by their heavy radar masts.

**APPLACHIAN Class**

<table>
<thead>
<tr>
<th>Class</th>
<th>YO</th>
<th>AGC 1-4</th>
<th>Blue Ridge</th>
<th>AGC 2</th>
<th>Cactus</th>
<th>AGC 3, 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>NYY</td>
<td>4</td>
<td>1-2</td>
<td>6-5</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dimensions**

<table>
<thead>
<tr>
<th></th>
<th>AGC 1-4</th>
<th>Blue Ridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>450’3”</td>
<td>493’4”</td>
</tr>
<tr>
<td>Beam</td>
<td>63’</td>
<td>64’</td>
</tr>
<tr>
<td>Displacement</td>
<td>11,998 tons</td>
<td>13,144 tons</td>
</tr>
</tbody>
</table>

**Boats**

<table>
<thead>
<tr>
<th></th>
<th>AGC 1-4</th>
<th>Blue Ridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCV (P)</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>LCP(L)</td>
<td>1-2</td>
<td>1-2</td>
</tr>
</tbody>
</table>

**Speed**

<table>
<thead>
<tr>
<th></th>
<th>AGC 1-4</th>
<th>Blue Ridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knots</td>
<td>15-5</td>
<td>18</td>
</tr>
</tbody>
</table>

**Armament**

<table>
<thead>
<tr>
<th></th>
<th>AGC 1-4</th>
<th>Blue Ridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-5”</td>
<td>3-8</td>
<td>2-5”</td>
</tr>
<tr>
<td>2-40 mm</td>
<td>4-40</td>
<td>4-40</td>
</tr>
<tr>
<td>10-20 mm</td>
<td>10-20</td>
<td>10-20</td>
</tr>
</tbody>
</table>

**Accommodation**

<table>
<thead>
<tr>
<th></th>
<th>AGC 1-4</th>
<th>Blue Ridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Officers</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>Enlisted</td>
<td>869</td>
<td></td>
</tr>
</tbody>
</table>

---

1. All diagrams and photographs of landing craft are reproduced from United States Division of Naval Intelligence, *Allied Landing Craft of World War II* (Annapolis: Naval Institute Press, 1985). This publication was originally produced as a classified document by the US Division of Naval Intelligence in 1944. It does not contain page numbers. The photographs of the loading plan for USS Antares as part of Fleet Landing Exercise 4 were taken by the author of the original diagram, which may be found in Box 4, Exercises Collection, United States Marine Corps Archive, Quantico, VA.
HIGH-SPEED TRUJISPORTS (DESTROYERS) APD

- Converted "bush-deck" destroyers designed to accommodate raiding parties and land them by small craft. Nineteen are now in service, others are contemplated for conversion.
- Dimensions: 314'x9'x3'8"; 11'11" plus 4' sound dome (max. draft).
- Displacement: 1,060-1,090 tons; 1,700 (loaded).
- Capacity: Four LCP(L) or LCP(R) and one Marine rifle company. Over 200 men have been successfully accommodated in 140' of hulls to serve as APD. Thirteen are now converted.
- Armament: Four 3" .50cal. DP; five 20mm., six D.C. projectors are carried.

HIGH SPEED TRUJISPORTS APD
(DE CONVERSION)

Operation of TRUJISPORTS are: transport and land soldiers or reinforese troops quickly.

Description: Plans are being developed for the conversion of DE hulls to serve as APD. The WGT (Westinghouse Gearless Turbine) type is being used. No dies not used have been assigned yet.

Capacity: 4 LCP at down, 162 Troops, 4.75 mm. Pack Howitzers, 4.500 cubic feet cargo ammunition, 6-1/4 ton trucks, 2-1 ton trucks, 1,000 cubic feet gasoline, 3,500 cubic feet general stores, 4 cars 74E.

Dimensions: Length 306', Beam 37'.

Draft: 14'9" (full load), 16'1" (with sound dome down).

Displacement: 2,043 tons (full/loaded).

Armament: 1-5"38 cal., 3-40 mm. twins 8-20 mm.

Speed: 23 kts. (maximum).

Endurance: 5,000 m. @ 15 kts., 2,000 m. @ 23 kts.

Propulsion: Gearless turbines.

Crew: 212

119
Landings Craft, Control (Mark 1) LCC (1)

Operational use: Amphibious Army truck for ship-to-shore transport, capable of operating in a moderate sea and surf.

Description: 6-wheeled truck with a boost hull, propeller in funnel, and small rudder. Hold may be covered by portable canvas and litters; cockpit has collapsible hood. Sometimes carried or davits, generally transported on the decks of ships.

Endurance: 400 miles at 35 miles per hour on land.

Speed: 5.5 kts. in water; 50 m.p.h. (max.) on land.

Displacement: 30 tons.

Armament: 3 twin .50-cal. M.G. on bridge or gun deck; 130 summit smoke pots.

Armor: L175" x 35" x 8" of steel, 9" x 3" x 8" of steel. T-18 deck armor (A.K.A.) and SO radar equipment.

Propulsion: 6-cylinder GM engine, 6-wheel drive on land; propeller in water; steered in water by front wheels and small rudder.

Crew: One.

Landings Craft, Control (Mark 2) LCC (2)

Differs from LCC (1) in draft (3'11" max.), armament (2 twin .50-cal.) and SO radar (has NPM microfilm chart projectors).
### LANDING CRAFT, INFANTRY (LARGE) -- Number 1-350

**LCJ(L)**

**Operation:**
An ocean-going infantry carrier designed for direct unloading on the beach. Although living space, galley, and toilet are provided for accommodation of troops, the space is limited to a practical operational time of 48 hours.

**Description:**
Early models, illustrated by the drawing, are undergoing the changes shown by the photos; heightened conning tower, mainmast moved forward.

**Capacity:**
- troops: 182 enlisted men or 75 tons cargo.
- Endurance: 4,000 miles @ 12 knots; beaching draft all oils for 300 miles @ 15 knots or 1,500 miles @ 12 knots.

**Speed:**
- 16 knots max. (flooded) 650 r.p.m.
- 14 knots max. (continuous).

**Dimensions:**
- Length: 158'5/8" o.a. Beam: 23'3"
- Displacement:
  - Landing: 234 tons
  - Loaded: 380 tons
- Tons per inch immersion: 6.5 at landing draft, 7.0 at ocean draft.

**Armament:**
- 20 mm.
- Plastic splinter protection for guns, conning tower, and pilothouse sides.

**Propulsion:**
- 2 sets of G. M. Diesels; max. B.H.P. 1,600; twin variable-pitch screws.
- 130 tons fuel oil, 200 gallons lube. Crew, 3 officers, 21 men.

---

**LANDING CRAFT, INFANTRY (LARGE) Nos. 351-**

**LCJ(L)**

**Dimensions and all statistics not mentioned below are the same as early model.**

**Capacity:**
- 9 officers, 196 enlisted troops; 32 tons cargo (ocean-going.)

**Endurance:**
- 8,000 miles @ 12 knots and 110 tons fuel.

**Displacement:**
- Landing: 250 tons
- Draft: 3'0" for'd, 5'0" a'ft.

**Armament:**
- 20 mm.

**Armor:**
- 2" plastic on guns, conning and pilothouse sides.

**Crew:**
- 4 officers, 24 men.

**Fuel:**
- 110 tons fuel oil, 37 tons water, 5 tons lube.

All production in this class after 1 June 1944 will incorporate centerline ramp as shown on left. Boilers and troop spaces have been rearranged but statistics are unchanged.
LANDING CRAFT, MECHANIZED-(MARK 1)  LCM (1)

Operational use  To land a single tank or miscellaneous vehicles on a beach slope greater than 1/43. Cargo and personnel carrying one secondary function.

Description  The first British small tank landing craft, since superseded by LCM (3). Transported on decks of landing ships and lowered by booms, davits, stern chutes, or gantries.

Capacity  Tanks or trucks of less than 16 tons total or 100 men or mixed loads—
One 25 pdr. gun and 1 DUKW or
One DUKW and 1 kitchen trailer or
Two 37 mm. AT guns and 2 weapon-controllers or
One 37 mm. AT gun and carrier and 2 jeeps or 1 staff car or
Six jeeps or
Two 37 mm. AT guns and 4 jeeps.
Some units carry 17° tons, increasing draft 1".

Endurance  56 miles (9/10 m. k.). Speed, 7/3 kn. (loaded) 12,000 t. p. m.

Dimensions  Length, 44' 8" a. a. Beam, 14' 0".
Displacement  Light, 21 tons. Draft, 1' 4" a. f. or/d. 2' 0" a. b. or/d. 1' 6" a. b. or/d. 4' off.

Armament  Two 303 Lewis guns.

Crew  8 or 10 lb. bulwarks, deck, control and fuel tanks.

Propulsion  Two 60 hp. Thornycroft or Chrysler engines; 285/turn screw.

This craft can be loaded with a load of up to 10 tons in craft. Some units are fitted with davits dinging eyes 26° 9' a. f. aport.

Fuel  100 gals.

LANDING CRAFT, MECHANIZED-(MARK 2)  LCM (2)

Operational use  To land one light tank or motor vehicle (photo left).

Description  U. S. model, generally superseded by LCM (3).

Capacity  One 13/8-lton tank or 34,000 lb. cargo or 100 men.

Dimensions  Length, 45' 6" o. a. × 14' 1" i. Weight, 45,000 lb. Draft, 3' (mean).
Endurance  75 miles (121 m. k. max. speed).

Armament  Two 50 col. M. G. Armor, 1/4" control station.

Crew  4.

Propulsion  Two 100 hp. Kentworth gasoline engines (twin screws).
LANDING CRAFT, MECHANIZED  

LCM(3)

Operational use: Signed to land one medium (30-ton) tank or motor vehicles directly on beach.

Description: Two designs are in use, the Higgins type constituting the majority. Recent changes include addition of machine guns and more powerful engines, higher bulwarks, and slight rearrangement of the interior.

Capacity: One 30-ton tank or 60,000 lb. of cargo, or 60 troops. Bureau type (few in number) carries 120,000 lb. of cargo.

Endurance: 850 m/60 knots or 550 miles at 8 knots; 41 knots (normal load).

Dimensions: Length, 500 ft.; Beam, 14'1".

Displacement: 52,000 lb.; Loaded: 52 tons.

Armament: Two .50 cal. M.G.

Armor: No armor.

Crew: Four.

Propulsion: Two 110-225 hp diesels of different designs, twin screws.

Higgins design.

LCM(4), (5) and (6) differ slightly from LCM(3).

LANDING CRAFT, MECHANIZED  

LCM(6)

A Higgins type LCM(3) with 6' added to the hull amidships. Photo shows new portion unpainted. Other characteristics are similar to LCM(3).
**LCT (1) LANDING CRAFT, TANK (MARK 1)**

<table>
<thead>
<tr>
<th>Description</th>
<th>British prototype for all but large tank-landing craft, now considered obsolete and used principally for training.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opacity</td>
<td>Three 40-ton, six 25-ton, or six 18-ton tanks, or 250 tons cargo.</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Length, 152' o.a. Beam, 29' Draft, 3' ford (loaded) 5'9'' aft (loaded)</td>
</tr>
<tr>
<td>Displacement</td>
<td>Light, 226 tons.</td>
</tr>
<tr>
<td>Endurance</td>
<td>900 miles @ 10 kts. (max. speed)</td>
</tr>
<tr>
<td>Armament</td>
<td>Two 2 pdr's.</td>
</tr>
<tr>
<td>Propulsion</td>
<td>2 Hall-Scott gas engines; twin screws and rudders.</td>
</tr>
</tbody>
</table>

**LCT (2) LANDING CRAFT, TANK (MARK 2)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Large oceangoing landing craft designed to land tanks or vehicles directly on beaches, or to land tanks or vehicles directly on beaches, or to land tanks or vehicles directly on beaches.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opacity</td>
<td>Thre 40-ton or six 25-ton tanks, or 5 trucks, or carriers, and 1 scout car, or 250 tons of cargo.</td>
</tr>
<tr>
<td>Capacity</td>
<td>2,700 miles with 3 engines Speed 11½ kts. (max.) Diesel 3,500 miles with 2 engines 10½ kts. (max.) gasoline</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Length 159'11&quot; o.a. Beam 31'0&quot; Draft 1'11&quot; ford, 5'0&quot; all loaded (trucks) loaded (tanks)</td>
</tr>
<tr>
<td>Displacement</td>
<td>Light 296 tons.</td>
</tr>
<tr>
<td>Armament</td>
<td>Two 2-pdr. pompoms or two 20 mm.</td>
</tr>
<tr>
<td>Armor</td>
<td>15-lb. OIBT plate for wheelhouse, foc'sle shelter, DKM to deck and sides; 20 lb. splinter shielding to gun positions; 2¼ ft plastic to bridge.</td>
</tr>
<tr>
<td>Crew</td>
<td>2 officers, 10 men, with accommodations; refrigerator provided in tropics.</td>
</tr>
<tr>
<td>Propulsion</td>
<td>3 Paxman Diesel (500 hp. each) or 3 Napier Lion gas engines (350 hp. each); 3 screws, 36° - 40°, single rudder.</td>
</tr>
</tbody>
</table>

**LCT (3) LANDING CRAFT, TANK (MARK 3)**

<table>
<thead>
<tr>
<th>Description</th>
<th>British type, longer than previous models. It can land tanks on slopes greater than 1/33, can only be transported on LSD.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Five 40-ton tanks or ten 3-ton trucks or 300 tons cargo.</td>
</tr>
<tr>
<td>Endurance</td>
<td>1,900 miles@ 10½ kts.; Speed 10½ kts. (max.) (loaded) 2,700 miles @ 9 kts.</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Length 192'0&quot; o.a. Beam 31'0&quot; Draft 1'9&quot; ford, 5'3&quot; off. 3'8'' ford, 6'8'' aft. 2'2½ ford, 6'0'' off.</td>
</tr>
<tr>
<td>Displacement</td>
<td>5 d'e (hold) loaded (trucks).</td>
</tr>
<tr>
<td>Armament</td>
<td>Two 2-pdr. pompoms or two 20 mm.</td>
</tr>
<tr>
<td>Armor</td>
<td>15-lb. OIBT over wheelhouse, to com in tower; 15- or 20-lb. splinter protection to gun positions; 2½ ft. plastic protection to compass platform. Armored doors (gangways) in hold at bow.</td>
</tr>
<tr>
<td>Crew</td>
<td>2 officers, 10 men, with accommodations.</td>
</tr>
<tr>
<td>Propulsion</td>
<td>2 Paxman twin 400 hp. (aft); scout car and rudders.</td>
</tr>
<tr>
<td>Fuel</td>
<td>24 tons oil stowed.</td>
</tr>
</tbody>
</table>
This e-ah has also been converted to LCF (4) and LCG (4).

Operational use
Besides the function of landing tanks and vehicles directly on beaches, these craft perform many varied base duties, such as net-laying (photo).

Description
A British development of LCT(1) 3 designs. Shorter and broader, this craft is capable of beaching on slopes greater than 1/150. Note that hold, unlike previous models, cannot be covered.

Capacity
Six 40-ton or nine 30-ton tanks, or 12 loaded 3-ton trucks, or 350 tons of cargo.

Endurance
500 miles at 91/2 kts.; Speed, 8 kts. (max. continuous) @ 1,100 miles at 8 kts. 1,375 c.p.m., or 5 kts on full time.

Dimensions
Length, 187'3" o.a. Beam, 38'8". Displacement, Light, 280 tons. Draft, 1'0" for'd, 4'0" aft. Loaded (tanks), 3'1" for'd, 4'3" off. Loaded (tanks), 3'10" for'd, 4'0" off.

Armament
Two 20 mm. Army 40 mm can be fired on routine as A.A. protection.

Armor
15-lb. platting to steerage, gun positions, air winches, and 10 lbs. to anchor reels.

Crew
2 officers, 10 men, and tank crews, with accommodations.

Propulsion
2 Paxman 500 hp. Diesels—twin 21" screws and rudders.

Operational use
Same as previous designs. In emerencies, this craft can serve as a floating bridge for unloading LSTs. This is accomplished by mooring LST and LCT m hine.

Description
LCT(5) hull modified to permit stern loading and increased living spaces.

Capacity
Four medium or three 50-ton tanks, or 150 tons cargo. Accommodations for 8 troops.

Endurance
700 miles @ 7 kts. Speed 8 kts. (max.).

Dimensions
Length, 120'4" o.a. Beam 32'.

Displacement
Light, 143 tons. Landing, 284 tons. John in. immersion, 7'5" in landing condition.

Draft
3'4" for'd, 4'0" off (landing conditions).

Armament
Two 20 mm.

Armor
20-lb. STS on pilothouse for'd. 15-lb. STS on pilothouse side. 10-lb. STS on splinter shields.

Crew
1 officer, 11 men.

Propulsion
3 Gray 225 hp. Diesels.

Fuel
11.12 tons fuel oil, 14090 lube oil.
LANDING CRAFT, TANK (ROCKETI LCT(R)

Operational use: To deliver a large volume of preparatory rocket fire on landing beaches.

Description: British conversions from LCT Marks (2) and (3). Folk deck and rocket stands are readily removable so that the craft may continue as a tank-landing unit. Once the initial landings are accomplished, electrically fired at 24/s, the rockets cover an area of 750 x 160 yards, with a density of one rocket per 100 sq. yards.

Armament:
- 792 (LCT(2)) or 1,064 (LCT (3)), 5" rockets in stands of six
- 2 x .30 cal. M. G.
- 750 x 160 yards, 792 (LCT (2)) or 1,064 (LCT (3)), 5" rockets in stands of six
- 2 x .30 cal. M. G.

Endurance: 2,700 miles @ 9 kts. Speed: 11½ kts. (max.)
1,400 miles @ 11½ kts. Draft, 4'3" off.

Protection:
- Blast screen and woodenshelter on bridge.
- As per LCT (2), (3).

Propulsion:
- As per LCT (2), (3).

LANDING CRAFT, VEHICLE, PERSONNEL LCVP

Description: Essentially an improved LCV with steering control and gunners' cockpits in the hold. This design is standard equipment for all ships and supplied LCVP in production.

Capacity: 25 tons
Endurance: 102 miles
Dimensions: Length 36' o.a. Beam, 10' 5'' o.a.
Displacement: 1,000 lb.
Armament: Two 30-cal. M. G.
Armor: 7/8'' STS, ramp and sides.
Crew: 3.
To transport loaded landing craft to the landing area, where the hold is flooded and the craft move out under the ship's own power.

Description
An adaptation of the floating dry-dock principle. Landing craft up to the size of LCI(3)'s may be stowed in the well. 2 35 ton cranes service the craft, land vehicle and cargo. British Entrench Team.

3 LCT (5) each with 5 medium tanks or 2 LST (1) (4) each with 12 medium tanks or 14 LCM (5) each with 1 medium tank or 1,500 tons of cargo or 41 LVT's or 47 DUKW's. Troops, 20 officers, 218 men.

Endurance
8,000 miles @ 15 knots. Design speed is 17 knots minimum.

Displacement

<table>
<thead>
<tr>
<th>Displacement</th>
<th>Draft</th>
<th>Light Draft</th>
<th>Endurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light draft</td>
<td>4.032</td>
<td>2.92' for'd</td>
<td>6,000 mi</td>
</tr>
<tr>
<td>Light service</td>
<td>5.050</td>
<td>10'9&quot; f'm</td>
<td>(maxim</td>
</tr>
<tr>
<td>S.tonnage(loaded)</td>
<td>7.370</td>
<td>12'2&quot; f'm</td>
<td>um)</td>
</tr>
<tr>
<td>Ballasted(n.b.)</td>
<td>11.5'9&quot;</td>
<td>18'2&quot; f'm</td>
<td></td>
</tr>
<tr>
<td>Tons per inch immersion, light condition</td>
<td>43</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dimensions
Length 457'9" o.a., Beam 72'.

Armor

<table>
<thead>
<tr>
<th>Armor</th>
<th>Type</th>
<th>Cal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>British 1-3&quot; 50 col. DP</td>
<td>1-3&quot;/50 col. DP</td>
<td></td>
</tr>
<tr>
<td>2-40 mm. twin</td>
<td>4 2. pdr. pompons</td>
<td></td>
</tr>
<tr>
<td>16-20 mm. singles</td>
<td>16 20 mm. singles</td>
<td></td>
</tr>
</tbody>
</table>

Propulsion
LST 1-8, steam reciprocating; LST 9-15, steam turbines; twin screws.

LANDING SHIP, DOCK - LSD

Operational use
Ocean-going ship designed to land waterproofed tanks or vehicles over a low ramp on a 1/50 beach slope.

Description
An American design now the United Nations standard. Elevator and tank service main deck where miscellaneous vehicles and cargo are stowed. Starting with LST-513 and exceptions LST-531, main deck ramp is substituted for elevator. For inaccessible landings, sectional k Tưchák's are alternated with submerged tanks. Main deck is designed for concentrated load of trucks having standard gross, 50 tons. When this load is exceeded, as in case of LVT's, vehicles should be loaded over short spans of side beams with planking to distribute load.

Tank deck load is designed for concentrated load of heaviest tanks. The install height from deck to underside of lights in this space is 11'3". Volume is 923,765 cubic feet. 1,000 tons of Diesel oil can also be carried.

Endurance
6000 mile radius of 9 knots. Speed—108 knots (maximum).

Displacement

<table>
<thead>
<tr>
<th>Displacement</th>
<th>Draft</th>
<th>Lift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Draft</td>
<td>4.032</td>
<td>1,400 tons</td>
</tr>
<tr>
<td>Light service</td>
<td>5.050</td>
<td></td>
</tr>
<tr>
<td>S.tonnage(loaded)</td>
<td>7.370</td>
<td></td>
</tr>
<tr>
<td>Ballasted(n.b.)</td>
<td>11.5'9&quot;</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions
Length 538' o.a., Beam 75'.

Armament

<table>
<thead>
<tr>
<th>Armament</th>
<th>Type</th>
<th>Cal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>British 1-12 pd.</td>
<td>1-3&quot;/50 col. DP</td>
<td></td>
</tr>
<tr>
<td>2-40 mm. twin</td>
<td>4 2. pdr. pompons</td>
<td></td>
</tr>
<tr>
<td>16-20 mm. singles</td>
<td>16 20 mm. singles</td>
<td></td>
</tr>
</tbody>
</table>

Propulsion
LST 1-8, steam reciprocating; LST 9-15, steam turbines; twin screws.

LANDING SHIP, TANK - LST

Operational use
To transport loaded landing craft to the landing area, where the hold is flooded and the craft move out under their own power.

Description
An adaptation of the floating dry-dock principle. Landing craft up to the size of LCI(3)'s may be stowed in the well. 2 35 ton cranes service the craft, land vehicle and cargo. British Entrench Team.

3 LCT (5) each with 5 medium tanks or 2 LST (1) (4) each with 12 medium tanks or 14 LCM (5) each with 1 medium tank or 1,500 tons of cargo or 41 LVT's or 47 DUKW's. Troops, 20 officers, 218 men.

Endurance
8,000 miles @ 15 knots. Design speed is 17 knots minimum.

Displacement

<table>
<thead>
<tr>
<th>Displacement</th>
<th>Draft</th>
<th>Lift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Draft</td>
<td>4.032</td>
<td>1,400 tons</td>
</tr>
<tr>
<td>Light service</td>
<td>5.050</td>
<td></td>
</tr>
<tr>
<td>S.tonnage(loaded)</td>
<td>7.370</td>
<td></td>
</tr>
<tr>
<td>Ballasted(n.b.)</td>
<td>11.5'9&quot;</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions
Length 538' o.a., Beam 75'.

Armament

<table>
<thead>
<tr>
<th>Armament</th>
<th>Type</th>
<th>Cal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>British 1-12 pd.</td>
<td>1-3&quot;/50 col. DP</td>
<td></td>
</tr>
<tr>
<td>2-40 mm. twin</td>
<td>4 2. pdr. pompons</td>
<td></td>
</tr>
<tr>
<td>16-20 mm. singles</td>
<td>16 20 mm. singles</td>
<td></td>
</tr>
</tbody>
</table>

Propulsion
LST 1-8, steam reciprocating; LST 9-15, steam turbines; twin screws.
LANDING VEHICLE, TRacked (MARK 1) LVT (1)

Operational use: Personnel and cargo carrier designed for landing operations over coral reefs and other obstacles.

Description: Steel constructed watertight hull propelled on land and in water by cleated tracks. Transported on deck or in the hold of LST and LSD. LVT (1) is now obsolete.

Capacity: 4,500 lbs. (normal) or 20 fully equipped men; cargo space, 8'6" long x 7'9" wide x 7'1" deep.

Endurance: 15 miles (land), 50 miles (water).

Speed: 15 m.p.h. (f.o.d.); 4 knots (water) (f.o.d).

Dimensions: 21'6" o.a. x 9'10" x 8'2" height o.a.

Weight: 16,900 lbs. (unloaded).

Armor: None.

Crew: 3.

Propulsion: Hercules WX (5) three 6-cylinder, 146 hp. @ 2,400 r.p.m. gasoline engine; 80 gal. fuel carried.

LANDING VEHICLE, TRacked (MARK 2) LVT (2)

An improved version of LVT (1), this type is now standard for the United Nations. Soon to be superseded in production by LVT (4).

Capacity: 6,500 lbs. (normal), or 24 fully equipped men.

Endurance: 150 miles (land), 75 miles (water).

Speed: 25 m.p.h. (land), 15 m.p.h. (water).

Dimensions: 26'1" o.a. x 10'8" x 8'1" height o.a.

Weight: 25,200 lbs. (unloaded).

Armor: Portable plating shown by diagram.

Crew: 3.

Propulsion: Continental radial air-cooled 7-cylinder 280 hp. @ 800 r.p.m. gasoline engine.

Fuel: 110 gals. gasoline carried; consumption — 15 gals. an hour.
**LVT (3) LANDING VEHICLE, TRACKED (MARK 3)**

Capacity: 

11 T. equipped.

Ramp is capable

Endurance: 150 miles (land), 75 miles (water).

Spd., d (ost.) 5.2 kts. (water), 25 m.p.h. (land).

Armor: None, except armor kits.

Dimensions: 24'11 1/2” x 10'6” x 8'11 1/2” Height: 9'0”

Wt./hull: 28,800 lbs. (unloaded).

Crew: 3.

Propulsion: Two Cadillac V-8 water-cooled 220 hp. 3,400 r.p.m. gasoline engines.

Fuel: 150 gallons gasoline.

**LVT (4) LANDING VEHICLE, TRACKED (MARK 4)**

An LVT(2) with a stern ramp.

Capacity: 6,500 lbs. (max.).

Spd., d: Same as LVT (2).

Armor: Removable armor kits are illustrated on diagram.

Wt./hull: 23,350 lbs. (unloaded).

Dimensions: 36' x 12' x 10'8” x 8'12 1/2” Height: 9'0”

Propulsion: Same as LVT (2).
A 1/4th-scale, lightly armored amphibious combat vehicle, similar in characteristics to the LVT(2).

**LVT(A)(I)**

**VEHICLE, TRACKED (JUMORED)**

- **Dimensions**: 20' 1'' o.a. x 10' 8'' x 10' 1'' height
- **Weight**: 32,800 lbs.
- **Armament**
  - Turret, 6 pdr. M-6 gun and One .30 cal. on ring mounts; Two .30 cal. M.G. on ring mounts.
  - Armor: 
    - 1/2" vertical cab sides, turret, and under bow: 1" elsewhere.
- **Crew**: 6.
- **Other details**: Identical to LVT(2).
LVT (A)(2) LANDING VEHICLE, TRACKED (ARMORED) (MARK Z)

An armored LVT(2) capable of carrying 6,500 lb. of cargo. Except for weight (27,600 lb.) all statistics are the same as LVT(2). Armor and crew are identical to LVT (A)(1).

LVT(A)(3) was designed for LVT(4) with built-in armor, but will not be produced.

LVT(A)(4) LANDING VEHICLE, TRACKED (ARMORED) (MARK 4)

An LVT(A)(1) with a 50 cal. machine gun replacing the 37 mm. Only one 50 cal. is carried as additional armament. Excepting the statistics shown below, all data is identical with the (A)(1).

- **Weight**: 38,000 lb
- **Capacity**: 2,000 lbs. ammunition and gear
- **Speed**: 25 mph. (13km/hr) 5.2 lbs. (2.3 kg).
- **Crew**: 5
- **Armor**: 1" turret, 3/8" vertical cab sides, 1/4" otherwise.
FIRST ENGINEER CO., FIRST MARINE BRIGADE, F.M.F.
MARINE BARRACKS, QUANTICO, VIRGINIA.

/c.IV?PORARY AUXIL ;q,eY
DECK FOR LOADING OF
- HOLD
U.5..S. ANTARES.

APPROVEO: .3 Ji9N Ur:JRY /93-

FIRST LIEUTENANT US.H.C.

/ASCAUO
J. O. No. J-44

/NOEX

OWG.No. c;:-48
Bibliography

Primary Sources


Ellis, Major Earl H., USMC, Operation Plan 712 J, Advance Base Operations in Micronesia, (Box 7, File 165 A, Historical Amphibious Files, United States Marine Corps Archives, Quantico, VA).


Excerpts from Report on U.S. Fleet Landing Exercise Number Two, undated. United States Navy Fleet Landing Exercise 2, 1936, (Box 6, Exercises Collection, United States Marine Corps Archive, Quantico, VA).


Headquarters, United States Marine Corps, *Joint Exercises in Landings Against Opposition (15 October, 1941)*, (Box 5, File 100, Historical Amphibious Files, United States Marine Corps Archive, Quantico, VA).

Headquarters, United States Marine Corps, *Joint Exercise in Landings Against Opposition (4 January, 1942)*, (Box 5, File 99, Historical Amphibious Files, United States Marine Corps Archive, Quantico, VA).

Headquarters, United States Marine Corps Memorandum, 23 July, 1923. (Box 7, File 165 A, Historical Amphibious Files, United States Marine Corps Archives, Quantico, VA).

Headquarters, United States Navy, *2d Joint Army and Navy Exercise, Problem No. 3, Oahu, Hawaii, 1925*, (Box 7, File 155, Historical Amphibious Files, United States Marine Corps Archive, Quantico, VA).

Headquarters, United States Navy, *Report of Observations of Maneuvers Conducted by Units of the 9th Division, US Army, Amphibious Corps, Atlantic Fleet, Solomons Islands Area (2-13 June 1942)*, (Box 5, File 110, Historical Amphibious Files, United States Marine Corps Archive, Quantico, VA).

“Joint Army and Navy Basic War Plans, Rainbow Nos. 1,2,3,4, and 5.” 05/11/1939, (RG-225 M-1421, Roll 11-0031, NA).


Kelly, Captain Paul B., USA, Extracts of Report to Commanding General, Fort Monroe, VA. United States Navy Fleet Landing Exercise 1, 1935, (Box 4, Exercises Collection, United States Marine Corps Archive, Quantico, VA).


Miller, Colonel C.J., USMC, Report to Commanding General, 1st Marine Brigade, FMF, 26 February, 1937, (Box 10, Exercises Collection, United States Marine Corps Archive, Quantico, VA).


Miles, Colonel Sherman, USA on Fleet Landing Exercise No. 2, Report of 18 March, 1936. United States Navy Fleet Landing Exercise 2, 1936, (Box 6, Exercises Collection, United States Marine Corps Archive, Quantico, VA).

Monson, Major G.E., USMC, On Fleet Landing Exercise 5 on behalf of Marine Corps Schools, Report of (date unavailable), 1939. United States Navy Fleet Landing Exercise 5, 1939, (Box 16, Exercises Collection, United States Marine Corps Archive, Quantico, VA).


Moore, Major James T., USMC to the Commanding General, Fleet Marine Force, Report of 2 April, 1935. United States Navy Fleet Landing Exercise Number 1, (Box 4, Exercises Collection, United States Marine Corps Archive, Quantico, VA).

Senior Umpire Blue to the Commanding General, First Marine Brigade, Report of 26 February, 1938. United States Navy Fleet Landing Exercise 4, 1938, (Box 13, Exercises Collection, United States Marine Corps Archive, Quantico, VA).

Senior Umpire White to the Commanding General, First Marine Brigade, Report of 21 February, 1938. United States Navy Fleet Landing Exercise 4, (Box 13, Exercises Collection, United States Marine Corps Archive, Quantico, VA).

Senior Umpire to Commanding General, First Marine Brigade, February, 1940. United States Navy Fleet Exercise 6, 1940, (Box 18, Exercises Collection, United States Marine Corps Archive, Quantico, VA).

United States Marine Corps, War Plans Division, OP-12C, *War Portfolio, 1921*, (Box 7, File 165 A, Historical Amphibious Files, United States Marine Corps Archives, Quantico, VA).


United States Department of the Navy, General Order No. 241, 7 December, 1933, *The Fleet Marine Force, Establishment of, 1933*, (Box 36, File 545, Historical Amphibious Files, United States Marine Corps Archives, Quantico, VA).


White, T.B., Officer in Charge of Aerial Spotting to Commanding Officer, VO Squadron, 9th Marine Regiment, Report of 4 March, 1935. United States Navy Fleet Exercise 1, 1935, (Box 4, Exercises Collection, United States Marine Corps Archive, Quantico, VA).

Williams, Major Dion, USMC, *Report on Men, Material, and Drills Required for Establishing Naval Advanced Base*, 2 November, 1909, (Box 52, File 769, Historical Amphibious Files, United States Marine Corps Archives, Quantico, VA).

Williams, Brigadier General R.P., USMC to Rear Admiral A.W. Williams, USN, 28 February, 1938. United States Navy Fleet Landing Exercise 4, 1938, (Box 12, Exercises Collection, United States Marine Corps Archive, Quantico, VA).

Williams, Brigadier General R.P., USMC, to the Commanding General, Fleet Marine Force, report undated. United States Navy Fleet Landing Exercise 5, 1939, (Box 16, Exercises Collection, United States Marine Corps Archive, Quantico, VA).
Secondary Sources


