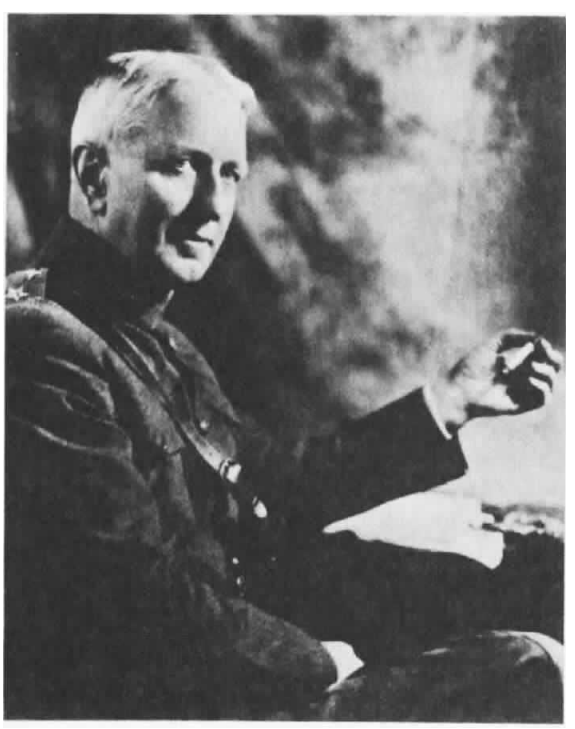
CHAPTER III

ECONOMY AND WITHDRAWAL

The whole decade of the 1930s was a period that tested the American Republic as America underwent the hardships of the Great Depression during the administrations of Presidents Herbert Hoover and Franklin D. Roosevelt. The Republican era ended with the defeat of Hoover for reelection in 1932 and the start of the Roosevelt Democratic era in March 1933. The Great Depression was caused in part by the market crash that began after Labor Day 1929 with the heaviest selling on "Black Thursday," October 24th. Two weeks after Black Thursday the average price of all common stocks was off 40 percent. Between 1929 and 1932, General Motors dropped in price from $73 to $8 per share and United States Steel from $262 to $22; the general average was down 90 percent. The Gross National Product dropped from $104 billion in 1929 to $59 billion in 1932.

A historian of the era, Professor William E. Leuchtenburg, stated that:

> . . . by 1932, the unemployed numbered upward of thirteen million. Many lived in the primitive conditions of a preindustrial society stricken by famine. In the coal fields of West Virginia and Kentucky, evicted families shivered in tents in midwinter; children went barefoot. In Los Angeles, people whose gas and electricity had been turned



Major General Ben H. Fuller, 15th Commandant of the Marine Corps, 9 July 1930 to 28 February 1934. (USMC Photo #308343).

Major General John H. Russell, Jr., 16th Commandant of the Marine Corps, 1 March 1934 to 30 November 1936. (USMC Photo #H-6252).

> off were reduced to cooking over wood fires in back lots . . . At least a million, perhaps as many as two millions were wandering the country in a fruitless quest for work or adventure or just a sense of movement.[1]

The unemployed in America during a 10-year period ranged from 1.6 million or 3 percent of the labor force in 1929 to 12.8 million or 25 percent of the labor force in 1933. By 1939, unemployment dropped by 3 million to 9.5 million or 17 percent of the labor force. To add to the economic woes, labor unrest produced in 1937 the worst strike year in the period between the stock market crash and the end of World War II. The depression hung like a pall over the entire country and the world.

When Franklin D. Roosevelt became President in 1933, his energies were concentrated on domestic economic issues. On the international scene, however, the picture was equally confused and threatening and, of course, he had to conduct the foreign relations of the United States along with the domestic policies of the "New Deal." Fast moving events in Europe and Asia became the stepping stones to World War II. Adolph Hitler was appointed Chancellor of Germany a month or so before Roosevelt became President. The militarists had tightened their hold upon Japan and the Japanese war lords began to encroach upon North China. In a hope of new Russian-American trade and the promise from the Soviets not to interfere in the domestic affairs of the United States, Roosevelt granted diplomatic recognition to the Soviet Union in November of 1933.

Americans in the meantime had become disillusioned and resentful of the European powers who had reneged on the World War I debts. "Isolationists were convinced that the United States should have little traffic with those faithless foreigners; the experience with the debts strengthened the tendencies toward economic nationalism and isolationism." [2] America's fear of becoming involved in another European war was reflected in the legislation of the middle 1930s. Strong isolationist sentiment was apparent in the Johnson Debt Default Act of April 1934, which prohibited loans to foreign governments that had defaulted on their obligations to the United States. The passage of the Neutrality Acts of 1935, 1936, and 1937 were designed to prevent incidents that might lead to war.

The historian Charles A. Beard possibly summed up American sentiment in 1935 when he wrote:

> We tried once to right European wrongs, to make the world safe for democracy. Even in the rosiest view the experiment was not a great success . . . [Isolation] may be no better, for aught anyone actually knows. But we nearly burnt our house down with one experiment; so it seems not wholly irrational to try another line.[3]

In view of the international uncertainties of the 1930s the Beardian logic was difficult to refute.

President Roosevelt continued the withdrawal policy even in Latin America. He did so not because we were disillusioned with the South Americans, but because he dedicated the nation to "the policy of the good neighbor." The American historian George Harmon Knoles said that "Americans were not in an imperialistic, aggressive mood in the 1920s and 1930s. The United States henceforth expected to treat the nations of the world and particularly of the Western Hemisphere as good neighbors; that is to say, a policy of noninterference in the private affairs of those states, yet standing ready to be helpful." [4] Secretary of State Cordell Hull at a meeting of the Seventh Pan-American Conference at Montevideo, Uruguay in December 1933, proposed in the Convention on the Rights and Duties of States, under Article 8, that "no state has the right to intervene in the internal or external affairs of another." [5] In effect, America was renouncing the right of intervention in the Western Hemisphere. The United States soon had an opportunity to match words with deeds. In May 1934, the United States abrogated the Platt Amendment, which had granted America the right to intervene in Cuba since the early part of the century. By 15 August 1934, the 826-man 1st Marine Brigade in Haiti under the command of Brigadier General Louis McC. Little sailed for home thus ending the long period of American intervention in Latin America.[6]

With the end of intervention abroad and the problem of domestic unemployment reaching its peak at 12.8 million persons, the middle part of the decade of the thirties became most trying for all of the armed services. The Navy Department had received an appropriation of only $309 million for fiscal year 1935. Out of this figure, the Marine Corps of 17,248 officers and men, received a little over $21

million.[7] The Marine Corps figure included everything, from pay to general expenditures, which meant clothing, fuel, and the like. A low budget for the armed forces, who were after all preparing for future wars, seemed reasonable enough to the average person. The war fought in the thirties by Americans against starvation and unemployment was by far more real to the average American than any future enemy.

All service budgets were scrutinized again and again. The Navy Department had already undergone an agonizing time because of cut backs resulting from the naval disarmanent treaties of the 1920s. The Marine Corps' turn came during 1931 and 1932 in the form of an examination of its organization and establishment. The General Board of the Navy undertook a year-long study to determine the need for, and size of, the Marine Corps in war and peace. The board examined every aspect of the Marine Corps, reviewing its history, missions, aviation, and its place in the war plans of the nation. The CMC, Major General Ben H. Fuller, answered fully all questions of the General Board. The pivotal question basically was to show the necessity for an appropriated strength of 21,000 men. It had been feared by the Marine Corps that the statutory peacetime strength of 27,400 would be reduced. This reduction was opposed by the Chief of Naval Operations (CNO)* in his review of the General Board report to the Secretary of the Navy. He stated that the "present authorized strength of 27,400 should be continued as the legally authorized peacetime strength in order to allow expansion to this number without the necessity of legislation during a period of strained relations." [8]

The Marine Corps survived the examination and the Secretary of Navy, Charles F. Adams, approved the report of the General Board and the CNO's comment on 2 March 1933, which kept the statutory peace strength of the Marine Corps at 27,400. While the appropriated strength of the Marine Corps remained at 21,000 during the decade, the actual average yearly strength was approximately 17,700 men.[9]

*The CNO office was created in May 1915. It was a continuation of the office of Aide-for-Operations founded in 1909. The CNO is charged with the operations of the fleet and with the preparation and readiness of plans for its use in war. It was quite natural that the CNO would comment on the strength of the Marine Corps inasmuch as it would affect the Marine strength for the fleet.

Marine Corps Schools of the Thirties

Rear Admiral L. E. H. Maund, Royal Navy, when speaking of the Gallipoli-Dardanelles Campaign, stated: "It had imagination, it had the promise of great strategic gains; while the reasons for its failure could easily be discerned and had to do with lack of technique, material and belief in this form of warfare; shortcomings that could all be overcome." [10] So it was at MCS that formalized instruction in landing operations continued into the crucial decade of the thirties. A development of a mature doctrine of landing operations had been made. The basis was the realization at the policy-making level that an assault of defended beaches was feasible and that, indeed, future wars would demand the execution of such operations. Concurrently, as relaxation of tension in China and Nicaragua gradually released Marines in substantial numbers, the various elements of the developmental process began to complement each other.[11] The MCS began to devote a major effort to the study of landing operations and by the end of 1939, out of a total of 1,092 hours of instruction, 455 hours or 42 percent pertained to some aspects of landing operations.[12]

Brigadier General Randolph C. Berkeley became the first general officer to command the Marine Corps Schools in August 1930. Under General Berkeley's tenure, great strides were taken to resolve many problems concerning landing operations. It was in 1931, a banner year for MCS, that a special committee from the Field Officers School, under the direction of Colonel Charles F. B. Price, started work on a tentative text for "Marine Corps Landing Operations." Other members of the committee, who were also instructors at the Field Officers School, were Majors Charles D. Barrett and Lyle H. Miller.[13] In April 1931, Price asked General Berkeley to assign Barrett and Miller full-time to the preliminary work of preparing the tentative text. Price stated that "the most important part of the preliminary work will be rather extensive practical experiments to determine the capacity for personnel and equipment of all of the various types of boats in use in the Navy which might be employed in actual operations." [14] General Berkeley concurred and appointed a board to "develop and write the text for Landing Operations and Small Wars." [15] In addition to appointing Barrett and Miller, Berkeley added Major

Pedro A. del Valle and Lieutenant Walter C. Ansel, USN.[16] The board became known as the Landing Operations Text Board.

The CMC realized the importance of a naval officer as member of the Landing Operations Text Board as he "doubtless will be in a position to obtain informally naval thought on questions of naval doctrine which may arise. . . ." [17] Concurrent with this board, other boards such as the Experimental Landing Lighters Board and a Curriculum Board were all doing yeoman work at MCS. As a result of the Curriculum Board's recommendations, a considerably revised schedule was worked out for the following school year, 1932. Greater emphasis was placed on landing operations, despite the fact that the scheduled number of hours already assigned to these courses had been increasing steadily. Another recommendation of the board was to have MCS instruct and solve problems on the basis of Marine Corps organization and material.[18]

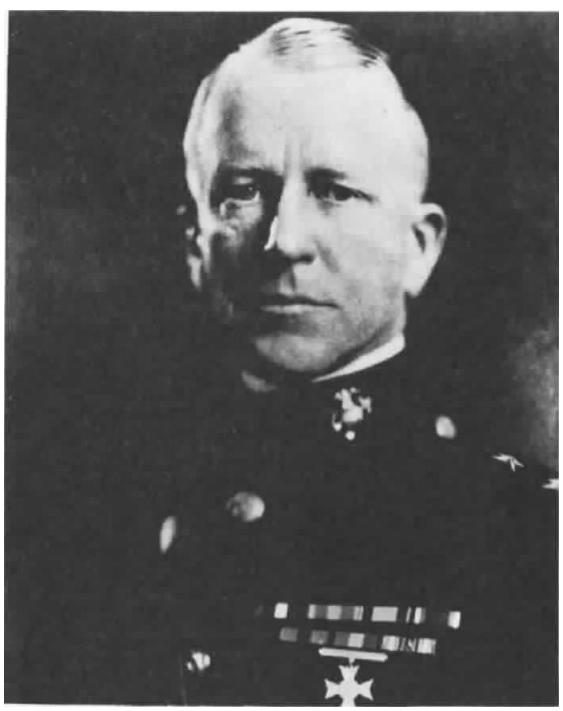
The changes that took place in the instruction and curriculum at MCS from 1931 to 1933 undoubtedly affected the Landing Operations Text Board of 1931. By 1933, there was no publication completed or printed from the work of this board on a landing operations text. The board's work was, however, the first effort to develop a modern landing doctrine and it provided a basis for the initial landing manual published a year later. Some of the work accomplished by the board, and used later in the 1934 manual, was studies on units of measurement for computing cargo requirements for military equipment, establishment of standard boat capacities for landing operations based on specific data, and whole chapters on signals, engineering, boats, air support, and artillery.

In April 1932, Brigadier General James C. Breckinridge succeeded General Berkeley as Commandant, Marine Corps Schools (CMCS). General Breckinridge, no stranger to MCS, having previously served as CMCS from 1929 to 1930, encouraged the changes taking place. In July of 1932, Lieutenant Colonel Ellis Bell Miller joined MCS as assistant to General Breckinridge. In two years, Breckinridge and Miller brought MCS to the forefront not only as the training center for Marine officers but as the intellectual/academic center for the Marine Corps. Miller reported into MCS from the Naval War College where, after completing the Senior Course, he had remained to be an instructor in strategy and tactics in its Senior and Junior Classes. In addition to the Marine Corps Schools, Miller was a graduate of two schools of the Army, Fort Leavenworth School of the Line and General Staff and the Army War College.[19] He consequently brought a great amount of service school experience with him. With the encouragement of General Breckinridge, Miller not only disagreed with the manner in which the school was run but the content and subject matter of many of the courses. He challenged the entire structure upon which the education of Marine officers was based.[20]

The first drastic action came when all the courses developed by the Army schools were discarded. These courses, and accompanying problems, had long been the basis for the cirriculum, but in order to make the problems work, the Army Tables of Organization had to be used. Instructors were directed to rewrite all their material and gear it to Marine Corps Tables of Organization and Equipment.

The changes at MCS were duly noted by the CMC when he summarized this small revolution in his annual report to the Secretary of the Navy in 1933.[21] Some of the changes he noted were:

> (a) School problems are now based on Marine Corps units and equipment.



Major General James C. Breckinridge, USMC. (USMC Photo #521272).

(b) Certain personnel were designated to prepare text books and pamphlets to cover fields of service for which no Marine texts existed.

(c) Support by naval gunfire and other naval agencies was developed in greater detail, and a closer relationship with the Naval War College was maintained.

(d) More effort was placed on the development of comprehensive courses on landing operations and small wars.

In addition to the curriculum changes, the content of a course in the study of landing operations was revised. The Dardanelles-Gallipoli Campaign formed an important part of the background in research on this subject. During the academic year 1932–1933, each student was issued a copy of the British official history of the Gallipoli Campaign. This book, *Military Operations, Gallipoli,* being the latest and most accurate publication on the subject, was used as a source book. The Gallipoli Course was organized "to acquaint the students with the Gallipoli Campaign; to train them in military research; and to provide the Schools and through them the Marine Corps with the material of value on a campaign which is in many respects of the type we are expected to be experts in." [22]

Concurrent with the Gallipoli studies, the students from the Field Officers School at MCS, in conjunction with the Naval War College, worked together on what had come to be called the Advanced Base Problem. The Advanced Base Problem series, 10 in all, started during the school year 1931–1932. Each year a theoretical problem of defending or seizing a base in a given area was considered by both groups of students. The Pacific area was the predominant choice of areas for such problems as evidenced by problems dealing with Dumanquilas in the Philippines, Truk, Palau Islands, Guam, Saipan, and Tinian.[23] The Advanced Base Problems afforded the Marine Corps Schools a chance to present its solutions at the Naval War College and most importantly, the problems awakened an understanding of the imporance of the establishment of organized fleet landing units.

Colonel Richard M. Cutts, on the staff of the Naval War College, had written to Colonel Miller at MCS and Major General John T. Myers, Assistant to the Commandant, proposing that a Marine base force be placed in the operating forces of the fleet:

> . . . as a fleet unit, with as much consideration given to it by the Navy as other fleet types, such as cruisers, destroyers, or carriers . . . establishment of the fact that naval overseas operations are doomed to failure lacking a proper Naval Advanced Base Force operated by the Marine Expeditionary Force . . . and the establishment of the fact that this necessary base force cannot be created by the Marine Corps alone; it requires the active assistance of the Navy Department necessitating appropriations and constructive action.[24]

Colonel Miller replied that "it was becoming clear that a complete reorganization and reequipment of forces was necessary to carry out Marine Corps missions in support of the fleet." [25] In an article in March 1931, Lieutenant Commander E. W. Broadbent, USN, who was one of the first naval officers to serve at MCS (1926–28) stated:

> 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 needs more and better bases, the Navy and the Marines can take and hold them.[26]

In August 1933, Major General John H. Russell, Assistant to the Commandant, suggested to the CMC the discontinuation of the old "expeditionary force" and the creation in its stead of a new body to be called either the Fleet Base Defense Force or the Fleet Marine Force. The Fleet Marine Force, or FMF, as it was to be called, was an old idea of General Russell's and he crystallized his ideas, Miller's, Cutts', Myers', and many others when he insisted that "this force should be included in the fleet organization as an integral part thereof, subject to the orders, for tactical employment, of the Commander-in-Chief, U.S. Fleet." [27] After approval by the CMC and the appropriate authorities of the Navy Department, the Secretary of the Navy, Claude A. Swanson, signed General Order No. 241 on 7 December 1933 designating the FMF from the "force of marines maintained by the Major General Commandant in a state of readiness for operations with the Fleet." [28] The FMF replaced the East Coast and West Coast Expeditionary Forces and the Commanding General, FMF and his staff were initially stationed at Quantico.[29] This force provided the Navy with a "type-force" of reinforced infantry with the specific mission of executing landing operations.

As significant as was the creation of this force, the fleet did not yet possess the capability of actually seizing bases and thus projecting itself across the oceans. The FMF needed a basic doctrine to guide its training, and the

fleet elements which were to be involved in landing operations required guidance as to how they would perform their tasks in concert with the landing force. Between 1919 and 1933, the Joint Army-Navy Board had promulgated several manuals prescribing methods for Army and Navy cooperation in joint overseas expeditions. The latest was published in 1933.[30] The directives contained in the manual were concerned with the techniques and agencies for cooperation and with the respective functions of each service in the conduct of joint operations. But a manual of landing operations was still lacking. By late 1933, plans to work on a landing manual by MCS were interrupted by the mobilization of the 7th Marines for Cuban duty and the consequent drain on personnel. The CMCS recommended to the CMC that all classes be discontinued at the schools and that students and staff alike devote all time and effort towards the production of a landing operations manual. The Commandant agreed and, on 30 October 1933, directed the CMCS to prepare a manual on landing operations as expeditiously as possible and to commence work not later than 15 November. Classes were discontinued on 14 November and the staff and students began work on the manual.[31]

The Manual

How the finished product—the manual—was written and the multiple changes in title it went through is in itself a story almost as interesting as the contents.

> Students & instructors wrote out chronologically itemized lists of the things to be done from the inception of a landing operation to the tactical completion of a landing operation.
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> A committee of nine was appointed to consider the itemized lists and draw up a consolidated list embracing all recommendations and to group them under headings. Each member of the committee of nine formulated his own list, based on the results of his study of all lists submitted.
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> A committee of five then studied and further consolidated the lists from the committee of nine which resulted in a rough outline for the contents of the manual.
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> The prophetic nature of the rough outline was dramatically exemplified by an examination of the six elements into which the landing operation was subdivided: (1) Command relationships, (2) Naval gunfire support, (3) Aerial support, (4) Ship-to-shore movements, (5) Securing the beachhead, and (6) Logistics. These functions, together with communications, formed the basis to a greater or lesser degree of amphibious doctrine today.

On 9 January 1934, officers from the FMF, HQMC, and Quantico participated in a conference with respect to the outline. The outline was based on experience, both personal and that culled from reports of landing operations, experimentation, and the evolution of instruction and problems at the MCS. Some 70 officers from lieutenants to brigadier generals, including four Navy officers and one Army officer, attended the meeting. Following the conference, the manual was divided into various parts and responsibility for writing these parts was assigned to various committees. The bulk of the manual was grouped under three general areas: (1) Tactics, which included landing and defense of bases, prefaced by a general discussion of landing operations and the purpose of the manual. The committee chairman was Major John Marston and subcommittee members, Major DeWitt Peck and Major Charles J. Miller. (2) Staff functions, logistics, and plans and orders. Committee chairman, Major Harold L. Parsons and subcommittee members, Majors Wilbur Thing, Samuel A. Woods, and Thomas E. Thrasher; and (3) Training; chairman of committee, Lieutenant Colonel Calhoun Ancrum. In addition, separate parts on naval and aviation activities were prepared by Lieutenant Commander Clifford G. Richardson, USN, Chairman of the Naval Committee, and Captain Harold D. Campbell, Chairman of the Aviation Committee.[32] On 28 March 1934, committees that had been at work in earnest submitted to the CMC the first parts of the manual. By 13 June 1934, the remaining chapters were submitted.

The sequence of development of the manual was as follows:

> Tentative Manual for Landing Operations of 1934 was used at MCS during the 1934–35 school year in mimeograph format; it was not given outside distribution.
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> By July 1934, the title was changed to *Manual for Naval Overseas Operations* and published by the Navy Department.
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> 15 May 1935, a board headed by Lieutenant Colonel Charles D. Barrett was formed for revision of the 1934 edition of the manual.*

*General Alfred H. Noble considers Barrett (later a major general) to have been an outstanding original thinker who almost singlehandedly wrote two-thirds of the Tentative Manual based on the mass of uncoordinated material assembled at the time. "He [Barrett] was the man who put pencil to paper." Gen Alfred H. Noble ltr to Director, M.C. History, dated 3 April 1971 (Historical Division, Headquarters, U.S. Marine Corps).

Major Charles D. Barrett, USMC. (USMC Photo #519539).

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9 July 1935, a revised manual with photographs, better sketches, etc., approved by the CNO on 25 May 1935, was distributed by the CMC throughout the Marine Corps, Navy, and outside agencies with a "Restricted" classification. This 1935 edition became the first widely-distributed *Tentative Landing Operations Manual.*[33]

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On 15 June 1936, a board headed by Lieutenant Colonel Keller E. Rockey, along with Lieutenant Colonels Archie F. Howard and Alfred H. Noble, was convened to revise the 1935 edition of the manual.

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On 26 May 1937, the CMC sent to the CNO the report of the board on revisions.

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A revised manual was issued, but not for general distribution, on 21 June 1937 under the new title, *Landing Operations Doctrine, U.S. Navy 1937.*

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On 15 May 1938, a board headed by Lieutenant Colonel Allen H. Turnage was convened to make revisions on the 1937 edition of the manual. Other members of the board were Lieutenant Colonel Alfred H. Noble, Captain Francis M. McAlister, and Quartermaster Clerk Percy J. Uhlinger.

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On 25 November 1938, CMC authorized destruction of the 1935 manual, technically the *Landing Operations Doctrine* of 1937, with the issuance of *Fleet Training Publication (FTP) #167,* also known as the *Landing Operations Doctrine, U.S. Navy 1938.*[34]

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In May 1941, Change #1 to FTP #167 was issued based on experiences of the Fleet Landing Exercises and material developments up until 1941. This edition was the guide for the Guadalcanal landings in August 1942.

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Change #2 to FTP #167 was issued 6 days before Guadalcanal, on 1 August 1942.

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Change #3 was issued in August 1943, based on further experiences in the Solomons and in North Africa. It was used during the remaining part of World War II.

The Contents

Command relationships as described in the *Tentative Manual* dealt with the organization of the landing force as well as with command procedures. It was here that the inherent naval character of the landing operation was defined. The force was to be commanded by a Navy flag officer. The task force would have two main components: the landing force, made up of Fleet Marine Force units, and the naval support groups consisting of the Fire Support Group, the Air Group, the Covering Group, and the Transport Group. The specific responsibilities of the various commanders during all phases of the operations were enumerated and the principle of parallelism of command, subject to the overall authority of the amphibious force commander, was defined. With these arrangements one of the major causes of the Gallipoli disaster was overcome. Finally, it insured that naval forces would organize so as to be responsive to the needs of the landing force.[35]

The *Tentative Manual* recognized that a landing force in the assault followed the same pattern as conventional offensive action but it also recognized the fact that the over-the-water movements of troops complicated the problem of fire support. In developing a solution to this problem, an effort was made to adapt naval guns to missions normally performed by field artillery. The problems of fire direction, the nature of projectiles, magazine capacity, and the muzzle velocities and trajectories of weapons were all considered, and a sound doctrine for the effective delivery of naval gunfire was developed.

As a result of the many problems associated with the delivery of naval gunfire in close support of assault troops, the writers of the *Tentative Manual* explored the possibility of employing aircraft for this purpose. As a result, the initial doctrine for close air support evolved. This doctrine provided for both visual and photographic reconnaissance, air defense, and airborne fire support during the final run of landing craft to the beach. This doctrine will be discussed in the succeeding chapter.

To no one's surprise, the part that had the greatest impact on the art of landing operations was the ship-to-shore movement. The manual recognized that the ship-to-shore movement embraces the most critical phase of the landing operation and that it was more than a simple ferrying operation. The text provided a technique for the waterborne deployment of the landing force for battle in accordance with the principles of fire and movement. For securing the beachhead the manual defined the techniques which would permit the landing force to survive during the period between sole reliance on seaborne fire support and the landing of its own artillery. It spelled out in detail the procedures for establishing communications promptly between echelons ashore and those afloat, and it addressed itself realistically to the complex problems of supply and services required by the landing force.

In the field of logistics, the *Tentative Manual* emphasized the overriding importance of tailoring all loading to the requirements of the landing force; the ships would be loaded in a manner which would respond precisely to the tactical needs of the landing forces as they assaulted the hostile shore. The practice of stowing as much materiel into a ship as it would hold had to be replaced by a technique that gave careful consideration to the requirements of the troops on the beach. Recognizing this requirement and the related requirement for standardizing procedure for embarkation of the landing force, the Marine Corps developed and included in the manual instructions on embarkation. These instructions included the preparation of embarkation forms, loading plans, and set forth the technique of combat unit loading of assault ships.

The theory contained in the manual was specifically tested in the annual fleet training exercises from 1935 through 1941, conducted at Culebra, Vieques, the island of San Clemente near San Diego, and in 1941 at New River, North Carolina. These exercises refined landing force staff work, stimulated the evolution of landing craft and radio equipment, underscored the need for improved gunfire and air support doctrine, and gave practical experience to the forces involved.[36]

The *Tentative Landing Operations Manual,* initially published in 1934, is perhaps the most important contribution to military science the Marine Corps had made to date in the 20th century; certainly it is one of the landmarks in its history.

Boats, Lighters, and Amphibians

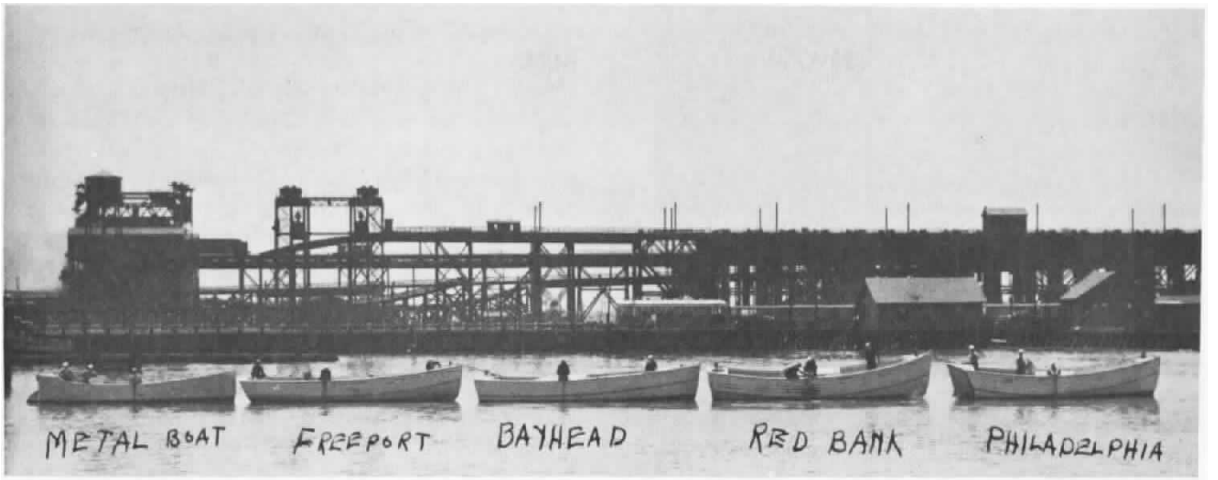
Along with developments in doctrine and technique there was a corresponding demand for specialized equipment to make the landing operation effective. In 1933, the CMC established a Marine Corps Equipment Board composed of 11 members who served on an additional duty basis. The primary assigned duty of the board was to recommend the types of equipment best suited to the needs of the Marine Corps. The Marine Corps was a "user" rather than a "developer" of equipment at this time. By 1937, the board, gaining momentum and importance in pressing the Navy Department to buy and develop landing boats, expanded to 20 officers assigned on a full-time basis.

The bureau within the Navy Department responsible for designing, producing, and paying for all ships and boats was the Bureau of Construction and Repair, later renamed Bureau of Ships in 1940. This bureau was of course struggling to make maximum use of the little money the Navy had in the 1930s. The development of landing boats was the least important item on its agenda. Tenacity and persistence on the part of the Marine Corps plus a few sympathetic naval officers in Construction and Repair had to be the primary reason for the success of the development of landing craft prior to United States entry into World War II.

The problems to be solved in procuring special landing craft needed in landing operations fell into three categories: (1) Landing boats—used as carriers of troops from ship-to-shore; (2) Lighters—used to carry tanks and trucks; and then finally (3) Amphibians—as thought of in the 1930s as a fire support weapon only, that is, an amphibious tank. By January 1937, the importance of obtaining suitable landing craft became apparent when the Secretary of Navy established a "Department Continuing Board for the Development of Landing Boats for Training Operations." The board membership included representatives of the CNO, CMC, Bureau of Construction and Repair, and Bureau of Ordnance.[37]

I—Landing Boats

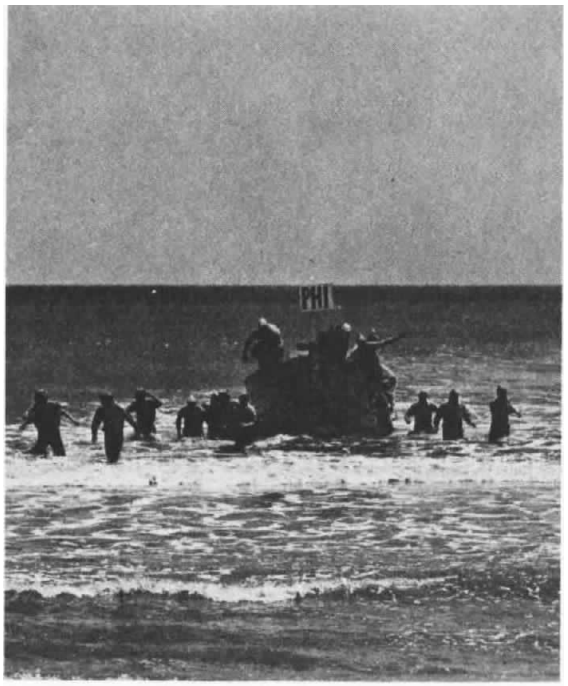
In an effort to explore the suitability of existing commercial craft for landing operations, the Navy, at the request of the Marine Corps, agreed to test a variety of small boats in consonance with available funds. In 1935,



Experimental surf boats lined up at Hampton Roads, Va., on 2 May 1938. (USNAS, Hampton Roads Photo #5773).

bids were advertised by the Bureau of Construction and Repair with specific details as to weight and length of the boats desired. The bureau had in mind the available deck space, handling facilities, and davit strength of the ships of the 1935 Navy. Undoubtedly, these specifications hampered some bidders as only nine replies were received by the Navy. Out of these nine, five boats were accepted by the Bureau and the Marine Corps Equipment Board for testing at Cape May, New Jersey, in the summer of 1936. The boats were not superior to conventional boats, although they included some improved features and would consequently be tested again in May of 1938 at Hampton Roads, Virginia. Four of the five boats tested were modified fishing boats used by Atlantic Coast fishermen for many years and named after the ports from which they came, Bay Head, Red Bank, Freeport, and Philadelphia. The fifth boat, a metal surf boat, was a separate commercial entry. In the May 1938 tests, none of the boats was satisfactory. The following winter, during fleet exercises at Culebra, three of the five boats, Bay Head, Red Bank, and Freeport, were again tested. "The modified fishing craft still had serious drawbacks. Owing to their exposed rudders and propellers they tended to dig in when retracting. They were so high forward that Marines debarking had to drop 10 feet from the bow to the beach. They were, moreover, all unsuitable for lowering and hoisting." [38] In the light of the drawbacks revealed by tests, the "Bureau of Construction and Repair undertook the construction of a boat embodying all the best features of the fishing craft. This was the beginning of a long and unsuccessful effort by the Bureau to develop a satisfactory landing craft. The 'Bureau Boat' in various forms showed up regularly at Fleet Landing exercises from 1939 through 1941, but efforts to get the 'bugs' out of its design were abandoned in 1940." [39] Along with the "Bureau Boats" that were being tested until 1940, experiments were carried out utilizing standard Navy ships' boats. The standard boats, designed for other purposes, also proved unsuitable for

Red Bank surf boat taking on board 18 Marines it had landed during trials in May 1938. (USNAS, Hampton Roads Photo #5762).



Philadelphia surf boat landing 18 Marines during May 1938. (USNAS Hampton Roads Photo #5758).

beaching operations. They lacked speed and maneuverability and were extremely difficult to handle in the surf.

In 1937, Andrew Higgins, a New Orleans boat builder, reentered the picture of solving the problem of a suitable landing boat. Higgins reentered because he had previously endeavored to interest the Navy and the Marine Corps in the Eureka boat that he invented in 1926. He had visited Quantico in 1934 to interest the Equipment Board in the Eureka boat, but with little or no money left in the Bureau of Construction and Repair nothing definite could be accomplished at the time. In the 1935 bidding for test boats, Higgins declined to submit a bid to the bureau. In October of 1936, Higgins wrote to the Navy offering his Eureka as a troop landing craft. The Eureka was a boat of promising design. It had a special shallow draft for the use of trappers and oil drillers along the lower Mississippi and Gulf Coast. It had a tunnel stern to protect the propeller and a special type of bow, called by Higgins a "spoonbill," which enabled it to run well up on low banks and beaches and retract easily.[40]

Timing was again poor and the Navy was unable to purchase the boat. In 1937, Commander Ralph S. McDowell, who was responsible for landing craft development in the Bureau of Construction and Repair, wrote to Higgins inviting him to visit the Navy Department for further discussion of his boat. Higgins visited McDowell in Washington shortly thereafter and spent one week working with him on redesigning the Eureka boat. Higgins was soon given a proprietary contract to deliver one boat, which he did within 30 days, to Norfolk. In the spring of 1938, McDowell and other members of the Continuing Board went to Hampton Roads and tested the Eureka boat. Everybody was pleased with the way it performed. The Eureka made its first maneuver appearance at Fleet Exercise 5 in 1939 where it competed against several bureau boats and the by-now venerable fishing craft. Again it surpassed all the tests but the Commander Atlantic Squadron recommended that the Training Squadron of the Atlantic Fleet, a counterpart of the Continuing Board, give further tests to the Eureka boat.[41]

These tests did produce good results and by 1940 money for naval procurement was beginning to be more plentiful. By about September, transports and converted merchant ships replaced warships as troop carriers in landing exercises. These ships were equipped with davits capable of handling 36-foot boats and as the Eureka of 36-foot length "had twice the capacity of the 30-footer then in service and could make the same speed without an increase in horsepower, the Navy decided to adopt the larger as standard." [42]

After many years, the Navy and particularly

Higgins boat, 1937. (USMC Photo #526331).

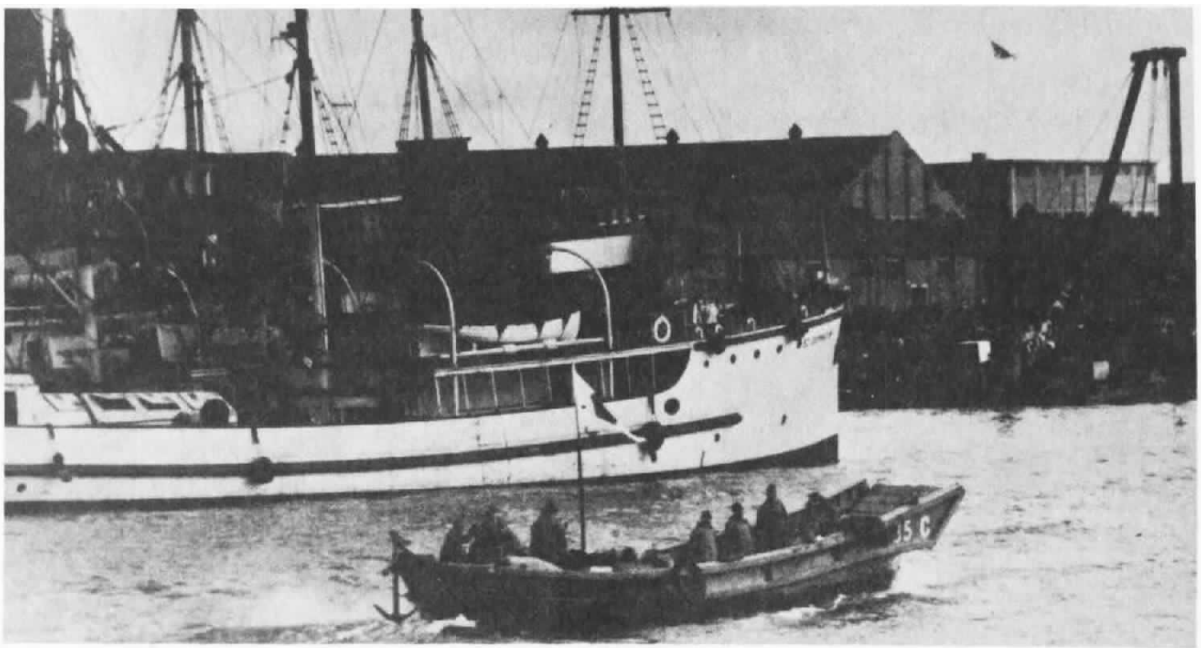
Re-embarking in a Eureka landing boat during joint Army-Marine exercises at New River, N.C., in July 1941. (USMC Photo #529125).

the Marine Corps had the landing craft that they wanted. The only existing drawback of the 1940 Eureka was the difficulty in unloading troops and supplies from the fairly high sides. On another visit to Quantico in April 1941, Higgins was shown a picture of a Japanese landing craft with a ramp in the bow by Major Ernest E. Linsert, Secretary to the Equipment Board.* Linsert and Brigadier General Emile P. Moses, President of the Equipment Board, asked Higgins to determine the possibility of installing a ramp in the bow of his 36-foot Eureka. Higgins was quite enthusiastic and agreed to make a prototype, converting a standard Eureka into a ramp bow at his own expense.

*The Japanese landing boat with ramp, shown Linsert, was part of a group of photographs that were enclosures to a report prepared by then First Lieutenant Victor H. Krulak, Assistant R-2, 4th Marines in 1937 entitled, "Report on Japanese Assault Landing Operations, Shanghai Area 1937." Lieutenant Krulak's report stated that "during the landing operations the Japanese forces were seen to employ a large number of boat types." Of one type, Landing Boat Type "A" (see photograph), Krulak observed "these boats are the only ones of the entire group which were obviously designed to negotiate surf and shallow beach landings." Krulak Report (Historical Amphibious File, Breckinridge Library, Quantico, Va.).

The next month, May 1941, Brigadier General Charles Barrett, Director of Plans and Policies at Headquarters, sent Linsert to New Orleans to see how Higgins was coming along with the prototype Eureka. Linsert tested the Eureka boat with a ramp on Lake Ponchartrain. Tests were also made with a truck and with 36 Higgins' employees running on and off to simulate embarkation and unloading of troops. Linsert also inspected a 45-foot steel lighter with a ramp bow that had been originally built for the Colombian government for custom duties. A bulldozer was carried in the lighter and of course the possibilities of using this type of craft as a tank lighter became immediately apparent. Linsert reported to General Barrett that both Higgins' boats were quite acceptable.[43]

On the recommendation of the Navy Department Continuing Board, a special board of Marine Corps and Bureau of Ships officers was appointed to conduct official acceptance tests. With General Moses as senior member, the board carried out the tests during the first week in June. The ramp bow craft passed with flying colors. Thus was born the precursor of the LCVP (Landing Craft Vehicle, Personnel).



Japanese ramp landing boat Type "A", photographed in Shanghai harbor by 1st Lieutenant Victor H. Krulak, USMC, in 1937. (Photo courtesy of Lieutenant General V. H. Krulak).

II—Lighters

The design of a successful tank lighter proved as difficult a process as did the development of the personnel landing craft. As mentioned in the previous chapter, a 50-foot lighter for landing artillery was tested in 1926. While it would be used during the intervening years, the lighters were not satisfactory to the Navy or Marines because they were not self-propelled and had to be towed by another boat.

Forty-five foot artillery lighter (Artillery Lighter "B") unloading a 5-ton tractor at Quantico in 1935. Troop Barge "A" is shown in the background.

The advantage of the 50-foot lighter, however, was the fact that it had two parallel hinged ramps in the stern and it could be beached successfully stern-to.

In 1935, at Quantico, a plan evolved to use a standard 50-foot motor launch for landing light vehicles and artillery with the help of a readymade rig, called Boat Rig A. In the 1935 fleet exercises at Culebra, the motor launch and rig was tested. It proved so top heavy that it nearly capsized in a moderate swell. The experience was accordingly written off.[44]

The importance of the the size of lighters varied with the tank size and weight at the time. In three separate years, 1935, 1939, and 1941, the modification of existing lighters had to be considered with the adoption of different size tanks. In 1935, the Marmon-Herrington Tank, a 9,500-pound model, could be carried by a 38-foot lighter. A 38-foot lighter was built at the request of the CMC and delivered for testing in the fleet exercises in 1938. The lighter was self-propelled and had sufficient speed. Another lighter, built by the Navy, was a 40-foot type used in FLEX 5 in the winter of 1938–1939. This lighter was equally successful. Both the 38- and 40-foot lighters were proved suitable for landing tanks and motor vehicles. By 1939, the Marine Corps had given up on the Marmon-Harrington

tank and began testing the Army's 15-ton tank. The Navy accordingly produced a new 45-foot lighter capable of carrying one Army or two Marmon-Harrington tanks.*

The lighter was tested in FLEX 6 in the winter of 1940. It proved adequate during the exercises. Subsequent doubt arose as to the seaworthiness of this lighter in another exercise when one of the lighters sank after an Army tank shifted to one side in a moderate sea. The next year, in May of 1941, the Navy Continuing Board turned again to Higgins of New Orleans. Higgins had on hand a 45-foot boat and was asked to convert the boat to a tank lighter. In a short time he made the converted tank lighter available to the Navy for examination.**

During the summer of 1941, the 45-foot Higgins lighter was tested during exercises at New River, North Carolina. Concurrent with these happenings, the Bureau of Ships had built a 47-foot lighter which was used in the fleet exercises at Culebra in 1941. Major General Holland M. Smith, the landing force commander, reported after the exercises that: "the Bureau type lighters are heavy, slow, difficult to control, difficult to retract from the beach and equipped with an unpredictable power plant." [45] By the fall of 1941, the tank lighter program had again changed direction with the introduction of the newly developed Army 30-ton medium Sherman tank. The 45-foot lighters, Bureau of Ships or Higgins, could not do the job for the new 30-ton tank. The Secretary of Navy directed the Bureau of Ships to remedy this deficiency. "Accordingly, in December existing tank lighter contracts were changed to provide 50-foot lighters in lieu of the 45-foot Higgins and 47-foot Bureau types still to be built. Both Higgins and the Bureau produced designs of 50-foot craft. Before any deliveries could be made President Roosevelt, at a White House Conference on 4 April 1942, directed the procurement of 600 additional 50-foot tank lighters by 1 September for the North African operation." [46]

Andrew J. Higgins, New Orleans boat-builder, with Sergeant Pearla McKinney at Camp Lejeune in October 1943. (USMC Photo #500883).

Tests of the Bureau of Ships' lighter and the Higgins' lighter were held near Norfolk in May 1942 with 30 tons of cement blocks in each lighter.[47] The Army sent observers to the test inasmuch as the initial projected use of the winning lighter would be in an Army operation. General Smith reported that the Higgins entry proved vastly superior as everybody who knew the two boats predicted. In fact the Navy lighters failed to complete the tests. As a result of these overall tests, the Bureau of Ships notified all yards making their model to shift to the Higgins design. Thus the Higgins 50-footer became the standard tank lighter of the Navy, the prototype of the LCM (Landing Craft, Mechanized).

III—Amphibians

The United States' first modern experience in amphibians, that vehicle that can operate on land and water, was the Christie Tank.*

*Major John Kaluf, Secretary to Equipment Board in 1938, recalls "when the futility of the Marmon-Herrington tank was pretty well demonstrated, the Equipment Board requested the procurement of an Army 15-ton tank for try-out purposes. Brigadier General Holland M. Smith, Director of Operations & Training, HQMC, told me to stop asking for such heavy items as a 15-ton tank and confine yourself strictly to the 5-ton limit. He said that the Navy General Board had told him in no uncertain terms that the Navy was never going to lift more than 5 tons." (The Navy's insistence on a 5-ton limit, at the time, had to do with the boom capacity on board Navy ships.) Col John Kaluf ltr to the Director, M.C. History, dated 19 January 1971 (Historical Division, Headquarters, U.S. Marine Corps).

**The Commandant stated "Higgins was first approached in the matter of converting the 45-foot boat into a tank lighter on May 27 [1941] and the tank lighter was ready for test yesterday 5 June [1941]. This man is certainly a wonder." MajGen T. Holcomb memo to Adm H. Stark, dated 6 June 1941, File A-111-JCW (Record Group 80, National Archives).

*See Chapter II.

Lieutenant General Holland M. Smith in October 1944. (USMC Photo #38219).

After tests had found the Christie Tank unseaworthy off Culebra in 1924, it was subsequently rejected as a military vehicle. It was never purchased by the U.S. Government and plans of the particular test model were sold to Japan.

Great Britain, already credited with the development of the tank to the extent that it could be used on the battlefield, also developed the first amphibious combat vehicle, the Medium D Tank. This tank was completed after the 1918 armistice. The intention of the British was to give a tank sufficient characteristics to get across a body of water, yet at the same time retain, as far as possible, the performance of the land tank. This characteristic of British design progressed with land tank development and shows that the British had no interest in true amphibian vehicles but preferred flotation devices for land tanks.[48]

The United States and particularly the Marine Corps, in the early 1930s, concluded that tanks, if landed close to the early assault waves, would prove valuable in the assault and even justify less artillery strength. The *Tentative Landing Manual* of 1934 pointed out that "the difficulties of transport and movement from ship-to-shore indicate that only light tanks can be used in the landing operation. These may be land tanks or amphibious tanks."

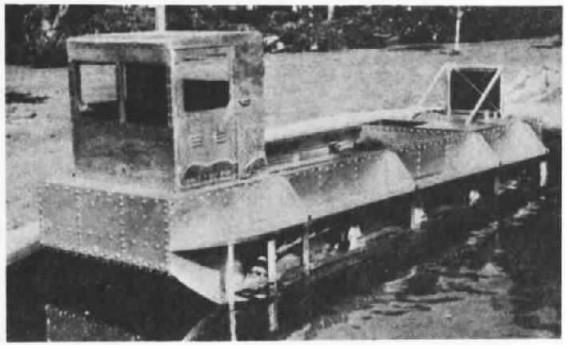
Ironically, the predecessor of the modern amphibian tractor was designed as a nonmilitary vehicle for the rescue of downed aviators and hurricane victims in the Florida Everglades. The developer of the craft was Donald Roebling, son of financier John A. Roebling and grandson of Colonel Washington Roebling, builder of the famous Brooklyn Bridge. It was John A. Roebling who, after hearing about and witnessing several devastating hurricanes, became aware that while he could not do anything about the hurricanes, he perhaps could help victims of such calamities. The victims, many of whom were in the otherwise impenetrable reaches of the Okeechobee region, needed help. John A. Roebling agreed to finance the project to build a vehicle that in his words, "would bridge the gap between where a boat grounded and a car flooded out." His son Donald became the developer and the father ultimately spent $118,000 for two amphibious tractors.

In designing such a vehicle, Donald Roebling felt that two things were absolutely essential, buoyancy and one means of propulsion for both land and water. For buoyancy the vehicle had to be constructed as light as possible and weight would be of prime concern. In the early 1930s, aluminum was a comparatively new product and Roebling believed that this material would be the key to the weight problem. In combination with the weight problem was the problem of locomotion on both land and water. Roebling believed that the paddle-tread track principle, similar to early paddle-wheel steamships, could be made to work.* Roebling, along with members of his technical staff, Earl De Bolt, Warren Cottrell, and S. A. Williams, started to build the Alligator. The first vehicle, completed in 1935, was 24 feet long and weighed 14,350 pounds and was powered by a 92-horsepower Chrysler industrial engine**

The performance of the first vehicle was a disappointment, because while it achieved 25 mph on land it slowed to a speed of only 2.3

*It was this paddle-tread principle that Roebling had patented in 1938. He turned over his patent, #2138207, to the government for universal use and without fee during World War II.

**The first model was immediately made available to the U.S. Coast Guard and American Red Cross for rescue work. There is nothing to indicate that either agency accepted it at the time, perhaps because of the initial performance of the vehicle.



Donald Roebling's original 1935 Alligator. (Photo courtesy of Sun Photos, Clearwater Sun, *Clearwater, Fla.).*

mph when run in water. Such performance indicated that the conventional straight tractor cleats set straight across the tracks were extremely inefficient for water propulsion. The first model was rebuilt and completed in April 1936. The cleats of the tracks were changed to a diagonal setting across the chains to push the water out from the sides, weight was reduced by 2,240 pounds, and a new 85-horsepower Ford V8 engine was installed. After testing, the vehicle's land speed was reduced to 18 mph but more important, water speed was more than doubled to 5.45 mph.[49]

A second modification in September 1936 reduced the weight by 310 more pounds and land and water speed slightly increased. The third modification, completed in 1937, resulted in the most significant changes of all. The length of the vehicle was decreased by four feet with corresponding decrease in track length and weight and a new track was installed. The new track was the highlight of the 1937 model. All tractors had used bogie and idler wheels, necessary appurtenances which normally supported the track and kept it moving properly. Roebling had not particularly liked this arrangement. He designed a chain with built-in roller bearings, with a smooth steel channel around the track contour for the rollers to ride on while supporting the weight of the vehicle. He replaced idler wheels with idler blocks and replaced straight cleats with curved cleats. The result of these changes was an increase in maneuverability and water speed. The water speed of this model was 8.6 mph while the land speed remained at 18 to 20 mph. The vehicle was reduced by 3,100 pounds and now weighed 8,700 pounds.

It was this 1937 model that appeared with picture and short story in the 4 October 1937 edition of *Life* magazine that would excite the Marine Corps' interest in an amphibious tank. Rear Admiral Edward C. Kalbfus, Commander, Battleships, Battle Force, U.S. Fleet, showed Major General Louis McCarty Little, then commanding the Fleet Marine Force, the *Life* magazine article with pictures of the strange vehicle. General Little was quick to grasp its potentialities and sent the article to the Commandant, Major General Thomas Holcomb. Holcomb in turn, passed it along to the Equipment Board at Quantico.[50] The board, headed by Brigadier General Frederic L. Bradman, dispatched Major John Kaluf, Secretary to the Board, to Clearwater to see the vehicle perform and to consult with Roebling. Kaluf recalls that "Roebling had a vehicle fully operational at the time and put it through every kind of test that I could dream up. I took about 400 feet of 16mm movie film which I brought back with me. The Board liked what they saw and gave it a very favorable boost." [51]

In May 1938, the Commandant cited this opinion in recommending to the Navy that "steps be taken to procure a pilot model of this type of amphibious boat for further tests under service conditions and during Fleet Landing Exercise No. 5." Both the Continuing Board and the Bureau of Construction and Repair endorsed the recommendation unfavorably on the grounds of economy. Funds were so limited at this time that the few dollars available were being spent on the development of landing boats.[52]

1937 Alligator model undergoing tests at Clearwater, Fla. Major John Kaluf, Secretary to the Equipment Board, was the Marine observer. (Photo courtesy of Sun Photos, Clearwater Sun, *Clearwater, Fla.).*

Again the Marine Corps persisted and again the few sympathetic naval officers at the bureau came through with a small appropriation to have Roebling start work on a model to be used by the military as an amphibian tractor. Three months earlier, in October 1939, General Moses, President of the Equipment Board, visited Roebling at his shop in Clearwater, Florida and persuaded Roebling to design a model for such use.[53] By January 1940, Roebling had completed the new design and in May, the new amphibious tractor was completed. This model, built from the ground up, incorporated all of the experience gained from the previous work including a further weight reduction to 7,700 pounds. The vehicle was 20 feet long, 8 feet wide, and had a maximum climbable grade of a 55 degree slope. Its water speed was between 8 and 10 mph and in the open sea, or when landing on a beach through surf, the 1940 "alligator" was more seaworthy than a normal boat of comparable size. It would not sink, even with its 7,000-pound cargo compartment full of water; nor would it capsize in a dive into deep water off a 6-foot seawall.[54] This new model was powered by a 95 hp Mercury V8 engine. Two vertical hand levers between the driver's knees controlled the steering clutches, and without cargo, the vehicle drew less than three feet of water.

With more money in sight, the Bureau of Ships contracted with Roebling to build one other vehicle of the same general design of the May 1940 model but powered with a 120 hp Lincoln-Zephyr engine. On 26 and 27 August 1940, Brigadier General Moses, with a party of Marine and Navy officers from the Bureau of Ships, inspected the model being built. The inspection was highly satisfactory and afforded an opportunity to make minor adjustments and modifications in the construction within the terms of the contract.[55] After the model was completed and given a final testing at Clearwater about the 14th of October, it was delivered to Quantico the first week in November.

Under the watchful eye of the CMC and a large party of high ranking officers of the Army and Navy, the October model travelled 29 mph on land and 9.72 mph in water. The Quantico demonstration was successful but had its bad spots, including the model being bogged down in the Chopawamsic Creek.[56] Further tests were scheduled.

During Fleet Exercises Number 7, in January and February 1941, the last such FLEX before World War II, Captain Victor H. Krulak of the 1st Marine Brigade staff with two other members of his test crew, Sergeant Clarence H. Raper and Corporal Walter L. Gibson, put the "alligator" through various tests. Lieutenant General Krulak recalls that he went on board the USS *Wyoming* to request Major General Holland M. Smith to ask Admiral Ernest J. King, Commander, Atlantic Fleet, who was visiting Culebra, if he wouldn't like to ride in the "alligator." Admiral King said he was pressed for time but yes, he would go for a short ride. General Krulak recounts the following:

> Admiral King came aboard and no one else volunteered to come and he didn't ask anyone else. It was just the Admiral, an aide, Raper, Gibson, and I in the "alligator." We cruised about a little bit and I said, "Now let me show you what it can do on this coral, Admiral." He looked at his wristwatch and said, "I don't have very long." "I said, "it will just be a minute." I was just going to show him how we go right over the coral but we didn't. The track broke and we were in water about 4 feet deep. We weren't going to get off the coral and no boat could get to us. We were about 50 yards from the beach, so he climbed over the side of the boat with his aide, waded ashore and was picked up in a vehicle and taken to the town of Dewey and went about his business. My impression was that I don't think the Admiral ever forgot the "alligator."[57]

The "alligator" measured up in every respect with two exceptions. Its aluminum construction was not considered rugged enough for hard military use and the track would not endure the abrasive effect of sand and salt water.[58] The tractor was so impressive in every other respect, however, that the Navy negotiated a contract with Roebling to redesign the tractor to include military characteristics with all steel construction in place of aluminum.* Roebling called on the Food Machinery Corporation (FMC) for help in redesigning the "alligator." The corporation had plants in nearby Dunedin and Lakeland and had made components for Roebling's earlier models. Mr. James M. Hait, then Chief Engineer of the Peerless Division, organized an engineering group to redesign the "alligator." Using all steel construction and changing from riveting

*On 29 August 1940, the M.C. Equipment Board recommended to the Bureau of Ships that future amphibian tractors be of welded steel construction. President, M.C. Equipment Board ltr dated 8 October 1940 (Box 2, Record Group 65A-4939, Federal Records Center, Suitland, Md.).

to welding, considered by Hait to be essential to the main design, two prototypes were built in the Riverside, California plant of FMC.[59] The Navy awarded FMC a contract for an official design and further development of the "alligator," now officially dubbed LVT (Landing Vehicle Tracked) (1). FMC was also awarded a contract for 200 more LVTs and the first one came off the assembly line in July 1941.

By the end of World War II, 15,654 LVTs were built. FMC's three plants in Lakeland, Florida and Riverside and San Jose, California built 11,251 LVTs. Borg-Warner Corporation of Kalamazoo, Michigan, St. Louis Car Company of St. Louis, Missouri, and Graham-Paige Motors Corporation of Detroit, Michigan built the remaining 4,403.[60]

As an anecdote to the building of the first 1,225 LVT (1)s, it was asked of Donald Roebling why all the Roebling alligators were built exactly 9 feet, 10 inches wide. Roebling gave, while not a scientific answer, a humorous reply when he said that the first military model was built in his own shop on his estate. The model produced was 9'10" wide simply because his shop doors and gate posts on the grounds were only 10 feet wide.*

In order to observe and report on the construction of the LVTs, Major George W. McHenry was appointed Resident Inspector of Naval Material at the Food Machinery Corporation plant at Dunedin, Florida in February 1941.[61] To work on and train in operating the new LVTs scheduled to come off the assembly line, an Amphibian Tractor Detachment was organized 2 May 1941 at Dunedin, Florida with Major William W. Davies as commanding officer. Four other officers and 33 enlisted men made up the detachment. This detachment served as a nucleus for training men in LVT operation. After training, officers and men were then assigned to the newly organized letter companies of the 1st Amphibian Tractor Battalion. By 16 February 1942, the battalion was complete with four companies, including an Headquarters and Service Company, and was part of the 1st Marine Division.[62]

*It should be noted that after the war, President Harry Truman presented the Medal for Merit to Donald Roebling for his outstanding services to the United States. (See Appendix H for citation). Robert L. Longstreet, *Clearwater News*, 27 March 1947.

LVT(1)s being tested by the Marine detachment at Dunedin, Fla., on 18 September 1941. (USMC Photo #529506).

An experimental observation aircraft, the Pitcairn OP–1 autogiro, at Quantico on 14 November 1932. (USMC Photo #514902).

Marine Aviation in the Thirties

Marine aviators in the early thirties were busy racing and testing aircraft. Captain Arthur H. Page and Lieutenant Vernon M. Guymon set a record for sustained blind flight, flying from Omaha to Washington, D.C., in July 1930. Captain Page, piloting an 02U from a sealed, hooded cockpit, flew the instrument flight of about 1,000 miles. Captain Page, who earlier in the year won the Curtiss Marine Trophy Race, an annual event for service seaplanes, died in a crash in September of 1930. He was the only military entrant in a race for the Thompson Trophy at Chicago.[63] In another part of the world, Major Francis P. Mulcahy and other Marine aviators in November 1932 had tested a strange rotary-wing machine, called the Pitcairn autogiro which was designated the OP–1. Mulcahy reported that the autogiro's chief value in expeditionary duty was in "inspecting small fields recommended by ground troops as landing areas, evacuating medical sitting cases, and ferrying of important personnel."[64] Technically, lack of weight-lifting capabilities and high gas consumption where two of the major shortcomings of the OP–1 of 1932.

Organizational changes brought on by the creation of the FMF in December 1933 raised the importance of Marine aviation. In 1935, the Aviation Section at Headquarters, Marine Corps was separated from the Division of Operations and Training and became an independent section under the CMC. On 1 April 1936, it became a division under a Director of Aviation. The director of the new division served as an adviser to the Commandant on all aviation matters and as a liaison officer between the Marine Corps and the Navy's Bureau of Aeronautics. Unlike the ground units of the Marine Corps which drew their equipment from both the Army and Navy, in addition to supplying much of their own, Marine aviation depended solely on the Navy for its aircraft and all other aviation gear.[65] By 1939, FMF ground forces were organized in two units, the 1st Brigade based on the east coast at Quantico and the 2d Brigade based on the west coast at San Diego. Each brigade had the support of a Marine aircraft group of corresponding numerical designation. In addition, FMF aviation further boasted a scouting squadron (VMS–3) based in the Virgin Islands.[66] By the end of the decade, the authorized strength of Marine Aviation, FMF, was 124 officers, 15 warrant officers, 56 aviation cadets, and 1,120 enlisted men.[67]

The Genesis of Close Air Support

As the Marine Corps developed the various techniques contributing to a smooth landing operation, it had to give more consideration to the means of providing early fire support for landing troops. In the absence of the artillery support available in conventional land warfare, the Marine Corps evolved the unique technique of close air support (CAS). The term "close air support" referred to the attack of ground objectives located close to friendly units. By its very nature, Marine Corps aviation had long specialized in the development of techniques for this type of support for ground forces. This had always been the principal reason for the existence of Marine Corps aviation as a separate branch of naval aviation. The development started shortly after World War I when various Marine aviators pursued with vigor any proposed technique which would enable them to deliver bombs on a ground target with an acceptable degree of reliability and accuracy. Marine Corps participation in "small wars" in various foreign countries from Haiti to China provided invaluable experience in supporting small ground units under difficult conditions of terrain and climate. These experiences were consolidated and reduced to written form in the

1934 edition of the *Tentative Landing Manual* and subsequent editions.[68]

The manual considered the vulnerable concentrations of troops in transports, landing boats, and on the beach and called for a three-to-one numerical superiority over the enemy in the air. In the 1938 edition, *FTP–167,* the ratio was increased to four-to-one, primarily to wipe the enemy air threat out of the skies and secondarily to shatter the enemy's beachhead defense and to cut off his reinforcements.[69] More important, emphasis was placed on the direct assistance aviation could give the troops such as guiding the landing boats to the beach, laying smoke screens, and providing reconnaissance and spotting for naval gunfire and artillery. The kernel of CAS lay in the importance of rendering direct fire support to the landing force until the artillery was ashore and ready to fire.

After the landing, the challenge became that of applying the fire power of Marine air to destroy specific enemy frontline positions without endangering nearby friendly troops. Refinement of this skilled technique as we know it today was slow because of many factors. An excellent analysis of this refinement of techniques is contained in Volume I, *History of USMC Operations in World War II:*

> There was so much for pilots to learn about rapidly developing military aviation that close air support had to take its place in the busy training syllabus after such basic drill as aerial tactics, air to air gunnery, strafing, bombing, navigation, carrier landings, and communications and constant study of the latest in engineering, aerodynamics, and flight safety.
>
> Also, whenever newer, faster, and higher flying airplanes trickled into the Marine Corps in the lean thirties, they were found to be less adaptable for close coordination with ground troops than the slower, .open cockpit planes which supported the patrol actions of Nicaragua. In Nicaragua the aviator in his open cockpit could idle his throttle so as to locate an enemy machine gun by its sound, but in the maneuvers of 1940 pilots flashing by in their enclosed cockpits found it difficult to see what was going on below or even to differentiate between friendly and "enemy" hills. In Nicaragua, the Marine flier was most often an ex-infantryman, but 10 years later many of the new Navy-trained Marine aviators were fresh from college and knew little about ground tactics. The lack of a real enemy to look for, identify, and to shoot at hindered attempts at precision, especially since air-ground radio was not yet as reliable as the old slow but sure system where pilots read code messages from cloth panels laid on the ground or swooped down with weighted lines to snatch messages suspended between two poles.
>
> The main key to development of close air support lay in reliable communications to permit quick liaison and complete understanding between the pilot and the frontline commander. Part of the solution lay in more exercises in air-ground coordination with emphasis on standardized and simplified air-ground communications and maps.[70]

By the end of the decade, the CMC noted in his annual report to the Secretary of Navy that "air-ground training between aviation and ground troops has been conducted whenever possible." Also as a step in the right direction, an aviator was assigned as an air liaison officer to the 1st Marine Brigade Staff in 1939. Thereafter, the billet became permanent. With the theory of employing aircraft in tactical support of troops well understood, and air-ground exercises conducted whenever possible, the method of exercising control of supporting aircraft, particularly large numbers of aircraft, would have to be left to the next decade and the initial engagements of World War II.

CHAPTER IV

THE DECADE OF THE FORTIES–THE WAR AND THE BOMB

The 1940s produced the most destructive war in history and by the middle of the decade had given birth to the atomic age. With the fall of France in June 1940 and the Battle of Britain about to begin, President Franklin D. Roosevelt announced his policy of endeavoring to save Britain and at the same time prepared America for a national emergency. In a speech to the graduating class of the University of Virginia on 10 June 1940, he announced:

> In our American unity, we will pursue two obvious and simultaneous courses; we will extend to the opponents of force the material resources of this nation; and, at the same time, we will harness and speed up the use of those resources in order that we ourselves in the Americas may have equipment and training equal to the task of any emergency and every defense.[1]

On 14 June 1940, the date that the Germans occupied Paris, the President signed a naval expansion bill that had been under discussion for months. In effect, it gave the Navy the green light to build a "two-ocean" Navy. By the end of the fiscal year Federal expenditures for the Army and Navy rose from $1.8 billion for the fiscal year 1940 to $6.3 billion for the fiscal year 1941.

On 15 June 1940, the President appointed a group of eminent civilian scientists to a new National Defense Research Committee. Vannevar Bush, president of the Carnegie Institution of Washington, was the chairman. From this committee stemmed most of the scientific research done for the armed forces during the war.* By September 1940, Congress established the first peacetime compulsory military service program with the Burke-Wadsworth (Selective Training and Service) Act which called for the registration of all men aged 21–35. By the end of the year, the President established the Office of Production Management under William S. Knudsen to coordinate defense production. In 1941, Congress passed the Lend-Lease Act, which empowered the President to provide defense equipment to countries whose security was vital to the defense of the United States. During the war, lend-lease aid totaled some $51 billion.

In the Far East, a Japanese imperial conference, in the summer of 1941, decided on expansion southward even if it meant war with the United States and Great Britain. Three weeks later, the Japanese occupied southern French Indo-China. America, two days later, declared economic warfare on Japan by freezing all Japanese assets in the United States and stopped all trading with Japan. Diplomatically, the remaining months of 1941 were concerned with talks between Japan and the United States about resuming trade and the American demand for Japan to get out of China and Indo-China.

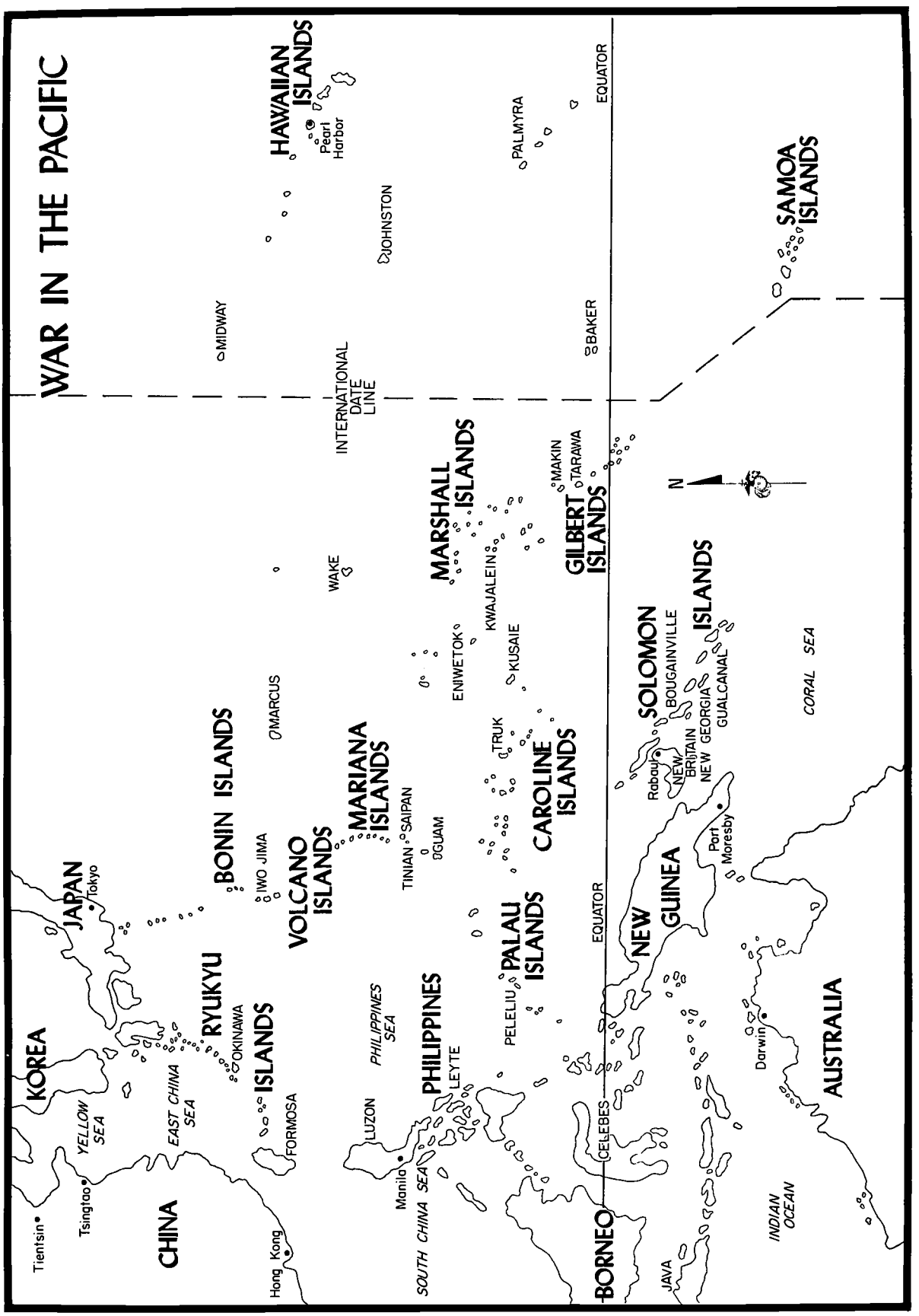
The day after the attack on Pearl Harbor, the United States declared war on Japan and three days later, Germany and Italy declared war on the United States.

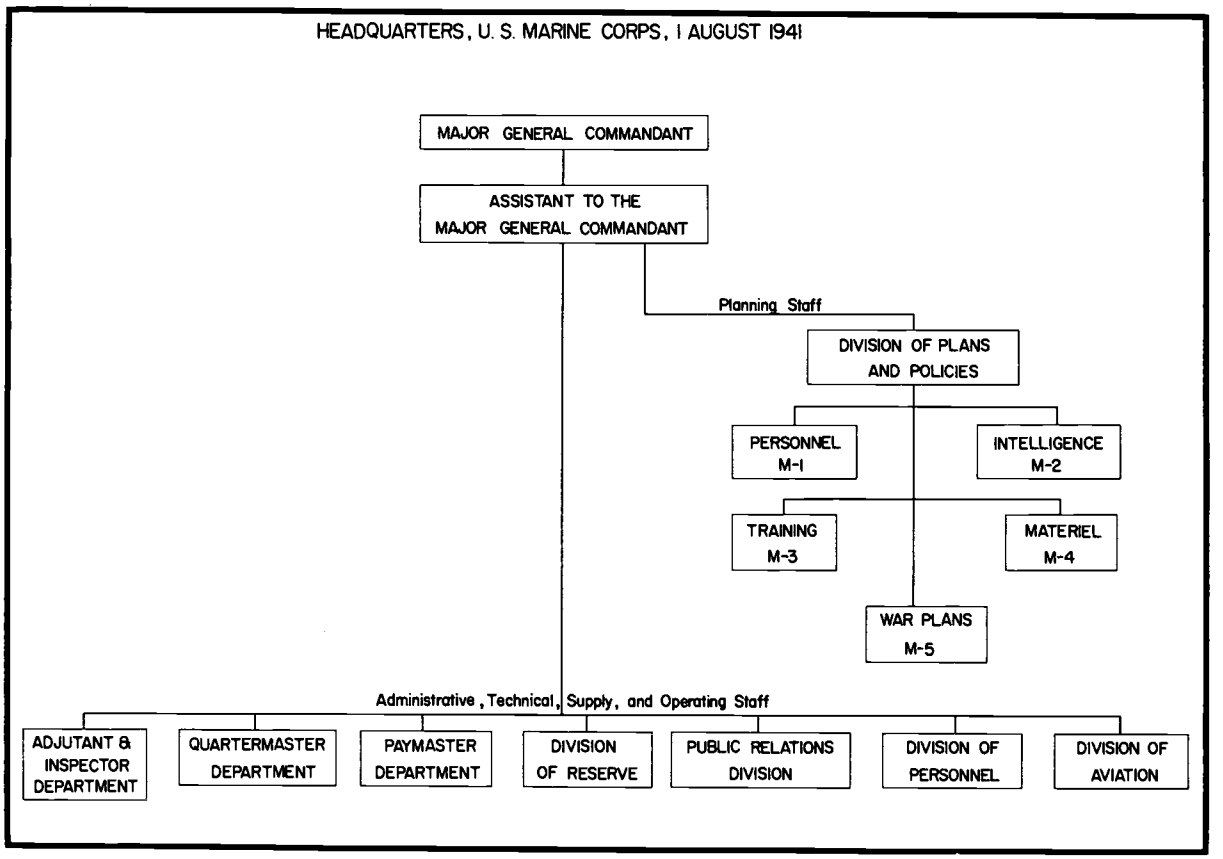
War Plans

The organization of our government is particularly well adapted to effective preparation for and conduct of war, yet history shows that, due to failure to give adequate consideration to this subject during peace, war has always found us unprepared, and our conduct of war has been both uneconomical and inefficient.[2]

The United States, as all sovereign nations before her, made plans for war with potential enemies and their allies. America, a late-

*An excellent history and analysis of the story of the National Defense Research Committee and other research and development agencies during the war is contained in Chapter XIX of the *Administration of the Navy Department in World War II* by Rear Admiral Julius A. Furer published in 1959.


WAR IN THE PACIFIC
KOREA
JAPAN
Tokyo
Tientsin
Tsingtao
YELLOW SEA
EAST CHINA SEA
CHINA
RYUKYU ISLANDS
OKINAWA
FORMOSA
Hong Kong
BONIN ISLANDS
IWO JIMA
MARCUS
VOLCANO ISLANDS
MARIANA ISLANDS
SAIPAN
TINIAN
GUAM
PHILIPPINES
LUZON
Manila
LEYTE
SOUTH CHINA SEA
PHILIPPINES SEA
PELELIU
PALAU ISLANDS
TRUK
CAROLINE ISLANDS
ENIWETOK
KUSAIE
KWAJALEIN
MARSHALL ISLANDS
WAKE
MIDWAY
INTERNATIONAL DATE LINE
HAWAIIAN ISLANDS
Pearl Harbor
JOHNSTON
PALMYRA
BAKER
EQUATOR
MAKIN
TARAWA
GILBERT ISLANDS
SAMOA ISLANDS
CELEBES
BORNEO
JAVA
EQUATOR
NEW GUINEA
Rabaul
NEW BRITAIN
NEW GEORGIA
BOUGAINVILLE
SOLOMON ISLANDS
GUALCANAL
Port Moresby
CORAL SEA
Darwin
AUSTRALIA
INDIAN OCEAN
N

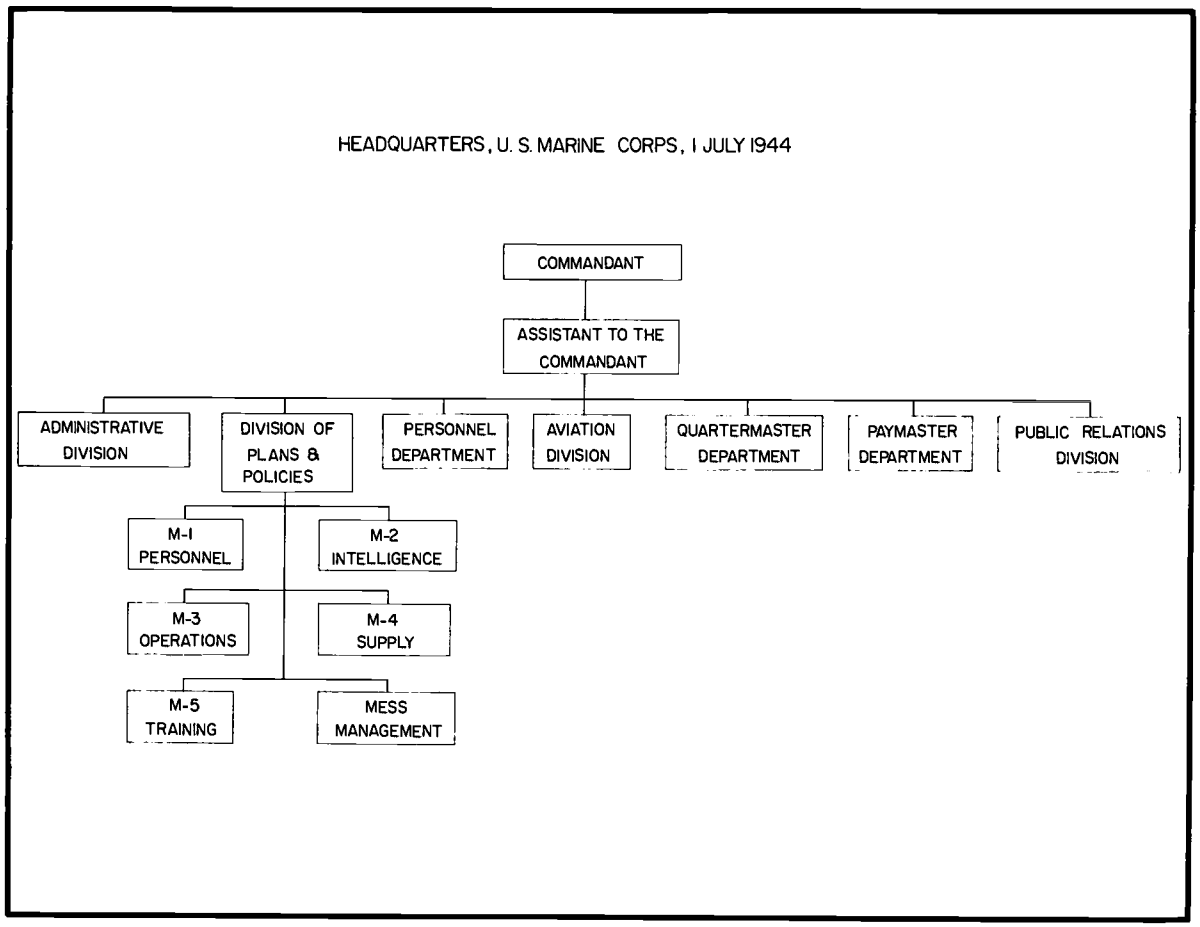


starter in the business of foreign wars, began making such plans only after it became a nation with colonies; that is, after the Spanish-American War. The group in the military services responsible for framing the war plans of the United States was the Joint Army and Navy Board. The board, founded in 1903, initially had a membership of eight; four Army and four Navy officers.* The Marine Corps was never represented on the Joint Board and would have to wait until after World War II to be represented on the Joint Chiefs of Staff. It should be noted, however, that the CMC or his representative, particularly during World War II, was always a close adviser to the senior naval officer on the Joint Board, in matters concerning the Marine Corps.

*After reorganization in 1919, the board consisted of six members, the Army Chief of Staff and the CNO, their deputies, and the Chiefs of the War Plans Divisions of each of the services. Kent Roberts Greenfield, ed., *Command Decisions* (Washington: Office of the Chief of Military History, Department of the Army, 1960), p. 13.

Prior to World War II, war plans derived their titles from the code name of the probable enemy, and because Japan was designated ORANGE, the plan dealing with a conflict with Japan was called ORANGE Plan.[3] After 1907, and the war scare with Japan (see Chapter I), the plan most likely to be used became the ORANGE Plan. It provided the strategic concept and missions to be followed in the event of war with Japan. Each of the services developed its own plan to guide its operations in an emergency, and field and fleet commanders drew up the plans to carry out these operations. Many changes in concept of the ORANGE Plan took place in the intervening years because of changes in the international scene.

Before World War I, the broad concept was that the Army was to defend the Philippines until the fleet could carry reinforcements across the Pacific. Naval strategists realized that before a relief expedition could be dispatched to the Philippines, Japan certainly would have seized



Guam, thus depriving the United States of its only fleet anchorage between Pearl Harbor and Manila Bay. The Navy conjectured that either Guam would have to be retaken or some other site occupied as a coaling and repair station. After World War I, the ORANGE Plan took on new dimensions when Japan gained control over the former German possessions in the Marshalls, Carolines, and Marianas. The Philippines were more vulnerable than before and Guam now was ringed by Japanese outposts. The Joint Board again had to review and revise the ORANGE Plan series.

The Marine Corps' claim for an important role in an ORANGE war came in their contributory plan to the Navy's ORANGE Plan. The plan, called 712D—Operation Plan, was the work of Major Earl H. Ellis.* In 1921, Ellis was assigned to the then newly formed Division of Operations and Training at Headquarters Marine Corps. Having previously written a significant article on Advanced Base Operations, Ellis wrote another study called

*Earl H. Ellis, also known as Pete, was born in Luka, Kansas, in 1880. After graduation from high school, he enlisted in the Marine Corps and served about a year before being commissioned from the ranks as a 2d Lieutenant in December 1901. He attended the Naval War College as a captain from 1911–1912, after which he remained on the staff of the college. While on the staff, he wrote a significant paper entitled "Naval Bases; Location, Resources, Denial of Bases, Security of Advanced Bases" in 1913. It was accepted and published in 1921, the same year as his "Advanced Base Operations in Micronesia." He served in France during World War I and received a Navy Cross for his services with the 4th Brigade. After a short tour at HQMC he was granted a leave of absence from the Marine Corps in 1922. He traveled to the Philippines, Japan, and finally to the Caroline Islands. The State Department notified the CMC that Ellis had died at Parao, Caroline Islands, on 12 May 1923. It is with historical certitude to say that Ellis had seen, while in the Caroline Islands, what the world would ultimately know by WW II, that the Japanese illegally fortified the mandated islands contrary to the League of Nations instructions.

Lieutenant Colonel Earl H. Ellis, author in 1921 of Operation Plan 712, "Advanced Base Operations in Micronesia." (USMC Photo #307257).

"Advanced Base Operations in Micronesia, 1921." It was this study that the CMC, John A. Lejeune, approved and accepted, in total, as 712D—Operation Plan.[4]

Ellis' plan concentrated on one segment of a war against ORANGE, that of seizing a base that would be urgently needed by the Navy as a coaling or repair station. The objective Ellis had in mind was that of the Marshall Islands. He outlined the tactics to be used against islands within the Marshall group such as Eniwetok, Wotje, and Maloelap. Although his theories were limited by the equipment then available, he made several sound recommendations, urging among other things that troops fighting ashore have at their disposal the on-call fire of supporting warships. Considering the times, Ellis' plan marked a complete break with tradition. No longer would Marines be used primarily to defend advanced bases; instead, they would seize these bases from the enemy.[5]

Aside from the important contribution and originality in Ellis' plan, the value of the writing lay in the fact that it was truly a first-step approach to the problems of landing operations. Marine Corps and Navy officers of the 1920s and 1930s elaborated on Ellis' concept of seizing a base, as evidenced by the Advanced Base Problems worked on and discussed by MCS and the Naval War College. Other key Pacific islands were subsequently studied as potential battlefields.

As a result of these studies, landing operations doctrine evolved, landing techniques were refined, and new types of landing craft were tested. There was no novelty or far-sightedness in that Ellis had foreseen a war with Japan, that fact was quite common among the planners and leaders of the times. What was far-sightedness on his part was in the unique contribution of his plan which lay in the detailed guidelines on the tactics and techniques employed in seizing an island base. With newer and better equipment, the tactics and techniques employed during World War II were little different than what Ellis had envisioned.

Refinement of Tactics and Techniques in Amphibious Operations During World War II

Naval Gunfire (NGF)*

During World War II, many additions, deletions, and variations in general were made on the proven existing tactics and techniques involved in amphibious operations** Perhaps the greatest improvements occurred in naval gunfire, close air support, and artillery fire. Certainly the best coordination of the three occurred during the war with the advent of the Fire Support Coordination Center (FSCC). In the area of naval gunfire, the *Tentative Landing Operations Manual* recognized the danger inherent in NGF support in conjunction with movement of troops ashore. A rudimentary doctrine evolved by the late 1930s, and bombardment experimentation was conducted on training ranges at

*Within the Marine Corps today, as a kind of a tongue-in-cheek truism, a person might be described as the "duty expert" in such-and-such a field. Using this term in retrospect, the "duty expert" in the naval gunfire area was Colonel Donald M. Weller. See his two articles in the *U.S. Naval Institute Proceedings* of August and September 1954, "Salvo-splash!, the Development of Naval Gunfire Support in World War II."

**"Amphibious operations" were words evolved during the early part of the decade of the 1940s. The meaning was not new but only the use of the words. Amphibious operations were synonymous with landing operations, a term used during the preceding 50 years. The term, amphibious, started to be used in fleet training publications during the late 1930s. By 1940, the U.S. Atlantic Fleet used it in a report to describe training of Army and Navy forces. By June 1942, the Navy added to the Fleet Training Division (Op-22) an "amphibious warfare section" (F-45). By the end of the war, it was quite a familiar term.

Culebra and San Clemente Islands. These bombardments were adjusted by shore fire control parties composed entirely of Navy personnel. Navy personnel were quite familiar with their ship's firing and no harm could come from shelling an island as long as troops were not involved. However, the same people were wholly unfamiliar with the tactical maneuvers of the troops they would be supporting in an actual operation. By 1941, the tempo of the development of NGF was accelerated. Shore bombardment exercises began to be conducted on a scheduled basis. The shore fire control party was reorganized as a landing force unit with a Marine artillery spotter and a Marine radio crew and a Navy officer serving in a liaison capacity. These shore fire control parties, as well as air spotters from potential fire support ships, received special training in Quantico and at a newly acquired bombardment range at Bloodsworth Island in the Chesapeake Bay.[6]

By August 1942, naval gunfire support was utilized in actual combat in the landing on Guadalcanal. There was, however, no initial hostile resistance to that landing. When planning for the Gilbert Islands began, it was realized that strong defensive fortifications would be encountered. The plan of gunfire support for the assault of Tarawa Atoll called for 75 minutes of the heaviest naval support ever delivered up to that time. Even so, although many enemy troops were neutralized, the majority of the defensive installations were still effective.* The lessons learned at Tarawa marked a turning point in the concept and execution of naval gunfire support. As a result, Marine Corps planners developed a concept for deliberate destruction of individual targets as opposed to general neutralization. This concept proved its value throughout the remainder of World War II.

General Alexander A. Vandegrift, 18th Commandant of the Marine Corps, 1 January 1944 to 31 December 1947. (USMC Photo #306429).

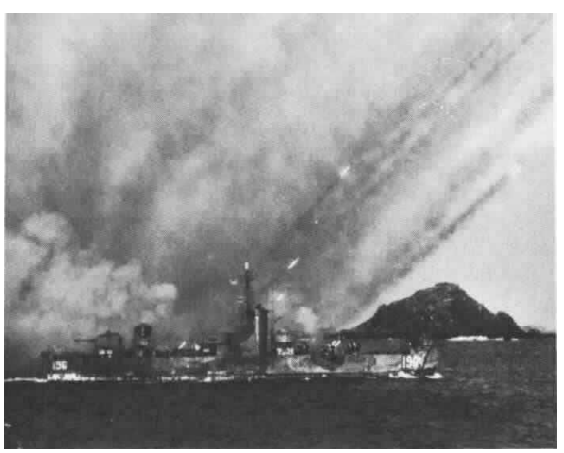
General Thomas E. Holcomb, 17th Commandant of the Marine Corps, 1 December 1936 to 31 December 1943. (USMC Photo #12444A).

The Marine Corps continued to press for improvements in gunfire support. At the request of the Marine Corps and with concurrence of the Navy, 20 LSMs, Landing Ships Medium, were converted into LSM(R)s, (Landing Ships, Medium (Rocket)). The LSM was developed as a tank carrier and was 203 feet long with a beam of 34 feet. It could carry either five M4 medium tanks, or six Landing Vehicles, Tracked (LVTs). The

*The commanding officer of the transport group which landed the Marines at Tarawa recalled stating his doubts of the efficacy of naval gunfire at Tarawa. He had witnessed a similar bombing and bombardment of Gavutu Island in the Solomons where he said the results had been most disappointing. RAdm Herbert B. Knowles ltr to the Assistant Chief of Staff, G-3, Headquarters, U.S. Marine Corps, dated 1 September 1962, as quoted in Shaw, Nalty, and Turnbladh, *Central Pacific Drive*, p. 36.

LSM, when converted to the LSM(R), was equipped in late 1944 and early 1945 with from 10 to as many as 105 rocket launchers and one 5-inch/38 caliber dual-purpose gun.[7] The LSM(R) was essentially an area suppressive fire ship used to support amphibious operations. These relatively inexpensive and simple ships provided the capability of delivering large volumes of fire in short periods of time.

Another support ship, a converted Landing Craft, Infantry (Large) (LCI (L)) and dubbed Landing Craft, Infantry (Mortar) (LCI (M)) was used extensively at Iwo Jima and later in the Okinawa campaign. At Iwo Jima, LCI (M)s provided "direct support on call and harassing fire to break up enemy counter-attacks. With their shallow draft they could work close inshore on the flanks and often were in a position to shoot up gullies against enemy targets that were not visible to the Marines."[8] During the first week on Iwo Jima, 30 LCI(M)s were assigned, but owing to breakdowns not all were available at the same time.



A LSM(R) fires its rockets at enemy targets in the Kerama Retto off Okinawa in late March 1945. (USN Photo #474951).

Close Air Support (CAS)

In the years prior to the war, the mission of Marine aviation, as directed by the General Board, was:

> Marine aviation is to be equipped, organized, and trained primarily for the support of the FMF in landing operations and in the support of troop activities in the field; and secondarily as replacement squadrons of carrier based naval aircraft.[9]

Out of the general definition the fine points of CAS were defined as:

> Attack by aircraft of hostile ground targets which are at such close range to friendly front lines as to require detailed integration of each air mission with the fire and movement of ground forces in order to insure safety, prevent interference with other elements of the combined arms and permit prompt exploitation of the shock, casualty, and neutralization effect of the air attack.[10]

The major problem initially of carrying out the intentions of the CAS definition was the lack of communications between the front lines and the support aircraft. CAS at Guadalcanal was rendered by Navy carrier planes supporting the landing. Later, Army and Marine pilots operating from Henderson Field gave support to the troops. The difficulty was that the line of communication extended from the front line to the headquarters at Henderson Field to the aircraft. Pilots were given the target before takeoff. In many cases they walked up to the front lines and visually checked the target. This system might be one of the forerunners of the Tactical Air Control Party consisting of a Marine aviator and communications personnel.* Prior to the Bougainville operation, a close air support school was organized under the direction of the 3d Division Air Officer and was attended by officers from each infantry regiment and battalion headquarters.

Based on Guadalcanal experience, three main objectives were sought in air support studies conducted by the 3d Division. These were: improved means of target designation, exploration of the precise effect of bombs and fusings of various types, and the determination of safety margins necessary for protection of our own troops. The employment of varied colored smoke for target designation was studied as a means of decreasing the effectiveness of the enemy's previous attempts to confuse our target designation with white smoke. During the instruction, air liaison party personnel were given intensive training in the use of field communication equipment and in air-ground communication procedure. When the 3d Division went ashore at Bougainville, its subordinate units included trained air liaison parties which could advise

*Brigadier General Edward C. Dyer suggests that an even earlier forerunner of the Tactical Air Control Party was the use of panels by front line troops and the system of dropping and picking up written messages such as was done on Culebra in 1939. BGen Edward C. Dyer ltr to the Director, M.C. History, dated 10 August 1970 (Historical Division, Headquarters, U.S. Marine Corps.)

the ground commander in matters of air support, transmit requests for such support, and assume tactical direction of any aircraft assigned.[11]

The Bougainville operation in November 1943 marked a long stride in the evolution of the part aircraft were to play in the support of the amphibious advance. The techniques of CAS were perfected throughout the war. They paid greater dividends as the island-hopping program went on but there remained the inherent danger; bombing friendlies. There were instances of pilot error resulting in strafing and bombing our own troops and this of course did not improve the ground troops' confidence in CAS. However, the decision to employ CAS, while recognizing the calculated risk, rested with the commander of the troops concerned.[12] The ultimate doctrine of CAS that the Marine Corps evolved by the end of the war was based on two major techniques used in two major campaigns—the Philippines and Okinawa.

In October 1944, Marine pilots from MAG–24, at Bougainville, were given a mission to support an Army corps in the Philippines. A CAS school was set up under the direction of Lieutenant Colonel Keith B. McCutcheon. The 37th Army Division was in the area and joint training problems were scheduled with them and MAG–24. McCutcheon noted:

> All pilots had the opportunity to observe a terrain problem conducted by an infantry battalion simulating an attack on a Japanese pillbox installation. To these problems the Group added planes in close support with their own Air Liaison Parties on the ground. Live bombs were not dropped, but the infantry actually fired everything in the book.[13]

What came out of the school was the principle that Marine aviators adopted and which was later adopted by Army Air and Navy that:

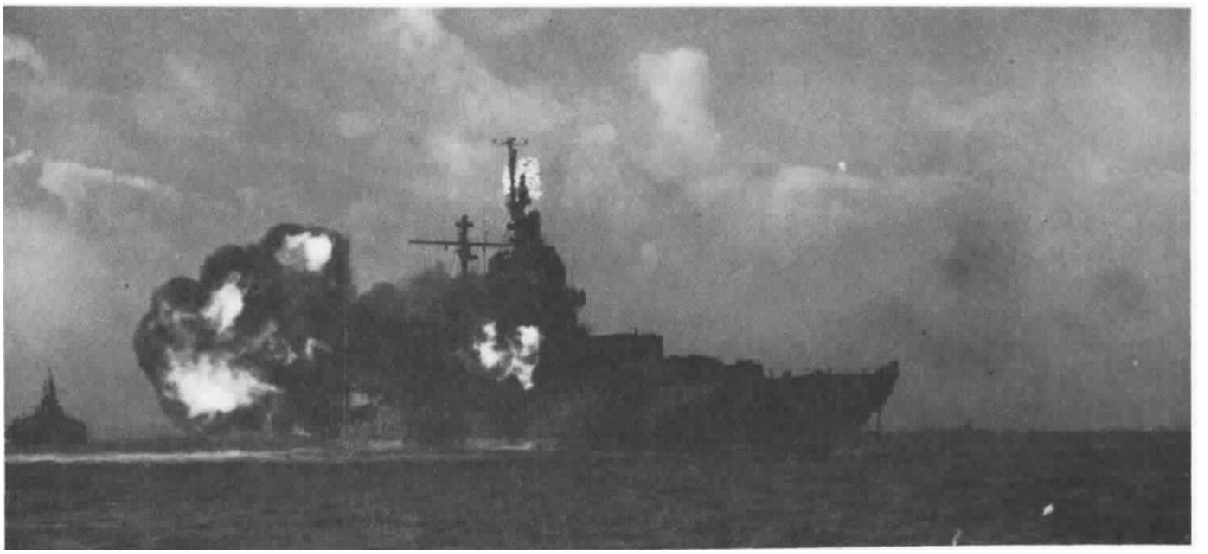
> Close Air Support is an additional weapon to be employed only at the discretion of the ground commander. He may employ it against targets that cannot be reached by other weapons or in conjunction with the ground weapons in a coordinated attack. It should be immediately available and should be carried out with deliberation and accuracy and in coordination with other assigned units.[14]

At various conferences prior to the Luzon operation and MAG–24's support of the 1st Cavalry Division's sweep toward Manila, the Fifth Air Force, Southwest Pacific Area, with the Navy concurring, stated that it was not contemplating using direct communication between its Air Liaison Parties (ALPs) and the planes in the direction of a mission. MAG–24 thought otherwise, so further emphasis was placed on training its own Air Liaison Parties. McCutcheon said that ". . . the Group did intend to have good control of its aircraft when engaged in close support, and if (Air Force) Air Liaison Parties were not to be permitted to give that control then the Group would send out its own personnel to give it." [15] So it was that MAG–24 furnished its own ALPs. It was further determined that the policy would be control of the aircraft by the front line ALP on his own front using direct communication. In this way the ALP talked the support pilots to the target without going through a distant controller.* This was possible in the Philippines operation because air units were supporting no more than one division at a time. This was not the case on Okinawa. Inasmuch as five divisions were involved on Okinawa, four in line simultaneously, a closer, coordinated control of aircraft was necessary.

The aerial support of ground operations was handled through a smoothly functioning system of coordinating agencies. The breakdown was as follows:

> Air Liaison Parties from the Joint Assault Signal Companies (JASCOs) were attached to each of the four divisions.
>
> * * * * *
>
> Requests for air support by the ALPs were made to one of the three Landing Force Air Support Control Units (LAFASCUs) all commanded by Colonel Vernon E. Megee. Colonel Megee, physically located at Tenth Army Headquarters in LAFASCU–3, coordinated the work of LAFASCU–1 and LAFASCU–2 which handled the air support requests of the III Amphibious Corps and XXIV Corps respectively.
>
> * * * * *
>
> Colonel Megee, in reality LAFASCU–3, screened all requests for air support of the ground troops and relayed all orders direct to Tactical Air Force (TAF), Tenth Army. Out of its allocation of planes, TAF responded accordingly. Because of the Japanese Kamikaze attacks directed against naval units

*Lieutenant General Keith B. McCutcheon stated, in a letter to the Director of Marine Corps History, that "The ALPS that we used (in the Philippines) were the true forerunners of TACPS. We also had a van mounted radio that we farmed out to division CPs when it was necessary, and it was the forerunner of the DASC. The main contribution that we made in the Philippines, however, was to break the ban on having controllers in the front lines talk directly to aircraft and actually control the strikes." (HRS, HD, HQMC)



USS Idaho *firing in support of landing operations at Okinawa on 1 April 1945. (USMC Photo #116412).*

off Okinawa, "operational control of aircraft in the Ryukyus remained with the Navy until the area was secured." [16]

By the end of the war a system of control evolved which attempted to incorporate the flexibility of the Philippine system with the coordination of the Okinawa system. The request for air support would go direct to a center called the Tactical Air Direction Center. Intermediate echelons would monitor the request, indicating their approval by silence. When air support was approved, it would be controlled by the Forward Air Controller whenever the tactical situation permitted. This introduced the flexibility of the Philippine system without sacrifice of safety to the ground troops or interference with the overall tactical situation.

Fire Support Coordination Center (FSCC)

Standard artillery tactics and doctrine proved sound throughout the war. On different islands some organic weapons were inadequate for the task of destroying the type of emplacements encountered. On Iwo Jima, the 105mm and 75mm howitzers of the divisional artillery battalions were completely unsuited for the work of destroying many of the imposing Japanese fortifications. Even the much heavier 155mm shells of corps units required 10 to 12 hits, all in the same place, to inflict major damage.[17] All was not lost, however, in the ultimate destruction of those targets on Iwo Jima. If artillery could not do the job, then naval gunfire or support aircraft might be able to do so. Iwo Jima was an example of successful coordination of supporting arms.

It was at Iwo Jima that the first Marine FSCC was established. Colonel John S. Letcher was selected by Major General Harry Schmidt, V Amphibious Corps commander, to coordinate all supporting arms ashore. Colonel Letcher was, in addition, commander of the 1st Provisional Field Artillery Group, namely two 155mm howitzer battalions constituting the corps artillery. Colonel Letcher, who set up the FSCC in a tent, was in continuous communication, afloat and ashore, with liaison officers assigned to each of the three divisional artillery regiments. Always at his elbow was a representative of the naval gunfire officer of the V Amphibious Corps, Lieutenant Colonel Donald M. Weller, and a liaison officer from the Landing Force Air Support Control Unit, headed by Letcher's senior, Colonel Vernon E. Megee. Both Megee and Weller had staff separate and distinct from Letcher's and the FSCC functioned as a clearing house of requests for close support coming in from the field. Letcher, giving orders only to corps artillery, along with the air and naval gunfire liaison officers, screened and integrated these requests, and Megee and Weller as the ranking corps air and naval gunfire officers forwarded them in the status of requests to the implementing agencies afloat.[18] This arrangement was in effect a safeguard against unwarranted duplication of fires and against impos-

sible demands being made on any given arm. In practice, it functioned extremely well.

The essential elements of the FSCC were used in the Okinawa operation. The Tenth Army utilized a Target Information Center (TIC). At each staff level down to the battalion, the artillery officer acted as the target coordinator for infantry support. Working in close conjunction with the NGF and air liaison officers, the TIC collated intelligence regarding enemy defenses. It allocated fire missions to the support elements whose capabilities promised the most effective results. The "system stood the test of combat without major difficulties and drew unanimous praise from the divisions using it." [19]

Trials and Adaptations—Marine Aviation

In addition to improvements in NGF, CAS, and artillery support, the Marine Corps adapted from the European war experience certain training thought usable in the Pacific. The first Marine Night Fighter Squadron, VMF (N)–531, was commissioned 16 November 1942 at Marine Corps Air Station (MCAS), Cherry Point, with Colonel Frank H. Schwable commanding. By 17 June 1943, the squadron had six combat aircraft. Marine night fighters operated for the first time during the Bougainville campaign and supplied the experience on which subsequent training was based. Pilots were given intensive training in interception of and firing at an airborne target at night. The Marine Corps sent officers to Great Britain in February 1943 where they studied the technique employed by the British in control of interception. They worked with the Royal Air Force and attended a Fighter Director school at Stanmore, England. What they learned was brought back to the United States where night fighter training was given greater emphasis. Marine Night Fighter Squadron 531, the original unit, went to Eagle Mountain Lake, Texas, in April 1944, but by that time six more night fighter squadrons had been organized in the Marine Corps.[20]

In addition, Marine Aviation set up an air warning program and commissioned at Cherry Point, on 1 July 1943, Marine Air Warning Group 1 under the 3d Marine Aircraft Wing. Subsequently, Air Warning Squadron 1 was commissioned as the first of 19 such units. Officers were trained in radar at the Massachusetts Institute of Technology and Harvard, then went to Camp Lejeune, North Carolina or Ward Island, Corpus Christi, Texas. Enlisted radar technicians were trained at Fort Monmouth, New Jersey, by the Army. Officers attended the air warning school at Orlando, Florida and commenced training at NAS, St. Simon's Island, Georgia.[21]

The Marine Corps considered training with parachute troops and gliders. Marine Corps paratroopers made their first demonstration jumps at Lakehurst, New Jersey, 29 December 1940. It was during fiscal year 1941, that the Marine Corps was authorized to organize two parachute battalions. A parachute training school was established in 1941 on the West Coast near Santee, in the San Diego area, and named Camp Gillespie in May 1942. These courses lasted six weeks. By April 1943, there were sufficient parachute troops available, approximately 3,000 men, to meet the operational requirements. However, because of the terrain of the Pacific Islands, and the lack of sufficient lift capabilities, parachute units were disbanded on 10 December 1943.[22]

In a similar vein, the Marine Corps organized a barrage balloon training school at Parris Island on 12 June 1941. Facilities were set up in September 1941 at New River (Camp Lejeune), North Carolina. The purpose was to train barrage balloon units with defense battalions in base defense operations. Of six barrage balloon squadrons (designated ZM squadrons) four remained in the United States to guard Navy yards and bases, two went overseas, one to Tulagi and the other to New Caledonia. It was learned that the balloon barrages created as great a hazard to friendly aircraft as to enemy planes. Their mission was to protect the artillery of the defense battalion to which they were assigned, but it was found that the 90mm antiaircraft guns proved more effective. The barrage balloon organization was abandoned 15 December 1943.[23]

Another type of training was in the use of gliders. A study by the Bureau of Aeronautics in June 1941 of towed gliders for the purpose of transporting personnel and equipment culminated in the organization of a Marine Corps Glider Detachment on 6 January 1942 at Parris Island for primary and advanced training. The bureau was responsible for the procurement of glider equipment, while the Marine Corps was responsible for training the personnel required to operate gliders as-

signed for troop-carrying purposes. In order to administer the program, the CMC authorized the Division of Aviation in July 1942, to organize a glider-paratroop unit, and had as officer-in-charge, Major John Wehle. By December 1942, there were 240 Marines taking training. Glider bases were constructed at Eagle Mountain Lake, Texas, and Edenton, North Carolina in the summer and fall of 1942 and training got under way at Eagle Mountain Lake in the spring of 1943. Again, after much thought about the type of terrain in the Pacific and the potential drain on pilot resources, the glider program was abandoned 24 June 1943 when Marine Corps Glider Group 71 was disbanded and its personnel transferred to the 3d Aircraft Wing. A total of 207 gliders were on order but none was delivered.[24]

And Then Came the Bomb

The atomic bomb ended the war and ushered in the atomic age. Much information and misinformation and legend came as a result of the survey of the damage at Hiroshima and Nagasaki. In order to get the facts, the government set up a series of tests, under the cognizance of the Navy, called Operation CROSSROADS in the summer of 1946. The place was Bikini Lagoon in the western Marshalls. Two atomic bombs, one in the air, the other underwater, were exploded in the midst of a fleet of obsolescent warships used as targets. The results of the tests indicated that enough damage was done to drastically alter the World War II techniques of amphibious warfare. Certain responsible military leaders were quoted as saying that it would be impossible to conduct an amphibious assault in a nuclear war. It is important to note that the Navy and Marine Corps, from the outset, believed that the atomic weapon had had no significant effect upon amphibious doctrine but it did, of course, affect techniques and equipment.

The senior Marine officer at the tests, Lieutenant General Roy S. Geiger, Commanding General, FMF Pacific, wrote to the CMC three weeks after the tests what must be considered a truly historic document of the Marine Corps. His deep concern was reflected in the impressions he conveyed in his letter as follows:

> Under the assumption that atomic bombs can be produced in large quantities, that they can be used in mass attacks against an enemy objective, and that our probable future enemy will be in possession of this weapon, it is my opinion that a complete review and study of our concept of amphibious operations will have to be made. It is quite evident that a small number of atomic bombs could destroy an expeditionary force as now organized, embarked and landed. Such a force might not fare so badly on the high seas, if properly dispersed.–It is my opinion that future amphibious operations will be undertaken by much smaller expeditionary forces, which will be highly trained and lightly equipped, and transported by air or submarine, and movement accomplished with a greater degree of surprise and speed than has ever been heretofore visualized. Or that large forces must be dispersed over a much wider front than used in past operations. With an enemy in possession of atomic bombs, I cannot visualize another landing such as was executed at Normandy or Okinawa. It is trusted that Marine Corps Headquarters will consider this a very serious and urgent matter and will use its most competent officers in finding a solution to develop the technique of conducting amphibious operations in the atomic age.[25]

Only 13 days after receiving this grim warning, the CMC appointed a special board headed by Major General Lemuel C. Shepherd, Jr., Assistant Commandant of the Marine Corps and two other members, Major General Field Harris, Director of Aviation and Brigadier General Oliver P. Smith, Commandant of the Marine Corps Schools. The task of the Special Board was to take up the matter of amphibious warfare in the atomic age.[26] As it happened a decade or more before, and will undoubtedly happen in the future, the Marine Corps Schools were called upon again to help arrive at a solution. This Special Board appointed a Secretariat, to conduct the actual research into probable effects of atomic explosion on future amphibious operations. The Secretariat consisted of Colonel Merrill B. Twining, Colonel Edward C. Dyer, and Lieutenant Colonel Clair W. Shisler.

The problems confronting the Marine Corps in conducting amphibious assaults in the face of atomic attack were exceedingly complex. The Navy believed, and the Marine Corps agreed, that naval air and surface warfare could be conducted in an atomic attack with increased dispersion of the fleet. However, the immediate problem for the FMF would be that dispersion would not provide increased protection for the landing force. On the contrary, the landing force, as in the past, had to concentrate in strength at the point of landing or risk the consequences of depleted firepower aggravated by insurmountable dif-

ficulties of control and communications. Dispersion, which was necessary to the fleet, likewise deprived the amphibious attack of its greatest characteristic—the ability to strike swiftly and in overwhelming force. General Alexander A. Vandegrift, the CMC, advised the Special Board that in surmounting certain requirements revolutionary measures might be required. He stated that "details are neither expected nor desirable at this time, but general principles must be determined in order to orient the effort of the Marine Corps away from the last war and toward the next." [27]

The Shepherd Board's precept directed it to study:

> (1) Employment of helicopters for ship-to-shore movement,
>
> (2) Damage effects of the explosion of an atomic bomb, and,
>
> (3) Special equipment for amphibious operations.[28]

Within number (3) above, special equipment for amphibious operations, the board considered airborne landings, submarine landings, large flying boats, and helicopters.

On 16 December 1946, the Special Board submitted to the CMC the findings of their study. The Special Board stated:

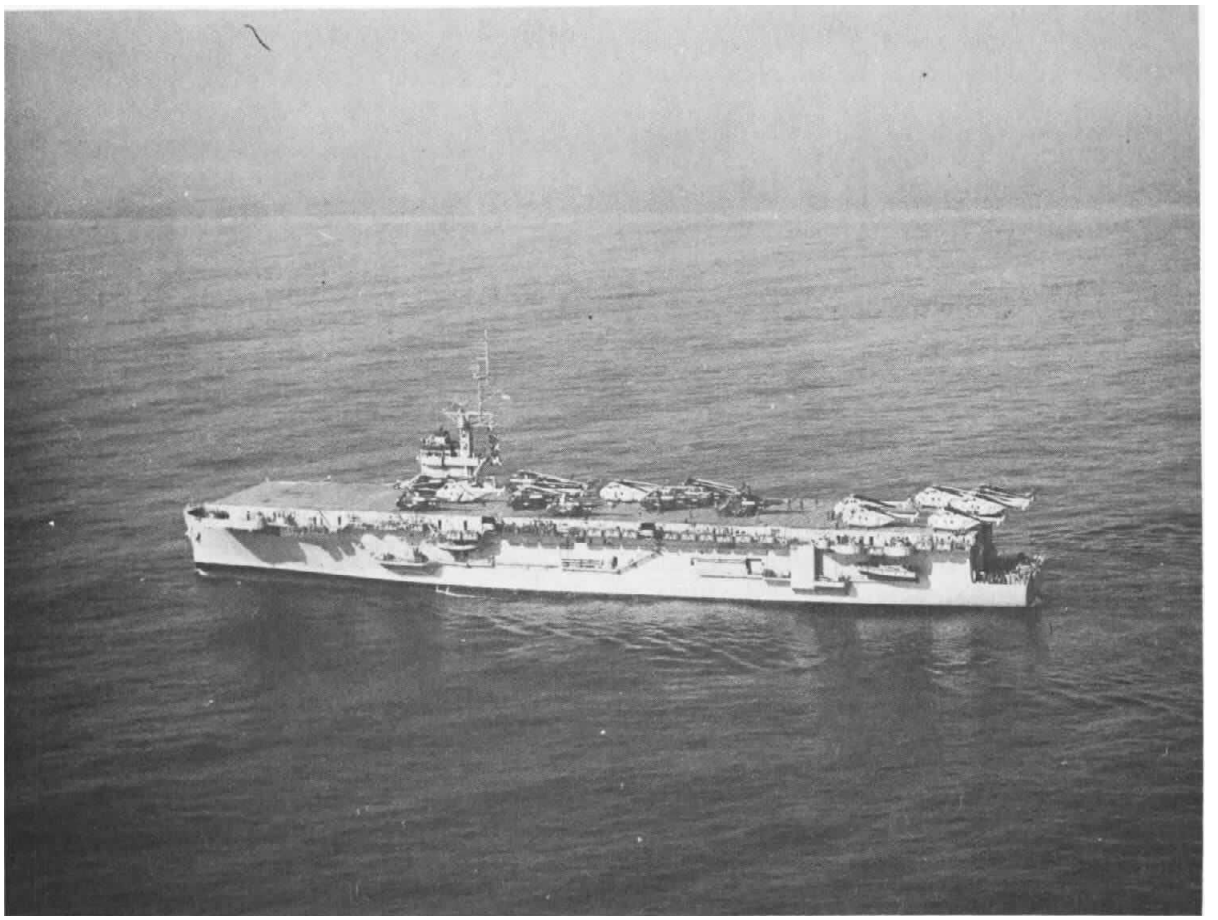
> The atomic bomb now prohibits the heavy concentrations of ships and landing craft heretofore used in amphibious operations. The answer lies in a wide dispersion of our attack force, a rapid concentration of our landing force by means other than small boats or amphibians and thereafter maintaining close contact with the enemy. Airborne operations by landplane transport, by parachute or by glider are not suitable for Marine Corps employment . . . Submarine transports will be useful but to a limited extent. The development of a combination of large flying boats and helicopters will overcome the limitations of a purely airborne method, keep the enterprise a purely naval one, and permit its rapid exploitation and support from widely dispersed and more economical surface vessels.[29]

The report, in studying airborne landings, submarine landings, large flying boats, and helicopters, indicated that while all of the courses of action had some elements of advantage, all had marked disadvantages. It was obvious, even at this early date, that the board had more faith in the helicopter. The second choice was the large seaplane.* The board felt that the speed of the helicopter offered a practical means of overcoming the effects of dispersion while likewise reducing exposure to atomic attack. In addition, it possessed many of the advantages of the airborne attack with few attendant disadvantages. Under the method visualized, helicopters would be carried by transport carriers with additional machines carried by transports and LSTs. The board felt that personnel could be landed in proper formation on the flank or rear of the hostile position and that palletized supplies could be landed in or near dumps without further handling. Helicopters of the future could be constructed to carry larger loads; they could be made faster and ultimately less vulnerable than landing craft. The board concluded that "the speed of the helicopters renders the degree of transport dispersion at sea a matter of no disadvantage and likewise introduces a time space factor in landing that will avoid presenting at any one time a remunerative atomic target." [30]

The board believed that the helicopter amphibious assault technique capitalized on the inherent characteristics of the vehicle with a view of providing the landing force with those precious ingredients, "speed," "flexibility," and "dispersion." The report also included a proposed program for the use of helicopters by the Marine Corps. The board recommended the following: (1) that an experimental squadron should be organized and equipped with 12 helicopters of the first available type; (2) that a study of techniques, tactics, logistics, and other phases of ship-to-shore movement by helicopters be made to include military requirements for future helicopter design.[31]

Within three days, the Commandant concurred in the board's conclusions and forwarded the report to Brigadier General Oliver P. Smith, CMCS, directing him to implement the developmental program outlined in the report.[32] The CMC directed the MCS to undertake "an immediate study of the employment of helicopters in an amphibious operation,"

*At the time, the seaplane in the immediate future was the Martin "Mars" with an empty weight of 75,000 pounds and a cargo and fuel load of 63,000 pounds. It was to have a troop-carrying capacity of 133 equipped men in seats. Howard Hughes, millionaire aircraft designer, was building a prototype eight-motored transport seaplane, which was designed to carry a 44-ton tank as part of its payload of 120,000 pounds. Clamshell doors and a landing ramp could be added to the design. The Special Board did not seem very optimistic about the outlook for either the Hughes or Martin seaplane being delivered in adequate numbers "within the next five years."



USS Thetis Bay *(CVEA–1) with helicopters on deck preparing to ferry troops to attack positions during Operation SKI JUMP (January 1957) at Camp Pendleton, Calif. (USMC Photo #A352474).*

and to submit: "a. A tentative doctrine for helicopter employment, and b. The military requirements of a helicopter specifically designed for ship-to-shore movement of troops and cargo." In the same letter, MCS was directed to further study the employment of transport seaplanes in amphibious operations. As a last bit of guidance, the CMC stated:

> As a concurrent problem it is obvious that operations using such air-vehicles may well require a complete revision of Tables of Organization as well as prescribed equipment. If it is found that revision or reduction in the size of organizations or changes in the types of amounts of arms, equipment, and supplies are necessary, recommendations to that effect should be included.[38]

Repeat of the 1930s

Unlike 1933, and the writing of the Tentative Landing Operations Manual, classes did not have to be suspended at MCS during 1947 to write the new doctrine for helicopters. The Committee to do the work was officially called the Committee of the Academic Board (referring to the Academic Board of the Educational Center of MCS). This Committee, headed by Colonel Robert E. Hogaboom, was assisted by the Secretariat that researched for the Special Board, Colonels Twining, Dyer, Shisler, and (later added to the Secretariat) Lieutenant Colonel Samuel R. Shaw.*

Unlike other boards that would bear the name of the chairman, the Committee of the

*Presumably because any work done at MCS is a team effort, official reports covering tactical and doctrinal work are signed only by the chairman of a committee or the CMCS even though a dozen men might have contributed. This method may be commendable but it plays havoc with historical records.

Academic Board simply became known as the Helicopter Board. Colonel Hogaboom would indeed head another board in 1957 that would be called the Hogaboom Board and would reshape the FMF.

Within three months of the CMC directive of 19 December 1946, the Helicopter Board submitted a report entitled "Military Requirements of Helicopter for Ship-to-Shore Movement of Troops and Cargo." [34]

The report envisioned a helicopter with a seating space for a minimum of 15 and a maximum of 20 infantrymen "suitably armed and equipped to initiate combat." The report did not set its sights on a helicopter carrying more than 20 men as "a capacity in excess of twenty (20) men is not desirable in an assault helicopter since the craft will undoubtedly be extremely vulnerable." [35] When the committee initially outlined the problem, it appeared to be realistic in view of the times:

> On the premise that the helicopter offers a valuable means of accelerating and dispersing the ship-to-shore movement, it is recognized that complete replacement of all existing ship-to-shore conveyances may at some future date be desirable. Under such conditions it would appear necessary that there be designed a relatively small type helicopter for transportation of assault troops, as well as a large type helicopter capable of lifting all divisional loads. However, examination of current technical developments indicates that the latter type may not be practical for some time to come. Accordingly, it is considered more realistic to approach the problem in increments, establishing initially the characteristics for a purely assault conveyance. . . .[36]

In general terms, the report briefly discussed the payload, range, speed, armor, etc., desirable for the 15–20-man helicopter. However, it was the 1930s again, doctrine being evolved first and then the equipment to fit the doctrine.

In view of the recommendation of the Shepherd Board of December 1946, the CMC requested the Secretary of the Navy through the CNO to activate an experimental helicopter squadron (HMX). This squadron, HMX–1, was placed under operational and administrative control of the CMC via the Commanding Officer of the Marine Corps Air Station at Quantico who was designated to furnish logistic support for it.[37]

The CMC assigned missions and tasks to HMX–1 as follows:

Missions

1. Develop techniques and tactics in connection with the movement of assault troops in amphibious operations.
2. Evaluate a small helicopter as replacement for the present fixed-wing observation (OY) aircraft in gunfire spotting, observation, and liaison missions in connection with amphibious operations.

Tasks

1. Develop a doctrine for the aviation tactics and technique in the employment of the helicopter in amphibious operations.
2. Assist the Marine Corps Schools in the development of a doctrine covering the tactics and techniques of the employment of helicopters in amphibious operations.
3. Study the operation and maintenance of assigned aircraft.
4. Develop the flight proficiency of pilots and air crewmen.
5. Develop and maintain the technical proficiency of mechanics.
6. Submit recommendations for tables of organization, equipment allowances, and related data for future helicopter squadrons.[38]

Colonel Clayton C. Jerome, Commanding Officer of Marine Corps Air Station, Quantico, welcomed the new HMX–1 squadron with instructions that it was to get the pick of personnel and the best facilities of the station. The first commanding officer of HMX–1 was Colonel Edward C. Dyer, former member of the Secretariat of the Helicopter Board. While waiting for helicopters, Colonel Dyer arranged to have the eight officers that were assigned to the squadron sent to the naval experimental helicopter squadron, VX–3, at the Naval Air Station, Lakehurst, New Jersey, to obtain some flight training. Among the few experienced instructor pilots at Lakehurst was a Marine, Major Armond H. DeLalio, "who is recognized as the pioneer helicopter pilot of the Marine Corps. He had taken part from the beginning in the Navy's helicopter program; and as operations officer of VX–3 in 1947, he provided training for Dyer's officers in Navy helicopters. . . ." [39] At Colonel Dyer's request, Major DeLalio was subsequently assigned to HMX–1 as operations officer in early 1948.

The year 1948 was a good year for HMX–1. In February it received its first two helicopters, both HO3S–1, Sikorsky-built with a 450-horsepower Wasp engine. Though listed as a four-place craft, it could actually lift only two combat-equipped men in addition to the pilot, or two casualties on external litters. The maximum load, including gas, pilot and passengers or cargo, was 1,180 pounds; the

Sikorsky HO3S–1 observation-utility helicopters at Quantico's air station in May 1948. (USMC Photo #25605).

operating radius, 80 miles; and the maximum speed at sea level, 103 miles per hour.[40]

While not the large prototype theoretical helicopters discussed in doctrinal writings, the HO3S–1 proved invaluable for training the pilots for better models to come. As in the thirties, when Roebling and Higgins were encouraged to manufacture their craft for military needs, so, too, did Marine officers, namely Colonels Dyer and Twining, encourage Sikorsky, Piasecki, and Bell to design for the needs of the Marine Corps.*

Paradoxically at HMX–1, the first mission, in addition to training purposes, occurred when a helicopter was used to "determine the best route for a salvage party to remove a 'Weasel' (Amphibious Jeep) that had become mired in a nearby creek." [41]

By 1 May 1948, the squadron had enough personnel, 12 officers and 32 enlisted men, plus a total of five HO3S–1s to participate in Operation PACKARD II. This operation was the second amphibious command post exercise held jointly by Navy and Marine forces to simulate a ship-to-shore assault landing against an enemy defending the beaches. This time, the beach was not at Culebra but at Onslow Beach, Camp Lejeune, North Carolina.

The following objectives were assigned to HMX–1 during the PACKARD II exercise:

> To take a positive step forward in the development program by making an actual landing of troops by carrier-based helicopters;
>
> To gain experience in operating helicopters on board an aircraft carrier and experience in helicopter landing operations upon which a sound doctrine for these operations could be written;
>
> To gain individual and collective experience for pilots, aircraft crews, and other squadron personnel so that more extensive operations could be undertaken in the future;
>
> To determine probable military requirements for landing force helicopters of the future.[42]

Colonel Dyer and his squadron reported to Captain R. E. Dixon, USN, commanding the CVE (escort aircraft carrier) USS *Palau*. In the exercise, HMX–1 was to simulate landing one regimental combat team. During the actual landing, a total of 66 men and considerable communications equipment were transported to the beach by helicopter. A total of 35 flights were made between the ship and the landing zone.[43] For the entire operation, a total of 28.6 hours were flown and a total of 103 carrier landings and take-offs were made.

Foremost among the conclusions arrived at by the HMX–1 report was the need for a larger helicopter. Change the name of the equipment and it would sound like the concluding remarks in the fleet landing exercises of the 1930s, "a better landing boat is needed." The report went on to say "if troops are to be landed expeditiously and in battle formation the time consumed and the movement of the very few troops transported in this operation served to point up the fact that a transport helicopter carrying at least eight passengers is urgently required." In an entirely optimistic vein, the report concluded:

> No unsurmountable obstacles, either theoretical or actual, were developed or experienced that might prevent the future operation of mass landings of troops by helicopters. The operation was entirely successful in that its limited objectives were reached. No attempt, however, was made to fully exploit the

*Igor Sikorsky, Russian-born, American aeronautical engineer, builder, inventor, and founder of the Sikorsky Aviation Corporation and Engineering Manager of Sikorsky Aircraft Division of United Aircraft Corporation. Holder of many honorary degrees, awards, and honors, Sikorsky retired in 1957 but acted as consultant and adviser to United Aircraft until his death in 1972.

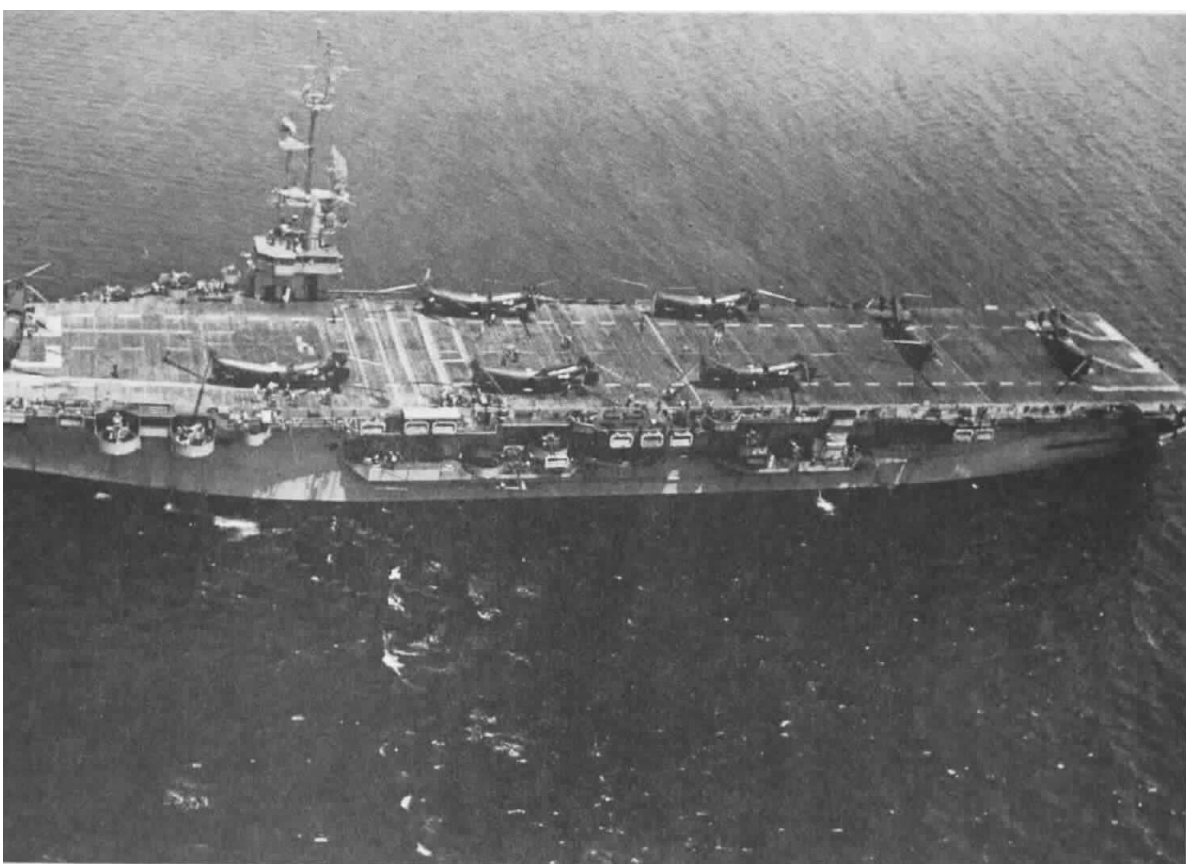
Frank N. Piasecki, American-born aeronautical engineer, builder, inventor, and founder of the Piasecki Helicopter Corporation and Piasecki Aircraft Corporation. Piasecki was president of his corporation and director of the Crown Cork International Corporation.

Lawrence D. Bell, American-born aeronautical engineer, builder, and designer. General Manager of the Glenn L. Martin Corporation, he later became vice-president in charge of sales for Consolidated Aircraft Company and later organized the Bell Aircraft Corporation. During World War II, Bell Corporation manufactured the P–39 Air Cobra fighter. Bell entered the helicopter field during 1943, specializing in light utility machines.

> capabilities of rotary wing aircraft. Much remains to be done in the future and these operations must continue to be thought of as experimental and developmental.[44]

After PACKARD II, HMX–1 provided aerial demonstrations and transportation to various groups, both military and civilian. In addition, experiments were made with an aerial public address system for directing traffic, troop movements, or rescue work. High-speed wire laying was successfully tested in conjunction with the Marine Corps Equipment Board, which had been evaluating various dispensers under all climatic conditions. By August of 1948, two new arrivals sparked the interest at HMX. The first Bell helicopter was flown to HMX–1 from Lakehurst, New Jersey. It was a three-place craft powered by a 178-horsepower motor. Dubbed the HTL–2, it was suitable for reconnaissance, artillery spotting, or aerial photography. No familiarization flying was necessary for this model as the pilots who trained at Lakehurst had been given their first 15 hours of flight instruction in this light aircraft.[45]

The great event of the year was the arrival at HMX–1 of the first HRP–1. It was the largest helicopter in operation at that time. The HRP–1 was a Piasecki-built, 10-passenger helicopter, powered by a 600-horsepower engine driving twin rotors. The maximum speed at sea level was 100 miles per hour and 75 miles per hour represented the cruising speed. It had a cargo space about 14-feet long and 5-feet wide with a cargo hoist of 400 pounds capacity and a cable length of 100 feet. Because of its elongated and curved configuration, the HRP–1 was nicknamed the "flying banana." By the end of the year, four more HRP–1s were delivered to Quantico where flight indoctrination training continued both for pilots and crews. This preliminary stage was followed by an inten-



HRP–1s spotted on the flight deck of the USS Palau *ready to load troops and equipment in June 1950. (USN Photo #707741).*

sive program of testing tactics and techniques for landing assault troops in an amphibious operation.[46]

Phib-31

> The evolution of a set of principles governing helicopter employment cannot await the perfection of the craft itself, but must proceed concurrently with that development.[47]

As if following a script written a generation before, the MCS had prepared a tentative doctrine on the employment of helicopters before there was any appreciable amount of helicopters in the world. The Army's air mobile divisions can only be the outgrowth of what the Marine planners of 1948 envisioned—a Marine helicopter wing composed of 240 aircraft, "each capable of carrying a payload of fifteen (15) fully armed troops or four thousand (4,000) pounds of cargo." There were not at that time as many as 240 helicopters in the entire world. The planners at MCS envisioned a "simultaneous lift of one RCT (regimental combat team), helicopter borne." They continued that "where helicopters are of lesser capacity the numbers of helicopters in helicopter units should be increased as necessary to provide for maintaining the tactical integrity of troop organizations." [48]

The tentative doctrine for helicopters, in mimeograph instructional form, was revised after PACKARD II in May 1948. Revisions were made in consonance with operations at HMX–1 and finally with the arrival of the first HRP–1 machines.

In November 1948, a 52-page booklet was published by MCS entitled "Amphibious Operations—Employment of Helicopters (Tentative)." As the 31st in a series of manuals on amphibious operations, the production was usually referred to as *Phib-31*.* The booklet was initially classified "Confidential" and approved for instructional purposes in MCS. The purpose of *Phib-31* was contained in the preface:

> The advent of the troop carrying helicopter and its establishment as standard equipment within the Marine Corps gives rise to a variety of questions related to the employment of such conveyances in the conduct of amphibious operations. It is the purpose of this pamphlet to explore the various aspects of helicopter employment, discerning the manner in which the characteristics of the vehicles can be best exploited to enhance the effectiveness of the amphibious attack, and providing thereby the basis for a body of doctrine governing helicopter landing operations.[49]

Phib-31 contained the following sections: Introduction, Organization and Command, Tactical Considerations, Embarkation, the Ship-to-Shore Movement, Fire Support, Logistics, Communications, and Characteristics of HRP–1 and HO3S–1. Much of the spadework had already been done in amphibious manuals of prehelicopter days, and the basic principles governing the conventional amphibious attack were still generally applicable. While the limitations of rotary-wing aircraft were apparent at the time, *Phib-31* took into account the potential advantages:

> The ability of the helicopter to rise and descend vertically, to hover, and to move rapidly at varying altitudes all qualify it admirably as a supplement or substitute for the slower, more inflexible craft now employed in the ship-to-shore movement. Furthermore, its ability to circumvent powerful beach defenses, and to land assault forces accurately and in any desired altitude, on tactical localities farther inland, endow helicopter operations with many of the desirable characteristics of the conventional airborne attack while avoiding the undesirable dispersal of forces which often accompanies such operations. The helicopter furthermore, when transported to the scene of operations in aircraft carriers, makes operations possible at ranges which have not yet been achieved by the existing conventional carriers.[50]

The MCS doctrinal work on the employment of helicopters came full-circle with the publication of *Phib-31*. The helicopter with its nicknames of "whirlybird," "flyinging windmill," "eggbeater," "flying banana," and the like, was certainly here to stay. What remained was how the military services would use this new and improving craft. The Marine Corps, seeing the vast possibilities in the craft, would have it fully and rapidly developed, as it was fully committed to new techniques of amphibious warfare. In these early years, the Navy and Coast Guard attitude toward their helicopter programs was more of progression rather than expansion. The Army was primarily interested in the helicopter for its logistical possibilities, envisioning it as a successor to the truck. The Air Force looked at the helicopter chiefly as an air-rescue craft.

**Phib-31* was written by then Colonels Victor H. Krulak and Edward C. Dyer. Krulak recalls that "we had so little to go on, no data; just conviction." LtGen V.H. Krulak ltr to Director, M.C. History, dated 3 August 1970 (Historical Division, Headquarters, U.S. Marine Corps).

By the end of the decade, the Marine Corps experimented with the helicopter in cold weather operations off Newfoundland and at the other extreme, tested it under tropical conditions off the coast of Puerto Rico in the Atlantic Fleet Exercise in 1949. On the other side of the world, in Tsingtao, China, a Marine captain, Wallace D. Blatt, flew an HO3S–1 helicopter as a rescue aircraft during the American withdrawal from China in February 1949.[51] In May 1949, HMX–1 participated in PACKARD III, off Onslow Beach, and among its new techniques it deployed an HTL–2 helicopter from a Landing Ship Tank (LST) for spotting operations. HMX–1 subsequently recommended that "the operation of small helicopters from LST's be further pursued by the operating forces of the fleet." [52] In May and June 1949, HMX–1 gave demonstrations in techniques of wire laying, evacuation of casualties, and flying crane lifts of 75mm pack howitzers before the 81st Congress and President Harry S. Truman at Quantico. The amphibious doctrine and boat development in the late thirties just prior to World War II was similar to the helicopter employment doctrine and development of various craft prior to the Korean War. The Marine helicopter program was overtaken by the Korean War by June 1950. It was only 30 months since HMX–1 was activated and the time in which to evaluate the capabilities of a new type of aircraft was short. In Korea a good deal would depend on the experience of HMX–1 and the doctrinal conclusions of the MCS since it was a truism of history that no new weapon is any better than the doctrines and techniques behind it.[53]

CHAPTER V

THE FIFTIES: MASSIVE RETALIATION, PEACEFUL COEXISTENCE, AND NUCLEAR STALEMATE

Introduction

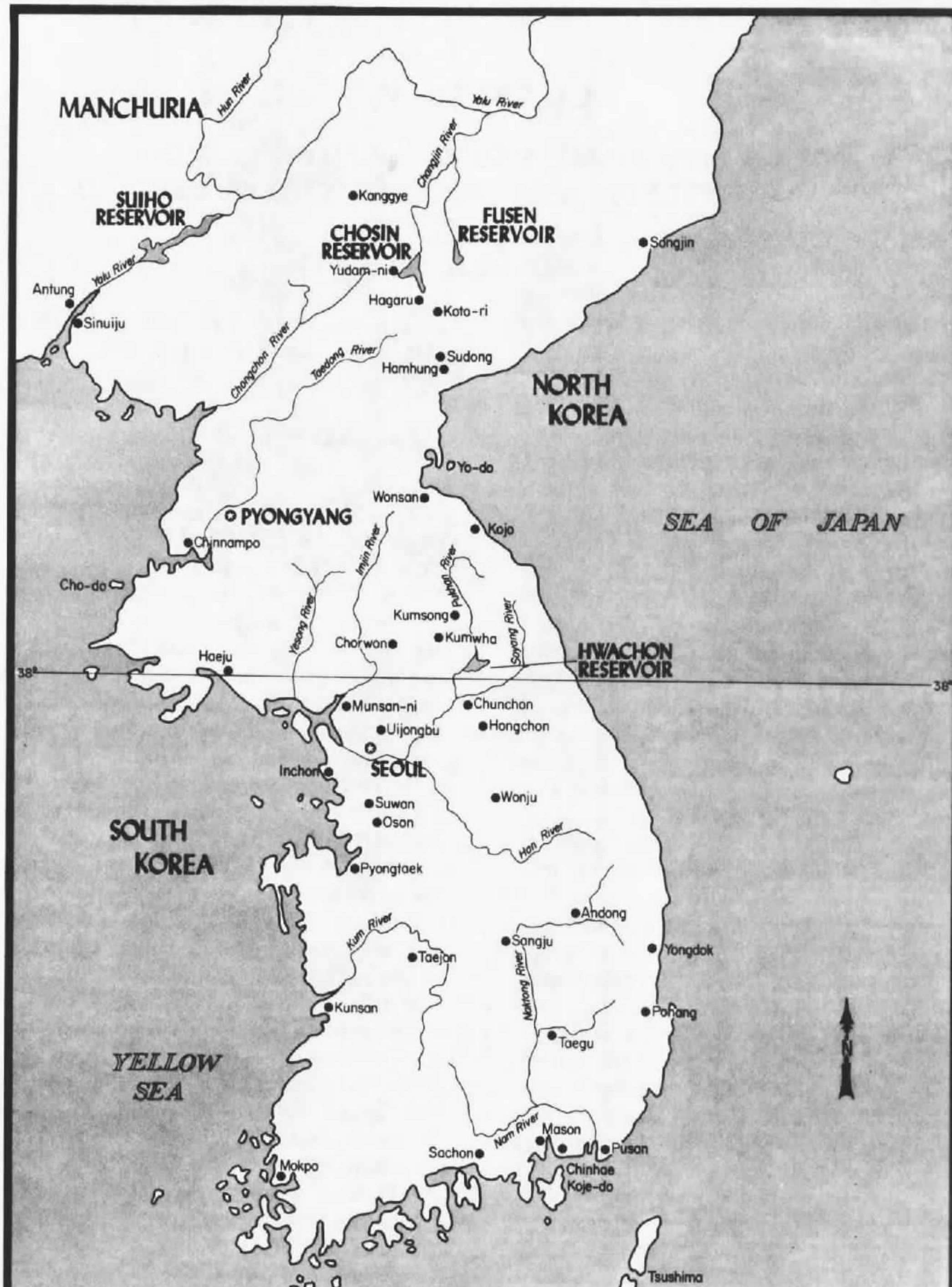
The fifties, beginning with a conflict in Korea, saw the end to the fighting and signing a truce in July 1953. At the time, it looked as if the United States had fought the last "conventional" war. We were in the midst of the Cold War and well advanced into the nuclear age. The new Republican Administration was in office about a year when Mr. John Foster Dulles, the Secretary of State, announced in January 1954 the new national defense policy based on "massive retaliation." As in any decade, the foreign relations of the United States were guided by the strength of the military posture. Our military strength in the mid-50s looked good as far as nuclear stockpiles were concerned, and by the end of the decade we were busy catching-up with the Russians on perfecting intercontinental ballistic missiles.

Military planners, taking into account United States defense policies, had to consider a nuclear solution to the next war. But as the decade came to a close, it was believed that Russia and the United States had so increased their capacity to destroy each other that nuclear or total war was completely outside the realm of rational policy. A policy of "Peaceful Coexistence" became fashionable. Nuclear "stalemate" replaced nuclear "superiority" as the principal deterrent to total conflict. In place of total war, the Communists chose the tactic of using war by proxy, war by satellite, war by threat and subversion. In the 1950s, the United States met the war by threat with the Formosa Resolution in 1955 and the landings in Lebanon in 1958. At the Inter-American Conference in Caracas in 1954, we met the threat of subversion in Guatemala by a multilateral anti-Communist resolution and support for an anti-Communist government. By the 1960s, we would be destined to fight in a proxy war, the unconventional war of the guerrilla.

The Status of the Marine Corps in the 1950s

The Marine Corps came of age, as it were, when in June 1952, Public Law 416, 82d Congress, was passed giving the Marine Corps, for the first time in its history, a voice in the highest military councils in those matters that directly concerned it.

To go back several years, in 1947 Congress enacted the National Security Act which set up a new organization for national defense. This act created a National Military Establishment consisting of three executive or military departments of cabinet level and the Joint Chiefs of Staff (JCS), all under the "general direction, authority and control" of a Secretary of Defense, who was given a small staff to help him provide policy guidance and high-level coordination for the separate departments in his charge. The basic act did not clarify the specific roles and missions of the different services. As an example, the Air Force philosophy, simple in theory but difficult in practice, had the view that everything that flies should be under Air Force control. Obviously, Marine and Navy air thought otherwise. In order to correct "overlapping" in the basic law, President Harry S. Truman issued Executive Order 9877 entitled "Functions of the Armed Forces," spelling out specific roles and missions. Again different interpretations of the basic law and the executive order varied, which led to the Key West Conference in March 1948. At this conference, Secretary of Defense Forrestal met with his top civilian and military aides to in-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Hun River
Yalu River
Changjin River
SUIHO RESERVOIR
Kanggye
FUSEN RESERVOIR
CHOSIN RESERVOIR
Songjin
Yudam-ni
Antung
Yalu River
Hagaru
Koto-ri
Sinuiju
Chongchon River
Taedong River
Sudong
Hamhung
NORTH KOREA
Yo-do
Wonsan
PYONGYANG
Kojo
SEA OF JAPAN
Chinnampo
Imjin River
Pukhan River
Cho-do
Yesong River
Kumsong
Soyang River
Chorwon
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HWACHON RESERVOIR
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Uijongbu
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Inchon
SEOUL
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Wonju
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Andong
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Yongdok
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terpret and adjust the roles and missions of the services to conform to the legislative requirements of the National Security Act. This conference resulted in agreement on a document designed to define more specifically, and to amplify, the basic functions assigned in law.

On 21 April 1948, the President revoked Executive Order 9877 and directed the Secretary of Defense to issue the statement of functions agreed to at Key West. This the Secretary did in a directive entitled "Functions of the Armed Forces and the Joint Chiefs of Staff," also referred to as the Key West Agreements and by the short title "Functions Paper." In another major change to the basic law, the National Security Act Amendment of 1949 was passed establishing the Department of Defense as an executive department, and creating a deputy and three assistant secretaries. The Departments of the Army, Navy, and Air Force were reduced in status to "military departments," whose Secretaries no longer enjoyed cabinet status or statutory membership in the National Security Council.

Public Law 416 of the 82d Congress, enacted 28 June 1952, specifically applied to the composition and missions of the Marine Corps. It provided:

> (1) The strength of the Marine Corps should be not less than three combat divisions and three air wings.
>
> (2) The Commandant of the Marine Corps should have co-equal status with members of the Joint Chiefs of Staff in matters of direct concern to the Marine Corps.[1]

The Joint Chiefs of Staff and the CMC are furnished with an agenda listing the items to be discussed before each meeting. If there are items on the agenda of direct concern to the Marine Corps, the CMC attends the meeting and participates as a co-equal member. In the first year after the passage of the law, the CMC had attended 84 meetings of the Joint Chiefs to deliberate upon 175 items of direct concern to the Marine Corps.[2] Aside from the CMC, Marine officers for the first time began serving on committees of the Joint Chiefs of Staff organization such as the Joint Strategic Plans Committee and Joint Logistics Plans Committee.

Other changes in the National Security Act were the Reorganization Plan No. 6 of 1953 and the Defense Reorganization Act of 1958. These changes gave greater authority to the Chairman of the Joint Chiefs of Staff and established a different chain of command running from the President to the Secretary of Defense through the JCS to the commanders of unified and specified commands.[3] The "Functions Paper," still intact from 1948, was revised in 1953 and on 31 December 1958 it was promulgated as Department of Defense Directive No. 5100.1, subject: "Functions of the Department of Defense and Its Major Components." The contents of this directive have since been included in Joint Chiefs of Staff Publication 2, "Unified Action Armed Forces (UNAAF)" of November 1959.

General Clifton B. Cates, 19th Commandant of the Marine Corps, 1 January 1948 to 31 December 1951. (USMC Photo #A42546).

In 1953, the Secretary of the Navy approved and issued two General Orders, Numbers 5 and 19, that directly affected the Marine Corps. These orders changed the position of the Marine Corps within the Department of the Navy, elevating the Commandant to a position comparable to the Chief of Naval Operations. The changes gave further recognition to the fact that there were Marine Corps forces other than those assigned to the Operating Forces and Shore Establishment of the Navy. In addition, the authority of the Naval District Commandants as it pertained to the Marine Corps became limited. Control responsibilities previously exercised by the District Commandants were given to commanders of Marine Corps forces within the district and to the CMC.

Naval gunfire support from the 16-inch guns of the USS Missouri *firing on North Korean positions at Chong Jin in October 1950. (USN Photo #421049).*

The Marine Corps fared well in the 1950s, coming into its own and truly becoming a partner on the defense team.

Korea—The Test

A month after the Korean truce of 27 July 1953, General Lemuel C. Shepherd, Jr., CMC stated:

> It is not the Navy Yard Guards or the Ships' Detachments or the State Department Security Forces that give us our fundamental strength. These are all fine and useful elements of our Corps, but realistically it is the ability to go into combat with our ground and air elements on short notice; to do *what* is required *when* it is required, that gives us our real strength.[4]

General Shepherd had in mind Korea, where in such a test the Marines on short notice activated the 1st Provisional Brigade on 7 July 1950 under the command of Brigadier General Edward A. Craig. Exactly one week later, the ground element, a reinforced regimental combat team (RCT), sailed from San Diego to the Far East. The air component, commanded by Brigadier General Thomas J. Cushman, consisted of three fighter squadrons and an observation squadron of Marine Aircraft Group (MAG) 33, 1st Marine Aircraft Wing. Included in this air strength was the first helicopter unit in history to be trained and organized for combat duty, the 7 officers, 30 enlisted men, and 4 HO3S–1 aircraft of the rotary-wing unit of Marine Observation Squadron (VMO) 6. To complete the squadron, there were eight OY–2 planes, fixed-wing, with eight officers and 43 enlisted men. Under the command of Major Vincent J. Gottschalk, VMO–6 sailed for Korea on 14 July under the operational control of the brigade and the administrative and logistical control of the 1st Marine Aircraft Wing.[5]

The mission of VMO squadrons had been stated in 1949 as the conduct of "tactical air reconnaissance, artillery spotting and other flight operations within the capabilities of assigned aircraft in support of ground units."[6] The definition left plenty of room for the helicopters to show what they could do under combat conditions. The first demonstration came on the very first morning in Korea, when General Craig and his aides utilized the rotary-wing aircraft not only for reconnaissance but also for locating assembly areas and directing troop movements. During the most critical phase of the Chosin operation, the helicopters provided the only liaison between isolated commands. Wirelaying by air was first employed by VMO–6 during the second battle of the Naktong River Bulge, in September 1950.

General Lemuel C. Shepherd, Jr., 20th Commandant of the Marine Corps, 1 January 1952 to 31 December 1955 (USMC Photo #A46471).

Hospital Ship Repose *used for the evacuation of the wounded at Inchon Harbor, Korea, 1952. The platform where helicopters landed is shown. (USMC Photo #A134641).*

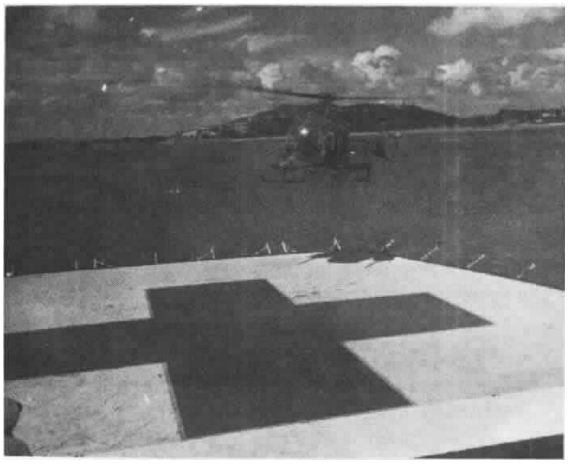
The value of the helicopter for the evacuation of the wounded became immediately apparent and VMO–6 did its job well. A wounded Marine could be transported from the front line to a hospital ship, perhaps 20 miles away, within 30 minutes. The United States Hospital Ship (USHS) *Consolation* was outfitted with a helicopter loading platform in July 1951 and eventually all hospital ships had such landing platforms. VMO–6 was joined on 31 August 1951 by Marine Transport Helicopter Squadron 161 (HMR–161) with its 15 new 10-place HRS–1s. This was the first such helicopter squadron in history. While evacuation of the wounded was a secondary mission for both VMO–6 and HMR–161, the importance of this mission lay in the fact that nearly 10,000 wounded Marines were evacuated by helicopter, 7,067 of whom were flown out by VMO–6 and another 2,748 by HMR–161.[7]

The first step toward using the helicopter in the mission most closely envisioned by Marine Corps planners, that of transporting troops and supplies in support of ground operations, was accomplished on 13 September 1951. In Operation WINDMILL I, HMR–161 carried out the first Marine mass helicopter combat resupply operation in history in a one day's lift of supplies in the Soyang River vicinity. A total of 28 flights was executed in overall time of 2½ hours (total flight time of 14.1 hours) to transport 18,848 pounds of equipment and 74 Marines a distance of seven miles.[8]

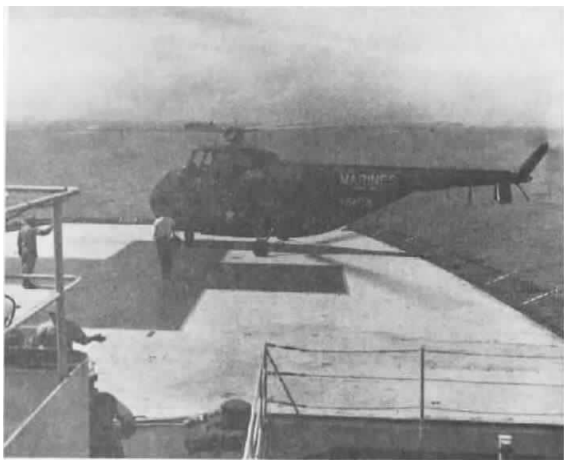
Marine Corps General Order No. 85, of 15 February 1951, proclaiming the doctrine of vertical envelopment was only in effect 59 days when HMR–161 transported 224 fully equipped Marines and 17,772 pounds of cargo from the reserve area to the main line of resistance. This was the first helicopter lift of a combat unit in history. On 11 November 1951, in Operation SWITCH, HMR–161 transported nearly 2,000 troops in 12 HRSs in 262 flights in an overall time of 10 hours (95.6 hours of flight time).[9]

In Operation HAYLIFT II, from 23 to 27 February 1953, HMR–161 set an all time cargo-carrying record when it lifted over a million and a half pounds of cargo to supply completely two regiments with daily requirements for a five-day period. This task represented a total of 1,633 lifts and 583.4 flying hours for the operations. Other tasks that became routine included ammunition resupply from the ammunition supply point to the front line, and a complete lift of a 4.5-inch rocket battery with personnel and rockets from one firing point to another. In July 1952, HMR–161 answered the call from the Army to evacuate 1,172 Army troops cut off by heavy rains in the Chunchon area of western Korea.[10]

Speaking in the same vein, about saving lives, two other innovations came out of the Korean War, the thermal boot and the armored vest. A limited test of body armor was made during the late months of World War II but tests were discontinued after the war had ended. The Marine Corps, through the Field Medical Service School at Camp Lejeune, North Carolina, had renewed the development of a lightweight plastic body armor. It was a



Marine helicopter (Bell HTL) lands on the Repose. *(USMC Photo #A163539).*



An HRS-Sikorsky helicopter from the 1st MAW lands on Hospital Ship Repose. *(USMC Photo #A163539).*

sleeveless jacket with zipper front and water resistant green cloth with armor consisting of ballistic nylon and curved plates, similar to fiberglass. The vest weighed 7¾ pounds and provided protection for the wearer against missiles of a velocity of 1,200 feet-per-second or less.[11]

By 30 January 1952, 500 of the armored vests had arrived in the 1st Marine Division for testing. The vests became a satisfactory and desirable item of equipment. By July 1953, the division had received its authorized quota of 24,000 vests. Since 70 percent of all battle casualties came from wounds in the chest, back, or abdomen, the vests prevented many wounds to those parts of the body with resultant lives saved and a boost in morale. By the end of the war, the armored vest or "flak jacket" was joined by another piece by body armor to protect the lower torso. This lower torso body armor resembled drawers and weighed about 3 pounds. It was worn as a supplementary item with the armored vest.[12]

If the thermal or vapor-barrier boot did not save lives, it certainly saved Marines from frostbite from the cold and gave comfort to those who wore them. In the first winter of the war in 1950, inadequate footgear and the shortcomings of shoepacs, the existing winter gear, caused serious frostbite cases. The dark days of the Chosin Reservoir and the move to the sea did not lend themselves to men stopping and changing socks in order to prevent frostbite, even if they had dry socks. By the second winter, thermal or "mickey-mouse" boots were available and foot frostbite was virtually eliminated. In a rather bizarre side effect, the thermal boot was found to afford some protection against land mines, perhaps because of its cumbersome shape and weight.[13]

Optimum Organization and the Boards

As we have seen from Chapter IV, the guiding doctrinal publication for the tactical employment of helicopters was *Phib-31, Amphibious Operations—Employment of Helicopters (Tentative),* prepared by MCS and used throughout the Korean War. In spite of the war, however, in December 1952, the Navy and MCS began publication of a related series, the Navy's Naval Warfare Publication (NWP-22) and the Marine Corps' Landing Force Manuals (LFMs) and Landing Force Bulletins (LFBs). These publications replaced the Current Tactical Orders and Doctrine, U.S. Fleet series (USFs), and included the doctrines and techniques for the execution of the helicopter-borne amphibious assault based on Phib-31 of 1948.

In February of 1953, a major original doctrinal contribution was made by the Marine Corps with the publication of Landing Force Bulletin 2, *Interim Doctrine for the Conduct of Tactical Atomic Warfare.* This document presented a concise and mature approach to the conduct of operations wherein atomic munitions are employed. At the time of its publication, this paper was the only doctrinal source of its kind promulgated by any of the armed forces. Other important LFBs published in the 1950s were LFB No. 17, *Concept of Future Amphibious Operations* and LFB No. 24, *Helicopter Operations.*

Concurrent with the publishing of LFMs and LFBs at MCS, the Marine Corps was involved with study boards. The boards, appointed by the CMC, met either at Quantico or Headquarters Marine Corps to study current problems and to make recommendations accordingly. At all times, the boards, regardless of what they studied, had to keep in mind the major concepts of the time, namely, the "new" concept of amphibious operations—dispersion of ships and possible tactical employment of atomic weapons—and the doctrine of vertical envelopment. To meet such concepts most of the boards during the 1950s concerned themselves with organization and structure of a lighter and faster Marine Corps. Some ex-

amples of these boards and their range of studies were:

Report of Board to Study and Make Recommendations on Air-Ground and Aviation Matters (Harris Board), headed by Major General Field Harris, August 1951.

Report of Board to Review the Basic Organizational Structure of the Fleet Marine Force, Ground (Wornham Board), headed by Major General Thomas A. Wornham, April 1952.

Report of Board to Review Aviation Organization in Order to Achieve Personnel Economy (Condon Board), headed by Brigadier General John P. Condon, February 1953.

Report of Board to Review Headquarters Organization of Fleet Marine Force, Atlantic for Tactical and Administrative Purposes (Hogaboom Board), headed by Major General Robert E. Hogaboom, June 1953.

Report of Board to Study Characteristics of Fleet Marine Force Ground and Air Units (Snedeker Board), headed by Brigadier General Edward W. Snedeker, October 1953.

Report of Board to Study the Composition and Functions of Marine Corps Aviation (Smith Board), headed by Colonel John L. Smith, February 1955.

In addition, the Commandant issued individual directives and reports on matters pointing to organization and doctrine for the future years of the Corps. Included in this category were CMC letters, with subjects as follows:

Air-Ground Relations, July 1954

The Marine Air-Ground Task Force Concept, November 1954

Provisional Force Service Regiment, February 1955

Concept for Logistic Support of the Landing Force, August 1955

Employment of Marine Corps Aviation, January 1956

Recommendations from whatever source had to be tested in the field. The CMC accordingly authorized the activation of Marine Corps Test Unit No. 1 (MCTU #1) in the summer of 1954, under the command of Colonel Edward N. Rydalch.[14] Its organization was equivalent to a reinforced infantry battalion, expressly for the purpose of developing tactics and techniques in support of the conduct of tactical atomic warfare. The principal highlight of the first year of operations was the unit's participation in Exercise DESERT ROCK VI, conducted at the Atomic Proving Ground in Nevada, in February 1955. The Marine 3d Provisional Atomic Exercise Brigade, comprising MCTU #1 and Marine aviation elements, was involved in the exercise. The CMC reported that "despite the inevitable artificialities, the exercise served to confirm Marine Corps theories and to provide a sound footing for projected efforts." [15]

By the end of the fiscal year 1955–56, MCTU #1 had completed testing 33 projects. Some of these focused on such weighty problems as the determination of what echelon of command should possess the capability of surface-to-surface delivery of atomic weapons. Primarily, solving the problems endemic to battalions and smaller units was emphasized by MCTU #1. During 1956 and until 30 June 1957, when the unit was disbanded, MCTU #1 completed 27 additional projects. The variety of tests and reports submitted by MCTU #1 ranged from determining size of a TACC controlling CAS to the distance helicopters should be from enemy atomic weapons.

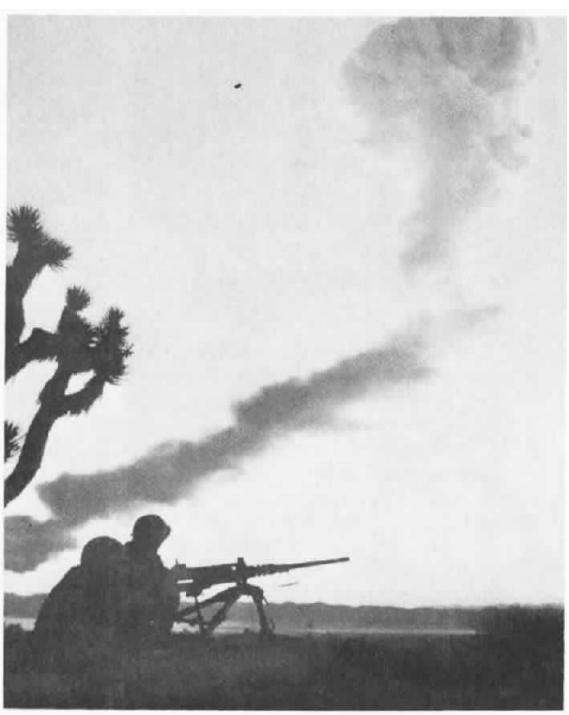
The unit participated with other Fleet Marine Force, Pacific (FMFPac) units with the use of the USS *Thetis Bay*.[16] The *Thetis Bay* was the first of a series of ships converted to serve as transports for helicopter landing teams. The Navy, again endeavoring to meet the needs of the Marine Corps, recommissioned the old escort-carrier in 1956, which became the first assault helicopter transport, LPH–1.

In 1956, the CMC appointed a study board,

General Randolph McC. Pate, 21st Commandant of the Marine Corps, 1 January 1956 to 31 December 1959. (USMC Photo #A402599).

Marines turn their backs to ground zero during rehearsal for Operation DESERT ROCK VI, at Yucca Flats, Nev., 1955. (USMC Photo #A327428).

whose recommendations a year later would change the basic structure of the FMF for the next several decades. The board that convened at the MCS on 4 June 1956 had as its president, Major General Robert E. Hogaboom. The board was instructed to "conduct a thorough and comprehensive study of the Fleet Marine Force and make recommendations to the Commandant of the Marine Corps for the optimum organization, composition and equipping of the Fleet Marine Force in order to best perform its mission." [17]



Atomic blast of Operation DESERT ROCK VI. (USMC Photo #A327288).

The Hogaboom Board in its deliberations had to keep in mind what the Navy and Marine Corps viewed as a proper approach to the "new" concept of amphibious warfare. Concisely, the concept was as follows:

> The assault is initiated by landing troops by helicopter to the rear and on the flanks of the desired landing beaches. These troops, supported by naval gunfire and air, then proceed to clear out the enemy defenses and seize the beaches from the rear. The beaches are then rapidly cleared of obstacles and prepared to receive landing craft and landing ships. The helicopters are subsequently used to provide tactical mobility for the troops ashore and to supply the widely dispersed tactical troop units.[18]

There were those in the Navy who believed that:

> At some time in the distant future it may be possible to build vertical rising and landing aircraft of sufficient speed, endurance and cargo capacity to make landings entirely by these craft. They would also, of course, have to be small enough to be transported in and operated from the decks of ships.[19]

Whatever the means for future ship-to-shore movement, whether it be helicopter or landing boats, the Navy felt that Navy ships would have to bring that means within range of the beaches.

There were those people in the Marine Corps who also believed that *all* movement

from ship-to-shore would be by helicopter in the "foreseeable future." The Hogaboom Board disagreed with this view. The board reported that it was working on problem areas in most cases that did not extend beyond "five to six years and in no area beyond about ten years." The "all" movement was not in that range of time. The board cautioned the "all" movement thinkers that the "all helicopter assault" should not become the "all helicopter concept." It said it believed this to be invalid and that it should be corrected immediately. In very simple terms the board laid to rest the "all helicopter concept":

> The Board believes that this line of thinking has perhaps obscured the continuing importance of crossing the beach operations in our modern concept. We believe that for the foreseeable future a substantial portion of the men and material required in effecting a lodgement on a hostile shore must still cross the beach in a "conventional" fashion. This is not in our opinion inconsistent with the "all helicopter assault" concept, or with the requirement for the projection of seapower ashore without the necessity of direct assault on the shoreline. Reduced to its simplest terms the Board visualized an operation wherein the flexibility of the helicopter-borne assault forces would be exploited to uncover and secure the beaches and to seize critical areas which will be required to enable us to phase in the additional means to maintain the momentum of the assault and secure the objective area. The Board considers that helicopters will be employed initially to displace the assault elements of the landing force from ships at sea to attack positions ashore from which they can seize the critical terrain features. In subsequent operations ashore helicopters will be employed to maneuver disengaged units into attack positions from which they can launch an attack against critical objectives at a decisive time.[20]

The Hogaboom report was forwarded to all major commands within the Marine Corps "for information." But the CMC stated that it was approved for "purposes of staff planning at this headquarters." [21] The value of the board report was that it had taken a thorough and objective look at existing doctrine and concepts and in many cases, such as the employment of Marine aviation, affirmed that they were basically sound. Other concepts such as the "all helicopter assault" and the "Marine-Air-Ground Task Force" were given approval but more definition and clarification of some aspects of both was needed. The board's recommendations for the change in structure of the ground forces of the FMF and in particular the division were, with few exceptions, accepted in total by the Marine Corps. A review

Major General Robert E. Hogaboom, president of the board that restructured the Fleet Marine Force in 1956. (USMC Photo #A401975).

of the current T/Os reflects substantially what the board recommended in 1957.[22]

After much study and comparison of the then-projected pentomic structure of the Army's division, the board maintained the integrity of the triangular structure of the Marine division at the regimental level—three regiments consisting of three four-company battalions. Other major changes, recommended by the board and subsequently adopted by the Marine Corps, were:

1. Tank battalion taken out of the division (then under the "L" Series T/O) and placed in Force Troops.
2. Ontos battalion added.*
3. Reconnaissance battalion added, replacing reconnaissance company.
4. Service regiment replaced by a service battalion.
5. Shore party battalion deleted and shore party function incorporated into service battalion.
6. Engineer battalion changed to a pioneer battalion with reduced personnel and equipment.**
7. Hospital company deleted from medical bat-

*Ontos battalion is listed as antitank battalion in 1970 T/O.

**Name rechanged to engineer battalion as shown in current T/O.

talion and a fourth collecting and clearing company added.

8. Infantry and artillery regimental headquarters become purely tactical in function.

9. Infantry regimental 4.2-inch mortar company, antitank company, and battalion weapons companies were all deleted.

10. A fourth rifle company added to the infantry battalion.

11. The artillery regiment reorganized and rearmed.

12. A communication intelligence company added to division headquarters battalion.[23]

The board reported the following:

> The Marine division has been lightened considerably by personnel reductions in headquarters, supply, maintenance, and other supporting elements and by equipment reductions in tanks, artillery, motor transport, heavy engineer equipment and heavy maintenance equipment. The resulting division is air transportable—and its assault elements are helicopter transportable. It is a well-balanced fighting entity capable of effective ground assault operations under conditions of either conventional or nuclear warfare. For sustained operations, this division requires additional external support. This support is furnished by Force Troop units, the numbers of which are based on the requirement to support at least one Division/Wing task force in each Fleet Marine Force.[24]

Techniques and Hardware Development During the 1950s

The list of projects investigated, tested, and completed by various agencies, internal and external to the Marine Corps, ran into hundreds of items during the decade. The range included successful development of lightweight radio relay communication equipment to the issuance of a new ration, "Meal, 25-in-1, Landing Force." In addition, work on dehydrated foods was being conducted. While the average Marine who ate at the battalion messhall would probably find it hard to believe, a pilot program, instituted by Food Service Demonstration Teams and the various Cooks and Bakers Schools, attempted to indoctrinate Food Service Personnel in newly developed methods of preparing and servicing dehydrated foods.

One of the major problems confronting the Marine Corps in perfecting its new tactical doctrine was that of providing operating facilities for aircraft ashore in the objective area, early in an amphibious operation. The construction of long concrete or asphalt runways for jet aircraft was virtually impossible in a landing operation. To eliminate the need for such runways, research was begun in 1954 on the problem of constructing an expeditionary airfield, long enough to land a jet plane, refuel it, and to have it take-off, all within the early stages of the operation. The rather successful conclusion to this problem, which indicated the development programs had paid full dividends, was installed at Chu Lai in the Republic of Vietnam in 1965.[25] The 15 odd years of hard work at the Development Center in developing and refining such a solution lies in a concept called "Short Airfield for Tactical Support" or SATS. The concept envisions the rapid establishment of hastily constructed or rehabilitated airstrips from which tactical aircraft can be operated through the use of launch and arrest equipment. The SATS today is a kind of a shorebased carrier deck. The deck, AM–2 matting, however, is aluminum and air transportable and the basic runway measures about 2,000 feet by 72 feet. Many elements make up the SATS including a CE–2 catapult, a shore-based expeditionary catapult powered by a J–79 turbo jet engine; an arresting gear called the MK–5 MOREST, a relatively heavy (74,000 lbs.) arresting system operating on the hydraulic ram principle; a Fresnel Lens Optical Landing System, consisting of a self-contained source light system that provides glide slope information to the pilot which enables him to make a precise landing into SATS arresting gear; and TACAN, Tactical Air Navigation System, composed of airborne and ground equipment operating at ultra high frequencies which provide pilots with continuous range and bearing information.

Formal test evaluation of the concept with selected equipment was directed in 1958 with the establishment of Project 51–58–01 at MCDC. The first airfield test under this project was conducted at the Marine Corps Air Station, Beaufort, South Carolina in 1959.[26] The first operational test of a complete expeditionary jet airstrip was made in March 1960 during Exercise BLUE STAR. This test was conducted in an amphibious assault environment on Taiwan by elements of the 3d Marine Division and the 1st Marine Aircraft Wing. A 3,400 foot by 36 foot airstrip with all-weather air control and complete aircraft servicing facilities was established on the site of an abandoned Japanese fighter strip within 70 hours of the commencement of beach unloading. One hundred and eighty Marine engineers resurfaced the BLUE STAR runway with aluminum matting. It was again tested on

Vieques Island during February 1961. At that time the airfield was constructed, in the main, on an old airstrip with a portion of it on an unprepared surface. The length of the airfield was reduced from the one tested on BLUE STAR to only 2,150 feet.[27] Short Expeditionary Landing Fields (SELFs), consisting of a SATS minus the expeditionary catapult, were established at Quantico and Bogue Field, North Carolina. In 1964, SATS was established along the southern coast of Spain during Operation STEEL-PIKE I. The use of it during STEEL-PIKE was a great success. In only 5½ days the SATS field was fully operational and ready to receive an F8 Crusader squadron as it flew in from the United States. "Nothing was used from the land. All matting and all control installations and fuel farm were landed over the beach." [28]

The problem of attacking ground targets without visual reference by the aircraft crews was solved with the introduction at the end of World War II of radar-controlled bombing equipment. With little refinement this equipment was introduced into the Korean War in the summer of 1951 by the U.S. Air Force using the MPQ-2 radar.* Based on a concept oriented towards deep support of troops in extended land campaigns, the Air Force system made use of 20-ton vans to house its ground components. Thus, the MPQ-2s used by the Air Force in 1951 were primarily for strategic long-range bombing as opposed to tactical bombing.

It was during this time, 1951, that the Marine Corps was developing a radar bombing system, to be used tactically and specifically designed for amphibious operations. The Marine system, called the MPQ-14, was built under the direction of Major Marion C. Dalby at the Naval Air Materiel Test Center, Point Mugu, California. The MPQ-14 reached the combat area of Korea in July of 1951 for evaluation. The unit was designed so that the largest piece could be put into a one-ton trailer. Major ground items included a generator power supply, a tracking radar, and a computer; the last essential component, an automatic bombing control, was mounted in the aircraft.[29] The MPQ-14 was evaluated by the Marine Corps and the Fifth Air Force against two other radar types, the MPQ-2 and MSQ-1 in tests called "PINPOINT ABLE." Even with some mechanical difficulty experienced with the radar bombing, "it soon became apparent that the accuracy (bomb cluster dispersion) of the MPQ-14 was greater than that of either the MPQ-2 or the MSQ-1." [30] The MPQ-14 was sufficiently reliable to permit bomb drops within one mile of friendly lines. By the middle of summer 1952, the Marines had obtained Fifth Air Force permission to use the MPQ-14 in a close support role. By the start of the truce in July 1953, properly trained controllers and technicians made up Marine Air Support Radar Team One (MASRT-1), who operated the MPQ-14 on a 24-hour basis. Operations of MASRT-1 demonstrated impressively that the Marine Corps had the capability to provide sustained direct air support to frontline troops under all conditions of weather and darkness in the target area. The development of the Marine MPQ-14 has proven to be a most significant step forward in tactical aviation.

In the field of logistics, the concept of "continuous flow" of supplies across the beach was developed in order to eliminate the buildup of large and vulnerable beach supply dumps. The refinement of this concept provided for the rapid delivery of ammunition, fuel, and other supplies directly to Marine air and ground units deep inland. As had happened many times before, the concept led directly to implementing techniques and related equipment. One of the techniques formulated was that of fuel handling in amphibious operations.

In September 1954, a report of a test of fuel handling was submitted to the CMC by the Development Center, culminating efforts in this area since 1950. The objective of the project was: "To provide the Marine Corps with a suitable amphibious assault bulk fuel handling system for receiving, transferring, storing and dispensing bulk liquid fuels during the initial phases of an amphibious operation." [31] Small prototypes were tested and used successfully both in Korea and the United States.[32] A year later, now called the expeditionary bulk fuel handling system, it was again tested successfully by a Marine aircraft group at Roosevelt Roads, Puerto Rico.[33] The system, a versatile, self-contained, portable, and readily installed complex, was capable of

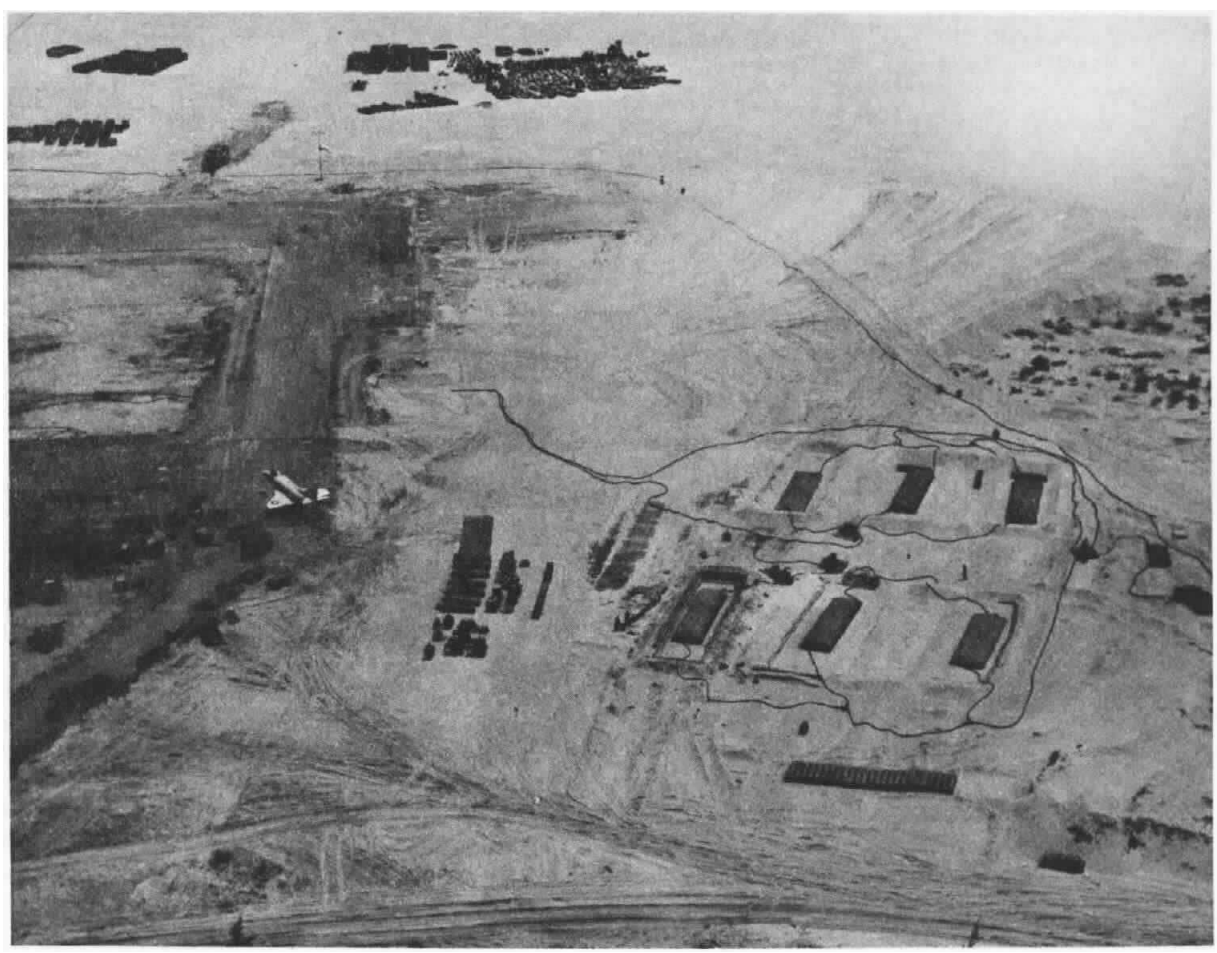
*The letters MPQ indicate the type of installation. M—mobile ground installation, the kind of electronic equipment, P—radar. and finally. its purpose, Q-intended for a combination of purposes. In this case, the number 2 indicates the model number in the development of the equipment.

receiving, storing, and dispensing motor, aviation, diesel, or jet fuel in quantities well over 300,000 gallons. The tank farms were essentially composed of collapsible 10,000-gallon capacity, rubber, pillow-like tanks with pumps and accessory equipment. Known today as the Amphibious Assault Fuel System (AAFS), it has become one of the many items which permits the execution of "continuous flow" of supplies.

The Marine Corps continued to support selected research and development efforts of other military services by serving on appropriate program and project steering and coordination agencies and contributing funds to joint projects. Interest in various items ranged from the smallest sensing devices to the guided missile programs of the HAWK and REDEYE. For the direct support of ground combat forces, a joint project was established with the Army in 1958 for the development of "Lacrosse," a field artillery guided missile. The "Lacrosse" missile was first conceived in 1947 by the Marine Corps but was dropped. When the project was reactivated, the initial development work was carried out under Marine Corps and Bureau of Ordnance sponsorship.[34] As is the case in many such developmental projects, the eventual decision was made not to purchase the missile.

To round-out the decade, the CMC reported to the Secretary of the Navy in 1959 that "the Marine Corps is closely monitoring the development of hydrofoils, ground effect devices and planing hulls that can be used in the development of high speed amphibious vehicles."[35]

Within the next two years, the Marine Corps built prototype developmental hydrofoil models, the LVHX–1 and the LVHX–2, a planing hull, LVW–1, and an air lubricated hull model, ARCK–1, to ascertain their capabil-



Bulk Fuel Farm at Chu Lai, 1965. (USMC Photo #A184696).

ities to fulfill its high speed amphibian support vehicle requirements. It also purchased experimental models of ground effects machines or air cushion vehicles for the ship-to-shore movement of troops, vehicles and supplies." [36]

Research and Development (R&D) Cycle

In addressing a general officers' meeting in 1953, General Lemuel C. Shepherd, Jr., CMC, stated:

> I consider it appropriate to recall to your attention the words of the National Security Act of 1947, as amended which say, "It shall be the duty of the Marine Corps to develop those phases of amphibious operations which pertain to the tactics, technique and equipment employed by landing forces." These words are a serious charge to the Marine Corps. They admit of no interpretation. They make it our duty to take the lead in landing force development. True enough, they require us to coordinate with other services, but there is no question as to who is responsible to the Congress in the last analysis. To me that means that the Marine Corps Development Center is our primary developmental agency.[37]

General Shepherd's words of 1953 are essentially true today. The Marine Corps' development is primarily done at Quantico, where the Development Center is now part of MCDEC, Marine Corps Development and Education Command.

The R&D process, let alone the term, was unheard of in the Marine Corps prior to World War I. In developing the proper balance for an advanced base force, the Marine Corps had doctrinal experience. The 1920s and 1930s produced the doctrine for the whole spectrum of amphibious operations in the publication of the *Landing Operations Manual.* Tactics, techniques, and equipment, particularly at the turn of the century, were by the nature of the times, completely of Army origin. Aside from uniforms and personal equipment, field equipment changed very little. It was in the 1930s and 1940s that the "Marine" tactics, techniques, and equipment development came into their own.

Before tracing Marine Corps involvement in the R&D process, definitions are in order. Research is theoretical analysis, exploration, and experimentation directed toward the increase of knowledge. Development is the extension of the investigative findings and theories into practical application for experimental or demonstration purposes. This includes the construction and testing of experimental models or devices. Service Test is the test of a specifically developed item—material, equipment, system, or device—under service or simulated service conditions in order to determine as accurately as possible its operational characteristics or performance and its utility in military operations.[38]

Today the R&D process takes in the foregoing definitions and many more. The Marine Corps' first step in the process was the establishment of the Marine Corps Equipment Board (MCEB) in 1933 (See Chapter III). This was the first organized attempt to have a group from within the Corps recommend the type of equipment best suited to the needs of the Marine Corps. The development and testing of the equipment recommended could be made by any agency so designated by the CMC, whether it be civilians, such as Donald Roebling or Andrew Higgins, or government, such as the Navy Department Continuing Board for the Development of Landing Boats. Marine Corps representatives were members of this board.

After the Roebling "Alligator" was adopted for military use, inspection and contract follow-up were performed by the Inspector of Naval Material with the assistance of Marine Corps officers. Marine Corps liaison officers were assigned to the Bureau of Ships in order to provide Corps influence in the development.[39] During World War II, a Marine Corps liaison officer was assigned to the Army Ordnance Department in 1942. The liaison officer represented the Marine Corps in the formulation of policies and procedures affecting procurement, allocations, and the supply of ordnance material. However, one of the most helpful and profitable duties occurred when he received ordnance information concerning the development of new material or modifications to existing materiel of interest to the Marine Corps.[40]

During World War II, 65 percent of the supplies and material used by the Corps for ground troops was obtained from the Army. "Included were 85 percent of all ordnance items, 75 percent of all food, and 5 percent of all engineer equipment." [41] Of the remaining figures, the "Navy contributed five percent, the Marine Corps manufactured five percent, principally clothing, and the remaining 25 percent was purchased on the open market." [42]

A substantial amount of signal gear came from the Army but the Bureau of Ships procured all electronic equipment for the Marine Corps.[43] Aviation clothing and personal equipment were acquired through regular Marine Corps channels. All aviation materiel, including ground equipment, was developed and supplied by the Navy through the Bureau of Aeronautics.[44]

Also during World War II, the Division of Plans and Policies of HQMC guided the continuous studies of new types of equipment made available within the Navy and Army and made recommendations concerning equipment which should be adopted by the Marine Corps. In addition, it had cognizance over the following: [45]

1. All inventions submitted to the Marine Corps for consideration
2. Maintenance of liaison with the Marine Corps Equipment Board
3. Selection of representatives for committees such as
   - —Army Ordnance Technical Committee
   - —Naval Liaison Committee on Naval Research
   - —Navy Department Continuing Board for Development of Landing Boats.

After World War II, a separate R&D Section was formed within the Division of Plans and Policies. This section, which constituted the first organizational component that formally recognized the R&D program in the Corps, was responsible for all research and development activities. In 1947, the Congress, through the passage of the National Security Act, gave the Marine Corps direct responsibility for amphibious development.

> Section 206, (c)—"It shall be the duty of the Marine Corps to develop, in coordination with the Army and the Air Force, those phases of amphibious operations which pertain to the tactics, technique and equipment employed by landing forces."

For all practical purposes, the law merely declared and recognized certain functions which the Marine Corps had been doing for the past several decades. The immediate problem, after the law was passed, was the lack of a coordinating agency functioning under the CMC to carry out the law. Colonel Merrill B. Twining, Executive Director of the Marine Corps Board at Quantico, stated:

> There is serious need for standardization; there is need for providing specifically for a means of Army and Air Force participation and a means must be provided for the Commandant to exercise an authority imposed by law.[46]

By order of the CMC, a board of general officers met at Quantico on 10 July 1950, with Lieutenant General LeRoy P. Hunt as President. The Hunt Board recommended the establishment of a "Landing Force Development Center" to be located at Quantico. The board further recommended that a Tactics and Techniques Board be established and combined with the Equipment Board into the Landing Force Evaluation Group. The newly created group should have the responsibility of studying, analyzing, and evaluating recommendations proposed by the Education and Development Centers in the field of amphibious development. The board also recommended that the Commandant Marine Corps Schools be designated "Coordinator, Marine Corps Landing Force Development Activities" (MCLFDA).[47] These recommendations were approved by the CMC and were implemented by two letters of August and October 1950.

To further implement the coordinating aspect of MCLFDC, the Joint Landing Force Board for the armed services was established by DOD at MCS to speed interservice agreement on amphibious landing techniques. The Joint Board, headed by Lieutenant General Franklin A. Hart, considered mutual problems of the Army, Navy, Marine Corps, and Air Force in the landing force field.[48] The Joint Landing Force Board lasted until 1 February 1955 when it was disbanded by the Joint Chiefs of Staff. The board, then at Camp Lejeune, North Carolina, had been responsible for four joint service agreement reports and had published two joint landing force manuals. The Marine Corps Development Center at Quantico took over the joint aspects of amphibious problems.[49]

In March 1952, the responsibilities for research and development within the Marine Corps were revised.[50] The Division of Plans and Policies was abolished and a general staff organization was instituted at Headquarters Marine Corps. In this HQMC reorganization the R&D Section became a branch of the G–4 Division. While not part of but akin to the R&D process, a Marine Corps Advanced Research Group (ARG) was established at Quantico. The first group, consisting of 10 colonels, was given the mission of conducting advanced study and original research with respect to problems affecting the Marine Corps. The group was under the direct supervision of the Director of the Education Center at

Quantico.[51] The group's course of study and research usually lasted 10 months whereupon its recommendations would be submitted to the CMC. Many recommendations and resultant changes were made through acceptance of their studies. As an example, the Advanced Research Group of 1955–1956 was given the task of determining the adequacy with which the Marine Corps was fulfilling its statutory responsibility for landing force development, and steps which should be taken to achieve improvement. The ARG concluded that the Marine Corps research and development organization required improvements. The ARG stated that the R&D program be given "high level direction, coordination and supervision" to all of its plans and programs.[52] The G–4 Division, with so many other duties, could not adequately handle the tremendous task of R&D.

As a result of the research group's recommendations, in 1956 the office of the Deputy Chief of Staff (Research and Development) DC/S (R&D) was created. However, the R&D Branch in G–4 (AO4E) continued to function until 1961 but was responsive to the new DC/S (R&D). In 1961 all AO4E personnel were transferred to the Office of the DC/S (R&D). The primary mission assigned to the deputy was to assist the Chief of Staff in the direction, coordination, and supervision of HQMC staff activities in R&D.[53] He was also to direct and supervise the formulation and maintenance of Marine Corps R&D plans and programs. Further, DC/S (R&D) represented the CMC on all departmental and interdepartmental committees, boards, and groups which were concerned with policy making and overall coordination in the field of R&D. Aviation research and development, though monitored by the Marine Corps, was primarily performed through Navy activities. The Marine Corps ended the decade of the 1950s squarely involved in the maze of what was called the R&D process.

CHAPTER VI

THE DECADE OF THE SIXTIES

> There is one resource of the Marine Corps that has always been fully developed: the individual Marine. What made a good Marine during the Revolutionary War still makes a good Marine. A competent, loyal, highly motivated Marine is an asset far exceeding in value all the developments of a technological age.[1]
>
> General Oliver P. Smith, USMC (Retired)

The decade of the 1960s began with the oldest President of the United States being succeeded by the youngest. By the end of the decade, two other Presidents had served. The sixties will have to be remembered for the violence at home and abroad experienced by Americans. Looking back, the violence at home seemed to have commenced with the assassination of President John F. Kennedy in November 1963. Subsequent unrelated violence in the cities and on college campuses tested the basic fiber of American social and political institutions.

In spite of the violence, not because of it, legislative history was made in the decade. The 1964 session of Congress enacted more domestic reform legislation than any session since 1935, the climactic year of New Deal laws.[2] Before the decade passed into history, Americans, through the Congress, produced

General David M. Shoup, 22d Commandant of the Marine Corps, 1 January 1960 to 31 December 1963. (USMC Photo #A408673).

General Wallace M. Greene, Jr., 23d Commandant of the Marine Corps, 1 January 1964 to 31 December 1967. (USMC Photo #A415346).

the strongest civil rights act in American history, the most aid to education, and medicare, and began the "unconditional war on poverty."

On the international scene, America faced crises with Cuba, the Dominican Republic, North Korea, and North Vietnam. It was, however, the Vietnam War, the longest in America's history, that dominated the 1960s. As in every other war, the Marine Corps was called upon to play its role; it played it well. The Marine Corps' contribution to the peak strength of United States forces in Vietnam of 543,400 men (31 December 1969) was 81,800 men.[3] By 30 June 1971, most Marines having been deployed to Okinawa, Japan, Hawaii, and Camp Pendleton, the number left in Vietnam was a little over 500 men. This figure represented advisory, communications, and embassy personnel.

The Vietnam War will probably rank on the level of World War II as the most written about and documented war in American history. Certainly, television brought the war more quickly into America's thoughts than the newsreels of World War II and Korea.

There is a myriad of material that could be discussed regarding the Marine Corps and Vietnam. Two major areas, however, are covered in this chapter, one of peace, that is the participation of Marines in pacification, more specifically civic action. The other area is the refinement of tactical mobility, and use of the fire support base. Neither of these areas were new to the Marine Corps, only to this generation of Marines. Past pacification experiences were incorporated in the *Small Wars Manual* published in 1940 (see Chapter II). Tactical mobility, in the form of helicopter-borne forces, is the fruition of post-World War II Marine thinkers. The Marine Corps envisioned the use of helicopters to carry regimental landing teams before any of the military services, including the Marine Corps, had a working helicoper (see Chapter IV).

Pacification in General, Civic Action in Particular

Pacification, as a concept, successfully carried out, could well become a milestone of the Vietnam War. Within the etymological essence of the word pacification is the meaning of peace. What better way could Americans in Vietnam be remembered than having been involved in pacification. The definition of the term, as approved by the Military Assistance Command, Vietnam (MACV), is as follows:

> Pacification is the military, political, economic, and social process of establishing or reestablishing local government responsive to and involving the participation of the people. It includes the provision of sustained, credible territorial security, the destruction of the enemy's underground government, the assertion or reassertion of political control and involvement of the people in government, and the initiation of economic and social activity capable of self-sustenance and expansion. The economic element of pacification includes the opening of roads and waterways and the maintenance of lines of communication important to economic and military activity.[4]

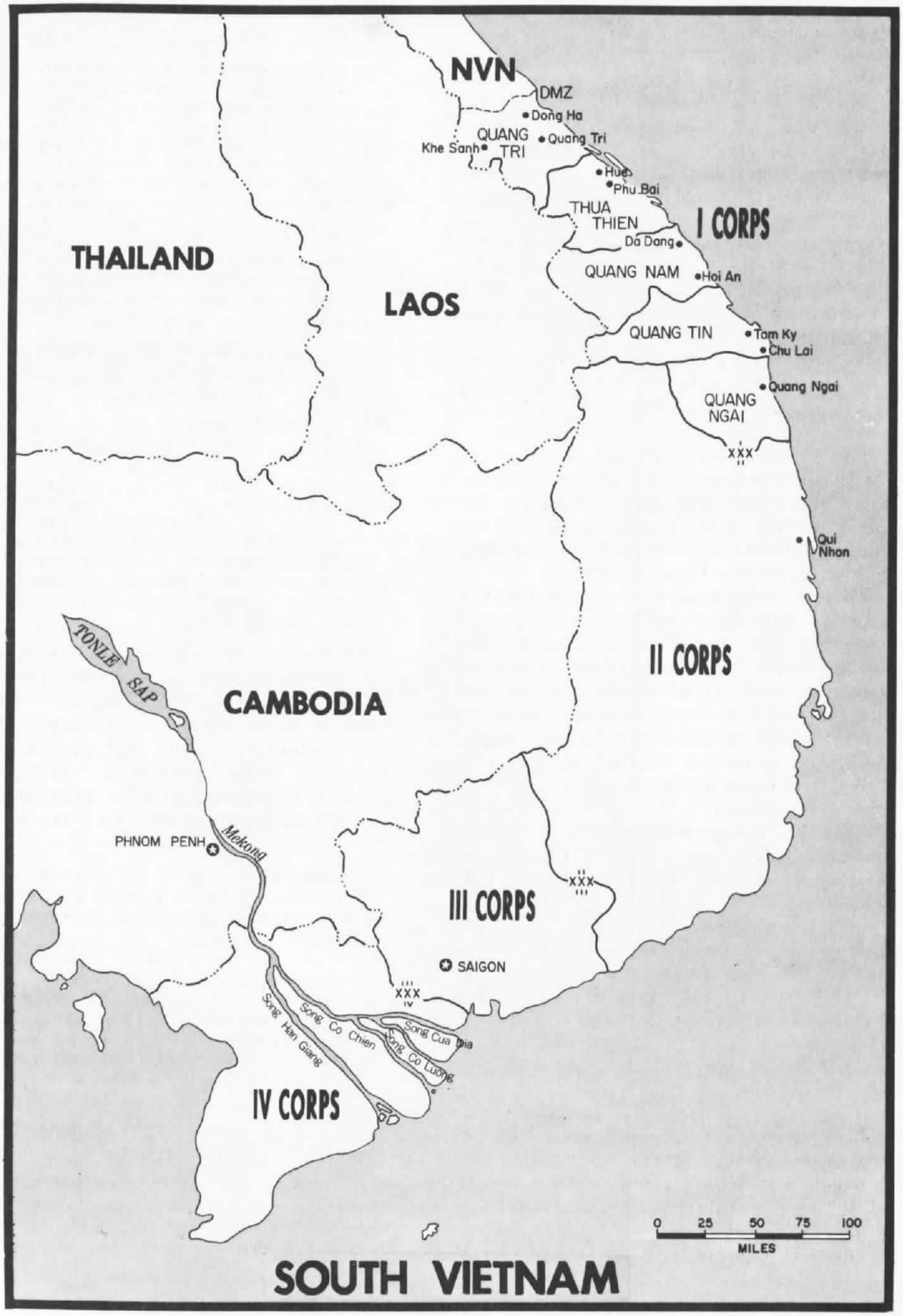
The Marine Corps' role in pacification took the name of civic action. Civic action is that segment of the overall effort of pacification that utilizes the local or military population. Civic action is defined as follows:

> The use of preponderantly indigenous military forces on projects useful to the local population at all levels in such fields as education, training, public works, agriculture, transportation, communications, health, sanitation, and others contributing to economic and social development, which would also serve to improve the standing of the military forces with the population.[5]

To reiterate, the involvement in civic action by the Marine Corps was not new. The Marines of the 1960s retrod the paths other Marines had journeyed from 1915 through 1933 in Cuba, Haiti, Nicaragua, and the Dominican Republic. The experiences as reflected in the *Small Wars Manual* may be summed up in the following two quotations from the manual:

> The motive in small wars is not material destruction. It is usually a project dealing with the social, economic, and political development of the people.[6]
>
> * * * * *
>
> The purpose should always be to restore normal government or give the people a better government than they had before, and to establish peace, order, and security on as permanent a basis as practicable.—In so doing, one should endeavor to make self-sufficient native agencies responsible for these matters.[7]

Experience gained and recorded in a manual written 25 years before can only be a reference for the new generation. A new chapter, not only of military action but of civic action, was begun on 8 March 1965 with the landing of the 9th Marine Expeditionary Brigade at


NVN
DMZ
Dong Ha
QUANG TRI
Quang Tri
Khe Sanh
Hue
Phu Bai
THUA THIEN
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Da Dang
THAILAND
QUANG NAM
Hoi An
LAOS
QUANG TIN
Tam Ky
Chu Lai
Quang Ngai
QUANG NGAI
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Qui Nhon
II CORPS
TONLE SAP
CAMBODIA
PHNOM PENH
Mekong
III CORPS
SAIGON
XXX
IV
Song Co Chien
Song Cua Dia
Song Co Luong
Song Han Giang
IV CORPS
0 25 50 75 100
MILES
SOUTH VIETNAM

School house built with the help of the 7th Marines' civic action program at Chu Lai, March 1967. (USMC Photo #A369955).

Da Nang, Republic of Vietnam.* Limited initially to the local defense of the fast-growing air base at Da Nang, Marine civic action consisted primarily of spontaneous acts of commiseration and charity by individual Marines toward a small population. As the military situation improved, more use of organic resources was made. Civic action projects were oriented toward medical assistance, repair of existing roads and facilities, and minor new construction projects. The doctors soon discovered that many of the superficial ills of the people, such as rashes and sores, could be cured by simply keeping the infested areas clean. The result was a loud plea for soap and other materials. By June 1965 the Commander in Chief, Pacific, Admiral Ulysses S. Grant Sharp, notified the Commanding General of III Marine Amphibious Force (III MAF), then Major General Lewis W. Walt, that supplies of all kinds would be available for use by the Marine Corps civic action groups through Project HANDCLASP. Project HANDCLASP, an official Navy program since 1962, was part of the Navy's people-to-people effort and overseas community relations program. Individuals and organizations within the United States donated material to the naval service and shipped it to warehouses at San Diego for further delivery by the Navy overseas on a space available basis. Within six months, 63,000 pounds of miscellaneous basic commodities were shipped to III MAF.[8]

Staff Sergeant Thad Jones and Lance Corporal Robert Bragan of 4th Marines Civic Affairs Team give showers to Vietnamese Children during MEDCAP visit, 14 June 1967. (USMC Photo #A188734).

As the civic action program matured, other needs and problem areas became evident. Requests for commodity support often could not be filled due to the lack of certain needed items and the uncertain arrival time of materials being shipped on a space available basis. This situation often resulted in embarrassing delays, and tended to erode the overall effect of the program. As though in answer to this problem, the Marine Corps Reserve concluded an agreement with CARE (Cooperative for American Relief Everywhere) whereby the USMCR would solicit money for support of the III MAF civic action program and CARE would act as the custodian of the fund. On the 13th of September 1965, this program was officially launched by the CMC. The program immediately proved successful, and III MAF was provided with one of the most flexible and useful civic action tools in its inventory.[9] Of the many programs implemented by the USMCR/CARE project, two were most successful:

1. MEDCAP (Medical Civic Action Program)—In addition to giving medical help to the people in the local hamlets, MEDCAP trained GVN (Government of Vietnam) medical personnel and trained rural health workers. On-the-job training was given

*Three years earlier, April 1962, Marine military action was begun when a squadron of UH-34 helicopters landed at Soc Trang in the Delta. The squadron was Marine Medium Helicopter Squadron 362 (HMM-362) commanded by Lieutenant Colonel Archie J. Clapp. LtGen Keith B. McCutcheon, "Marine Aviation in Vietnam 1962–1970," *U.S. Naval Institute Proceedings*, v. 97, no. 819 (May 1971), p. 124.

to volunteers who offered to assist the MEDCAP teams, and in this way the local people were encouraged to contribute to the welfare of their own community.

2. School Building Program—In the spring of 1966, III MAF developed an effective classroom building construction program. Local hamlets were required to provide a site for the classroom, a teacher, and people to provide self-help labor for construction. III MAF agreed to provide in return, construction materials, technical advice, and equipment for clearing and grading the site. The USMCR/CARE Civic Action Fund proved to be invaluable in support of this program by providing a ready means for acquiring special hardware items not available through other sources.[10]

The presence of a number of U.S. civilian agencies in I Corps was known to the Marines since March 1965, though interrelationships had not been developed at that time.* The mutual need for coordination and cooperation immediately became apparent when the civic action program began. The civilian agencies possessed commodities but lacked the manpower to provide an effective system of distribution and control. The Marines were in daily contact with the civil populace located in and adjacent to the areas which they controlled militarily, but they needed commodities for use in the civic action program. The largest civilian organization in I Corps in regard to available commodities were the U.S. Agency for International Development (USAID), the Cooperative for American Relief Everywhere (CARE), and Catholic Relief Services. USAID representation in I Corps consisted of a regional office located in Da Nang, and a provincial office located in the capital city of each of the five provinces. CARE and CRS each had one representative for the entire corps area, both located in Da Nang.[11]

The need for a means to insure continuous coordination and cooperation among the various agencies and organizations which shared an interest in winning the willing support of the people for the GVN resulted in formation of the I Corps Joint Coordinating Council (JCC) in August 1965. This council's membership included senior representatives of all major U.S. and GVN organizations and agencies, both military and civilian, located in I Corps. The council, as such, had no directive authority or funds but through its senior membership had access to the sum total of the available authority and resources. The mission of this council was to monitor progress of the GVN Revolutionary Development (RD) Program* and to provide a ready forum for frequent discussion of attendant problems.[12] To underscore the importance of the I Corps JCC, General Walt designated Brigadier Generals Keith B. McCutcheon and Melvin D. Henderson to sit on the council to ensure the best possible support in assisting the government of Vietnam in the execution of its rural construction program.[13]

By the end of the summer of 1965, the III MAF had developed the framework of the organization which was to conduct its civic action program. A fifth general staff section was created which was called the G–5 Section. This section was assigned the staff responsibility for the conduct of civil affairs which

General Lewis W. Walt, Commanding General, III Marine Amphibious Force, 1965–67. (USMC Photo #A416364).

*For military purposes, the Republic of Vietnam was divided into four corps tactical zones. In July 1970, Corps Tactical Zones were redesignated Military Regions, i.e., Military Region I (MR–I). At this point, I Corps will be used. I Corps comprised the five northernmost provinces of South Vietnam, Quang Tri, Thua Thien, Quang Nam, Quang Tin, and Quang Ngai.

*The Revolutionary Development Program was the Vietnamese effort in pacification. With RD cadres in the hamlets, it was hoped that the RD program would foster wide public construction and social development at all levels.

Vietnamese listen to a speaker during a county fair being held by Company "G", 2d Battalion, 7th Marines at Phu Le Village near Chu Lai. (USMC Photo #A189710).

included civic action. The 3d Marine Division followed suit and established a G–5 Section. Regiments and battalions appointed civil affairs officers, either as a primary or an additional duty assignment. This organization facilitated the development of effective techniques for distribution of civic action commodities, for dissemination of civic action information, and for collection of data for use in evaluating the effectiveness of the program.

To bring the generalities of civic action down to a statistical example for the reader, the following material contributions made by Marines in the short period from March to December 1965 is shown below:

Persons given medical treatment	199,631
Pounds of food distributed	142,756
Pounds of soap distributed	46,535[14]

In Support Of

In endeavoring to achieve the peaceful ends of civic action, new types of military activity in support of the Revolutionary Development Program and the Civic Action Program envolved. Three such actions, COUNTY FAIR, GOLDEN FLEECE, and the establishment of the Combined Action Force, were among the more successful Marine efforts within country.

(1) COUNTY FAIR Operations.—Initially started by the 9th Marines in August 1965 in the Da Nang area to find the local guerrillas, COUNTY FAIR Operations involved coordinated psychological warfare and combat power. These operations combined Marine Corps personnel and ARVN (Army, Republic of Vietnam) forces in an effort to destroy the Viet Cong influence in selected hamlets and restore government influence. Essentially, the operation consisted of a Marine unit moving into position early in the morning around a hamlet and establishing a cordon to prevent the escape of any Viet Cong. At first light, ARVN troops and political cadres of the GVN entered the area and moved all the civilians to a predesignated collection point where the people were fed, given medical aid, counted, identified, given propaganda lectures and drama presentations, and shown movies. While this segment of the operation was going on, ARVN troops thoroughly searched the hamlet for hidden tunnels, food, ammunition, and weapons. Militarily, it was simply a cordon-and-search operation and there was nothing new in that. General Lewis W. Walt stated that what was new about the COUNTY FAIR Operations was "such things as the explanation offered the people, the food and medical attention provided, shelter from the sun and/or the rain, and decent regard for the community as individuals and families . . . it worked well for us."[15]

Possibly as a result of the success of the Marine COUNTY FAIR, the Army in I Corps started a similar program a year later calling it HAMLET FESTIVAL. Regardless of what it was called, it proved to be highly successful.

(2) GOLDEN FLEECE Operations. In August 1965, a rather simple request from a village chief to the Commanding Officer of 1st Battalion, 9th Marines, Lieutenant Colonel Verle E. Ludwig, whose battalion controlled a sector of four villages and numerous hamlets in the Hoa Vang District of I Corps, produced one of the most successful and lasting operations. The opportunity came when some of the village chiefs wanted to know if the Marines would help them protect their rice crop from the Viet Cong tax. The chain of events was ideal. The peasants needed assistance and had requested it through their government leader. The Marine Corps got an opportunity to support a representative of the local government and to fulfill a basic need of a large number of people. Lieutenant Colonel Ludwig's efforts at coordination, and demonstrations of Marine Corps superiority over the Viet Cong, fused with the basic needs of a terrorized and partially starved population.[16]

5th Marines help the Vietnamese gather their rice crop in GOLDEN FLEECE Operations, October 1966. USMC Photo #A369634).

The challenge was met by the battalion commander by covering the area with guards and patrols and keeping mobile forces in reserve throughout the harvest season. He worked with the district chief to provide safe storage for the harvested grain and worked out a system of credit by which each family could draw their rice as they needed it, to eat or to sell.[17] Patrols were sent into the nearby hills to locate and if possible return rice already confiscated and hidden by the Viet Cong.

The success of GOLDEN FLEECE in the Hoa Vang District resulted in the populace of I Corps requesting Marines to protect their crops at the two harvest times each year. The GVN responded to requests with local guard forces and communal transportation from the fields to safe storage. The Agency for International Development provided cement and tin for the construction of dry buildings in safe areas.[18] The simplicity and total value of GOLDEN FLEECE Operations became SOP (Standing Operating Procedure) throughout III MAF.

(3) Combined Action Force (CAF).—The CAF was one of the most successful and rewarding experiences Marines encountered during their tour in Vietnam. The primary purpose of the CAF was to "1) to enhance village and hamlet security by the conduct of integrated military operations with the Popular Force, and 2) to increase the ability of the villagers to sustain and defend themselves by participating in and encouraging projects contributing to the people's well-being and their identification with the national government." [19] Starting with a contribution of four Marine

rifle squads in 1965, by March 1970, there were 2,000 Marines and Navy corpsmen, along with about 3,000 Popular Force (PF) soldiers involved in the Combined Action Force.

By way of background, between 1959 and 1961, the RVN government began to relocate the rural population into peasant-constructed rural towns called agrovilles in an effort to protect them against the growing insurgency threat. For many reasons the program did not work, but primarily because the rural population resented the forced relocation and the local defense forces were incapable of responding effectively to the Viet Cong hit-and-run tactics. The agrovilles were abandoned in 1961. From 1961 to 1963, the Strategic Hamlet theory was tried out by the Army. The elements were the same as the agrovilles, forced relocation with self-defense forces inadequately armed and poorly trained. The ARVN endeavored to strengthen the defense forces and give genuine security to the Strategic Hamlets but had other missions to perform.[20] The Strategic Hamlet concept was also abandoned.

In the spring of 1965, the GVN government opened a political cadre training center whose graduates were organized into Political Action Teams (PAT). Aside from the political activity, a 30-man PAT was assigned to the defense of a hamlet or village. The people were not relocated but allowed to stay in their own village. Again for a variety of reasons, this concept failed. There was no immediate and direct liaison with the ARVN and/or U.S. forces in the area. Their isolation from the other forces in the area, coupled with their light armament and inadequate knowledge of the local situation, foredoomed the PAT forces to failure.[21]

A Marine and Popular Forces of Combined Action Group 4 check the IDs of villagers where Viet Cong action was located. (USMC Photo #A191951).

In August 1965, the Marine Corps combined two elements, namely, not relocating the population and utilizing the local forces now called Popular Forces. They added to these elements another ingredient, the U.S. Marine. There was no question that if the people were insecure, all of the other efforts within the pacification framework would fail. In the Hue/Phu Bai area, the Marine Corps with the cooperation of several village chiefs formed a joint force to meet the problem of local security. Both the Marines and the Vietnamese knew the limitations of Popular Forces but wanted to place local security on Vietnamese shoulders. Several village chiefs agreed to allow four Popular Force platoons to work directly with four Marine rifle squads. The resultant force was called a Joint Action Company and was commanded by Lieutenant Paul R. Ek of Company I, 3d Battalion, 4th Marines.[22]

The Marines in the Joint Action Company trained the Popular Forces in small unit tactics, marksmanship, and improved fire support and served as the nucleus for patrols and ambushes throughout the village area assigned to each platoon. The joint platoons also conducted vigorous civic action programs in support of the local governing officials. The program emphasized self-help by the peasants in the civic action projects while the joint platoons provided security. The integration of Marines into Popular Force platoons succeeded from the beginning.

Basic to the success of the Combined Action Companies (CACO), the subsequent name for the former Joint Action Companies, or CAP, Combined Action Platoons, was the fact that the PFs, being local residents, provided knowledge of the area, rapport with the people, and improved access to information about the enemy. The PFs had the motivation that was inherent in the defense of one's own home. Although the PF comprised the lowest paid and least trained element of the Vietnamese military, their value was inestimable.[23]

By 1967, the Combined Action Program expanded throughout I Corps. It was necessary to appoint a CAP Director at the III MAF level, who operated under the general staff cognizance of the Assistant Chief of Staff, G–3, and who discharged administrative control

over the program but without operational command. By October 1967, the number of CAPS necessitated an intermediate level of supervision, and so the Combined Action Group (CAG) was activated. In January 1970, the Combined Action Force (CAF) was formed and had control of all 114 CAPs dispersed throughout the populated coastal lowlands of all five provinces in I Corps. Although the basic element of the CAF was the CAP, controlling and coordinating headquarters existed at the district, province, and corps levels. The 114 CAPs were organized into 19 CACOs which in turn were organized into four CAGs. Generally speaking CAG headquarters corresponded with and were located close to province headquarters. The CACO commander and CAG commander were counterparts to the district and province chiefs, respectively. Corps level coordination was effected through close liaison between the Commanding Officer, CAF and the Deputy Commander for I Corps.[24]

With the stepped-up redeployment of Marines from Vietnam in 1970, the CAF was deactivated on 21 September 1970 leaving only the 2d Combined Action Group functioning under III MAF. The last Commanding Officer of the CAF, Colonel Ralph F. Estey, summed up the CAF by stating that "it had played a unique and unparalleled role in combat operations supporting the pacification effort in the Republic of Vietnam. The neutralization of 7,785 enemy demonstrated the aggressive, tenacious, and courageous character of this force which never numbered more than 2,100 Marines and Navy personnel and 3,000 Popular Forces at any one time." [25]

Colonel Estey pointed out the positive statistics of the contribution of the CAF since its beginning in 1965, that the number of Medical Civic Action Program visits throughout I Corps approached nearly two million and that by 1970 the population protected by CAPs numbered over 425,000.

That the Combined Action Program worked, and worked well, in Vietnam did not preclude the fact that the program could have been improved. Definitive studies by the Marine Corps and private research groups will sift out the flaws and analyze what was done. Quoting from one research group writing in December 1969:

> The Combined Action Program is doing an excellent job in Vietnam, far more excellent, in fact, than we were led to expect by what reports are available in the United States. In the Combined Action concept, the Marine Corps has developed a tool with capabilities that are unique among the services and with a potential far wider than its present application. However, it is not in line with Marine traditions to rest on one's laurels—and it is especially important in today's rapidly changing world to reassess and perfect our instruments continually in order to meet the demands both of today and the future with maximum effectiveness.[26]

The Helicopter and Refinement of Tactical Mobility

In mid-1971, revisions being prepared for the series of Fleet Marine Force Manuals (FMFM) published by MCDEC reflected the importance of tactical mobility when applying combat power to the immediate battlefield. What will be stressed in the revisions will be a reminder to the commander that he will have greater means of obtaining higher mobility as additional equipment is added to the Marine Corps inventory. The ability to move infantry and maneuver direct support artillery units rapidly will provide the commander greater flexibility and depth on the battlefield. Vietnam experience is replete with examples of successful use of helicopter-borne movements. General Keith B. McCutcheon

Lieutenant General Keith B. McCutcheon, aviation pioneer and Commanding General, III Marine Amphibious Force, 1970. (USMC Photo #A700390).

A Marine ground crewman guides a UH–34D helicopter to a landing in a small jungle clearing in Vietnam. (USMC Photo #A329571).

stated: "Vietnam was certainly a helicopter war for U.S. forces. It is difficult to envisage how we would have fought there without them." [27]

The Marine Corps' faith and vision in utilizing the helicopter as a means to achieve high mobility in warfare was evidenced as early as 1946 and borne out in MCS publication of *Phib–31, Amphibious Operations—Employment of Helicopters—Tentative* in 1948. (See Chapter IV of this book). Subsequent years of study and development by the Marine Corps pioneered the use of helicopters in ground warfare in Korea. The Marine Corps pursued the development of aircraft that would provide the helicopter lift to execute the ship-to-shore movement in an amphibious operation. By the time of Vietnam involvement in 1962, the Marine Corps had squadrons equipped with UH–34s and CH–37s. In any other time, both models would have been considered obsolescent but imperative need deemed otherwise. In addition to having troop carrying helicopters in 1962, the 1st MAW had, by 1965, the UH–1E. While the Marine Corps experimented with armed helicopters as early as 1950, it did not pursue an active program inasmuch as the greatest need was for a helicopter to carry men and material. General McCutcheon recalls that the Marine Corps:

> . . . sought to procure a light helicopter which could perform a myriad of tasks, including the role of gunship. This program was a long time in materializing, but it finally resulted in the UH–1E . . . One gunship version of the Marine UH–1E was armed with a nose turret which could be elevated, depressed and swung left and right. In addition, weight permitting, it could mount left and right fixed, forward-firing machine guns, or 2.75-inch rocket pods. A .30 caliber machine gun could also be installed in each of the two side doors.

> The helo gunship proved to be indispensable. It was more immediately available than jets, more maneuverable, and it could work close-in with transport helicopters. . . .The AH-1G Cobra was not available for Marine use until 1969. The gunship was accepted with enthusiasm by the pilots, performed well in a fire suppression role and was maintained at a rather high rate of availability.[28]

Happy times for the 1st MAW came when the transition from UH-34s to CH-46s began in March 1966. It was not until 1969, however, that all UH-34s were withdrawn. CH-37s did yeomen service in Vietnam from 1965 to the arrival of the CH-53 in January 1967.

Combat helicopter (CH-46) used by Marines in Vietnam. (USMC Photo #A140869).

High Mobility and the Fire Support Base

At the end of the first year in Vietnam, 1965, Marine transport helicopters were lifting an average of 40,000 passengers and over 2,000 tons of cargo a month while operating from their main bases at Ky Ha and Marble Mountain in I Corps. Five years later, Marine helicopters were lifting more than 70,000 passengers and 5,000 tons of cargo in a month. Part of this increase was attributed to the increased use of the CH-53 in troop lifts.[29] Another reason for the increase was the extensive use of Fire Support Bases (FSB). A simple definition of a FSB is a "rapidly constructed artillery position defended by a minimum of infantry. The infantry and tactical elements operate within the protective fan of the artillery FSB. The FSB themselves offer overlapping artillery support to each other and protection for several landing zones." [30] Construction of the fire support base was a complex job that included everything from matting for the landing zone to helilifted rubber-tired tractors. The concept had expanded during the war to all parts of South Vietnam, depriving the enemy of staging areas and infiltration routes. It allowed the infantry to move throughout the I Corps area while retaining the protective fires of friendly artillery.

Another combat helicopter (CH-53A). (USMC Photo #A412902).

Perhaps a forerunner of the FSB technique, as developed by 1968 with its extensive use of helicopters, was a major operation that occurred during Operation HARVEST MOON in December 1965. The UH-34s of MAG-36 and MAG-16 flew over 9,230 sorties and lifted 12,177 passengers and 638 tons of cargo during the 12-day operation. A helicopter staging area was established at a logistic support area (LSA) located half-way between Chu Lai and Da Nang on Route 1. After the initial insertion of three Marine battalions into the area of operations on 11 and 12 December, the helicopters made 60 other lifts of platoon-sized and even larger forces. Brigadier General Jonas Platt, the task force commander of the operation, states that for the first time in combat, 105mm howitzers from Chu Lai and Da Nang were helilifted into the battle area. General Platt also noted that 4.2-inch mortars were helilifted in the area of operations and utilized in a leap-frog manner.[31]

By mid-1968, all III MAF forces went from a static defense to a mobile offense posture. Major General Raymond Davis' 3d Marine Division fanned out in wide arcs penetrating and establishing a presence in areas the enemy had once considered havens. Throughout the remaining months of 1968, 3d Division Marines ranged the length and breadth of western

Fire Support Base of the 3d Marine Division near the Rock Pile in January 1969. (USMC Photo #A192512).

Quang Tri Province in I Corps, employing heliborne infantry and mobile fire support bases to keep the enemy constantly off stride. By the end of the year the enemy, by and large, pulled back his major units, unwilling and to a large extent unable to risk further destruction at the hands of this maneuver and firepower. Within a year, the 3d Marine Division had pursued its checkerboard concept to the extent of carving out more than 140 FSBs from the jungled terrain in northern I Corps. If there can be a classic example of the mobile concept operation, it would have to be Operation DEWEY CANYON, conducted in and around the Da Krong Valley from 22 January to 18 March 1969. DEWEY CANYON was a multi-battalion operation involving the 9th Marines and two battalions of the Vietnamese 1st Army Division.

An excellent account, including the fine work accomplished by the 1st MAW during DEWEY CANYON, is extracted from an article on the history of Marine aviation in Vietnam by General McCutcheon.*

On 21 January 1969, a team was formed of representatives of the 1st MAW and 3d Marine Division. Infantry, engineer, helicopter, and observation aircraft specialists were included. The team was responsible to the overall ground commander for landing zone and fire support base selection and preparation and coordination of the helicopter assault. Early on D-Day the initial landing zones (LZs) were

*Another fine account of Operation DEWEY CANYON, written by a lieutenant and platoon leader is First Lieutenant Gordon M. Davis, "Dewey Canyon—All Weather Classic," *Marine Corps Gazette*, v. 53, no. 7 (July 1969), p. 33.

prepared by fixed-wing air strikes (made suitable for helicopter landing by bombing and strafing to reduce the threat of opposition to a minimum) and elements of the 2d Battalion, 9th Marines, landed at 0800. In the rapid buildup that followed, CH–46s, under the control of the division direct air support center and under the protective umbrella of gunships and observation aircraft, brought 1,544 Marines and 46 tons of cargo into two LZs. By the evening of 24 January, a battery of 105mm howitzers from the 2d Battalion, 12th Marines and the command post of the 9th Marines were in place on one of these landing zones, which became known as Razor. The following day, three companies of the 3d Battalion were helilifted onto a ridgeline further forward, known as Co Ka Va. It would soon be developed into FSB Cunningham, named for the first Marine aviator. In a few more days, elements of the 2d Battalion from FSB Riley pushed down the ridgeline to establish another FSB (Dallas) to guard the western approach to the area from Laos. To the east, the two Vietnamese battalions were lifted into two other bases. They would secure the left flank and cut-off the enemy escape route to the east.

About the 1st of February, the "crachin" season really began to make itself felt. This is a period when low clouds and drizzle cover the mountain tops in northern I Corps and obscure visibility in the valleys. On 4 February, a company of the 3d Battalion moved into and occupied what was to become the last FSB for the coming infantry advance. Erskine was to be its name. Marine helicopters continually worked out of the Combat Support Base Vandegrift carrying essential supplies of ammunition, rations, and water to the various bases. On the return trips they carried wounded back to aid stations. Often the weather precluded access to the area except by flying on instruments. Under such conditions, over 40 pallets of critically needed supplies were dropped by KC–130 transports and CH–46 helicopters, under control of the TPQ–10 at Vandegrift. When artillery was in place on both Cunningham and Erskine, the 9th Marines began moving on foot from their bases into the Da Krong Valley with battalions on line. Their objective was Tiger Mountain and the ridgeline that ran west from it. As they advanced, landing zones were carved out of the jungle with 2,000 pound bombs or, as a minimum, sufficient space was created so that a medevac could be performed by helicopter hoist, or an external load could be dropped to the troops on the ground.

The 22d of February saw the lead element of the 3d Battalion gain the crest of Tiger Mountain. In a few days it became FSB Turnage.

The 24th found the 1st Battalion in possession of the enemy's headquarters at Tam Boi. The 2d Battalion took control of the ridgeline overlooking Route 922, where it crosses from Vietnam into Laos. The 27th marked the first time a TPQ–10 had ever been emplaced and operated from a FSB. One was placed on Cunningham and remained there for 17 days, controlling 72 air strikes, 10 A–6 beacon drops, and 3 emergency paradrops. The 18th of March marked the final day of operation of DEWEY CANYON. On this day virtually the entire resources of the 1st MAW were committed. Over 350 tons of cargo and 1,400 Marines were helilifted out of Turnage and Tam Boi without a casualty. These were the last two bases to be vacated. Gunships and jets flew close cover and close air support. Perhaps the most notable accomplishment of the operation was that only one helicopter was lost in spite of the adverse weather and terrain and the efforts of a stubborn, well-trained, and professional enemy to counter the operation. Lieutenant General Richard G. Stilwell, U.S. Army, commander of all U.S. ground forces in the northern two provinces of I Corps under the Commanding General, III MAF, summed it up in a few words when he said, "Dewey Canyon deserves some space in American military history by sole reason of audacity, guts, and team play. I cannot applaud too highly the airmen of the 1st MAW in a variety of roles." [32]

Research, Development, and Studies in the 1960s

Research and development has been acknowledged as being a major force in our nation's impressive economic growth since World War II. The Marine Corps' portion of R&D comes out of the Navy's Research, Development, Test & Evaluation Objectives and Budget. The Marine Corps' R&D figure ranges from $35 to $40 million dollars per year. The figure is misleading, however, because the value of R&D done by the other services and of interest to the Marine Corps encompasses expenditures approximating $600 million.[33] The significant contribution of other services to Marine Corps

R&D is almost entirely in the execution phase of hardware development, including test and evaluation. They make very little contribution to Marine Corps concepts, plans, doctrine, and tactics. The Marine Corps has to do nearly alone whatever there is to be done in structural and doctrinal development and in the determination of its materiel requirements. This situation is not without its pluses, however, since development of, refinements to, and new tactical deployments of the Marine Corps Air-Ground Team make it unique in benefits and capability and its concept demands undivided attention.

Studies performed during the 1950s indicated that the Corps needed operations research/analysis capabilities. An operations research or operations analysis capability was first introduced into the Marine Corps in March 1957 with the appointment of a civilian analyst (civil service) to HQMC. Within a year this capability was augmented with the addition of a CNO Operations Evaluation Group (OEG) representative to the Headquarters. This provided the Headquarters with a two-man operations analysis effort for the next four years—a minimal operations analysis capability primarily directed toward improving the efficiency of man-machine systems especially in tactical problems or field exercises. One of the team's first efforts was directed to evaluations of the vertical envelopment assault capabilities as exemplified by LANTPHIBEX–58 and the BRIGADELEX series of 1959–1960. In 1958 the Marine Corps commenced a program to train a number of officers in operations analysis at the U.S. Naval Postgraduate School, Monterey, California. In 1962 the OEG billet at HQMC was moved to MCLFD at Quantico and with two other analysts an operations analysis unit was formed as a sub-element of the OEG.

To implement future goals, a Landing Force War Game Group was established at Quantico in 1961 in order to "develop objective methodology for the war gaming of amphibious operations." The group in conducting war games "acts" out the landing force aspects of amphibious operations. It simulates a military operation using rules, data, and procedures designed to depict an actual or assumed real life situation.

In June 1964, DC/S (R&D) prepared a staff study entitled "HQMC Capability to Support Programming, Planning, Budgeting and Appraising." This study concluded that HQMC must develop a cost-effectiveness study capability which would assist the Headquarters in participating more effectively in the Department of Defense Programming System and in complying with Secretary of Navy Directives. It recommended the establishment of a Studies Office and a Headquarters Study Group under the direction of DC/S (R&D). The study was approved and a Studies Group, Marine Corps Operations Analysis Group (MCOAG) was formed in the newly designated DC/S (Research, Development, and Studies).[34] The DC/S (RD&S) acting for the CMC provides research, development, test, and evaluation (RDT&E) requirements within the Marine Corps.

RDT&E is characterized by progression from the general to the specific or from concept to reality. As the initial step, a long-range concept is prepared which portrays the world as it is expected to appear 20 years in the future. Based upon this long-range projection, the Marine Corps Long-Range Plan (MLRP) is created to describe the operational, organizational, and material concepts which the Marine Corps needs to achieve in order to carry out the roles and missions which are projected for it in this long-range future. The Marine Corps Mid-Range Objectives Plan (MMROP) is created against the background of the MLRP. It translates the long-range plan into more definitive goals which must be accomplished 10 years in the future to provide for an orderly progression from the present towards the long-range concept of Marine Corps combat forces. Both of these documents, the MLRP and the MMROP, serve as guides for the identification and establishment of RDT&E objectives, for the determination of the RDT&E Program as well as the Studies Program, and for the execution of implementing actions to achieve future goals.[35] Both plans support the JCS' Joint Strategic Objectives Plan (JSOP) which in turn supports U.S. national objectives.

Within the R&D process of the Marine Corps, there are two unique features that complement the duties of DC/S (RD&S). While he works on a close and continuing basis with all general staff officers, he has a special relationship with the Deputy Chief of Staff (Air) and Assistant Chief of Staff, G–4. The Deputy Chief of Staff (Air) in Headquarters Marine Corps has, in addition to his responsibilities to the CMC, a responsibility to the Deputy Chief of Naval Operations (Air). He is concurrently DC/S (Air) in HQMC and Assistant Deputy

Chief of Naval operations (Air) for Marine Aviation in the office of the CNO. Air developments in the Department of the Navy are coordinated Navy/Marine efforts whenever it is possible. The Secretary of Navy requires the CMC to "provide Marine Corps RDT&E requirements in aircraft and related equipment to CNO." [36] The Marine Corps monitors aviation research and development but it is performed and funded by the Navy. The AC/S, G–4 is responsible for the materiel planning and requirement effort. In addition, he manages the execution of the majority of the ground R&D efforts. It must be remembered that DC/S (RD&S) coordinates the R&D effort but does not task the execution of development projects. The CMC has in effect selected the AC/S, G–4 to execute ground materiel development.

On 1 January 1968, MCS was redesignated the Marine Corps Development and Education Command (MCDEC). The Marine Corps Landing Force Development Center subsequently became the Development Center, Marine Corps Development and Education Command. The Commanding General, MCDEC is designated by the CMC as his field representative for all research and development activities. He has a total of 22 permanently assigned liaison officers located at major armed forces development centers throughout the United States to aid him in keeping abreast of developments and tests at their respective locations. Close liaison is maintained with the Canadian Army and the British Royal Marines.[37]

Throughout testing and development, information concerning new equipment and ideas is given by the Development Center to students of the MCDEC's various schools and the students provide their experience and knowledge in study efforts for the centers. In speaking of all efforts supporting the R&D program, whether it be from analysis groups, MCDEC students or liaison officers, Major General Louis Metzger, while DC/S (RD&S) in 1968, stated:

> The aim or objective of our R&D effort is to design and prepare the Marine Corps of the future to carry out its assigned roles and missions as the amphibious force in readiness of the United States and, additionally, to meet the broad mandate of "such other functions as the President may direct."
>
> We must be able to carry out assigned functions whenever and wherever we are called upon to do so, and must be capable of a flexible and rapid response to the wide spectrum of possible operations. In brief, we must violate the old drill maxim not to "anticipate the command" in order to retain our position of professional excellence.[38]

The Decade To Come

Officially, the policy and objectives of the Marine Corps during the next 10 years is contained within the Marine Corps Mid-Range Objectives Plan (MMROP). What will be discussed here is the reaffirmation of one doctrine, the Marine-Air-Ground Task Force (MAGTF) and the discussion of a possible variant emanating out of the Vertical/Short Takeoff and Landing concept.

The MAGTF is simply a task organization tailored to accomplish a specific mission or missions. Composition of the MAGTF many vary considerably, but will normally include a command element, ground combat element, an aviation combat element, and a combat service support element. It is in general a close integration of air and ground power formed for combat operations, training exercises, and deployments.

The MAGTF doctrine is over 25 years old. It is noted in this chapter because of its function in the decade of the 1960s and its implementation in Vietnam. The concept stems from a long period of development based upon and influenced by the advent of great tactical mobility (helicopters) and fire power (atomic weapons). It is after all the old "force-in-readiness" concept of ground combat units supported by air. Since the introduction of air power into 20th century warfare, the Marine Corps, from the beginning, had considered aviation resources as complementing the ground forces for the highly flexible team that would ensue. There was never a question that "aerial support" was an integral part of the amphibious operation as evidenced by it being a major chapter in the 1935 "Tentative Landing Operations Manual" (see Chapter III).

In the post-World War II period, the new ingredients of helicopters and atomic weapons introduced the dispersion theory as one of the answers to atomic warfare and consequently control and composition of forces had to be reconsidered. Examining all of the factors, the Commandant in 1955 reaffirmed, in Landing Force Bulletin No. 17, the simple maxim that, with or without nuclear weapons, the most effective employment of the FMF is in the form of an integral military organization emphasizing both air and ground elements re-

General Leonard F. Chapman, Jr., 24th Commandant of the Marine Corps, 1 January 1968 to 31 December 1971. (USMC Photo #A415547).

sponsive to a single Marine commander This organization can be structured to meet anything from a show-of-force situation to a major conflict. What must be remembered is that the MAGTF is a task organization tailored to accomplish a specific mission. The current Marine Corps Order 3120.3A [39] points out that the composition of MAGTF may vary considerably but will normally include the following major components:

A Command Element
A Ground Combat Element
An Aviation Combat Element
A Combat Service Support Element, including Navy Support Elements.

At the present time, the FMF can task organize three types of MAGTF:

Marine Amphibious Unit (MAU)
Marine Amphibious Brigade (MAB)
Marine Amphibious Force (MAF)

Before discussing the MAU, MAB, and MAF, let us look at the major components of a MAGTF. The Command Element is simply that commander appointed normally from sources outside the major elements of the task force. He will have a separate air-ground headquarters and the communications and service facilities required for its support.

The Ground Combat Element is constructed around a combat infantry unit with appropriate combat support and combat service support units. So too with the Aviation Combat Element. This element includes those aviation commands, including air control agencies, combat, combat support, and combat service support units, required by the situation. Normally both fixed-wing attack and helicopter aviation facilities are included in the aviation combat element of a MAGTF. The other component is the Combat Service Support Element which of course supports both the ground combat element and the aviation combat element.

In the evaluation of the MAGTF, it was envisioned, in 1953, that the MAGTF would be composed only of elements combining a division and wing such as the 2d MAGTF, composed of Headquarters, 2d MAGTF, 2d Marine Division, 2d Marine Aircraft Wing, and Force Troops then commanded by Lieutenant General Oliver P. Smith who was Commanding General, FMFLant. As a result the LANTAGLEX in April 1954 was one of the first division/wing level amphibious exercises of the 2d MAGTF. In subsequent years, however, LANTRAEXES were held which considered that a MAGTF was only comprised of an infantry regiment and a MAG.

Influential in changing the makeup of the MAGTF were the changing concepts of future amphibious operations as contained in the Advanced Research Group Reports and Landing Force Bulletin No. 17. Summarized below are some of the high-points of the evolutionary process of the MAGTF of today:

1954—Advanced Research Group 1953–54—Considered landing force aspects of future (within next 10 years). In essence, the report recommended the "all" helicopter concept based only on fighting a nuclear war.

1955—Advanced Research Group 1954–55—With a revised concept and an "all helicopter assault" concept in mind, this group tempered its recommendation with the real possibility of fighting a non-nuclear war.

1955—Landing Force Bulletin No. 17—Promulgated a concept which envisaged the employment, with or without nuclear support, of integrated Marine landing forces of ground and supporting air components, organized, trained, and equipped to exploit the speed and flexibility of the helicopter, for the projection of seapower deep ashore at any point on the world littoral without the necessity of direct assault on the intervening shoreline.

Marine air-ground team concept acted out at Marine Corps Air School, Kaneohe Bay, Oahu, T.H. by the 1st Provisional Marine Air-Ground Task Force. (USMC Photo #A290042).

1958—LANTPHIBEX 58—The first major test of the vertical envelopment concept was successfully conducted at Onslow Beach, N.C., with the entire 2d Marine Division involved in an assault landing. The vertical assault was conducted from three carriers (USS *Tarawa,* CVS–40; the USS *Valley Forge,* CVS–45; and the USS *Forrestal,* CVA–59) by helicopters of MAG–26 commanded by Colonel Keith B. McCutcheon.

1959–60—BRIGADELEXES—The vertical envelopment concept was perfected through a series of brigade vertical envelopment exercises conducted by elements of the 2d Marine Division and MAG–26 at Vieques, P.R., and Onslow Beach using the USS *Boxer* as the new LPH–4. The USS *Princeton* (LPH–5) was similarly employed in West Coast exercises.

1960—CMC promulgated a letter, dated 31 May 1960, describing air-ground task force command relationships and structures.

1962—CMC promulgated MCO 3340.3, dated 20 April 1962, subject—Employment of Marine Air-Ground Task Forces in Future Amphibious Operations. This is a broad conceptual statement on employment of a MAGTF.

1970—MCO 3120.3A, dated 18 August 1970, subpect—The Organization of MAGTF. This order is the current doctrinal guide on the structure of the MAGTF.

The structure of the types of MAGTF as contained in the current order is outlined below:

Marine Amphibious Unit (MAU)—The MAU, normally commended by a colonel is employed to perform combat operations in a relatively limited scope. The ground element is normally a battalion landing team (BLT) and the aviation element is normally a composite helicopter squadron. However, the aviation unit may consist of an attack squadron, a helicopter squadron, and elements of an observation squadron. The combat service support element of the MAU is formed primarily from division, wing, and force troops including the Force

Service Regiment (FSR). Detachments from Navy combat serivce support resources may be added.

Marine Amphibious Brigade (MAB)—The MAB, normally commanded by a brigadier general, is capable of conducting air-ground amphibious assault operations in low- and mid-conflict environments. The ground element of the MAB is normally equivalent to a regimental combat team (RCT). The air element is usually a MAG with varied aviation capabilities. The combat service support element includes significant resources from force troops, including the FSR, division and wing combat service support units, and the Navy support units. The present Marine Corps Division/Wing Team has the capability to deploy two MABS for separate missions should unusual circumstances require such flexibility.

Marine Amphibious Force (MAF)—Formerly designated Marine Expeditionary Force. This designation was changed in the early period of the Vietnam war in deference to Vietnamese uneasiness to the term "expeditionary." The MAF, largest of the Marine air-ground task forces, may be formed with many variations in task organization structure. The MAF is commanded by either a major general or a lieutenant general, depending on its size and mission. It is capable of conducting a wide range of amphibious assault operations and sustained operations ashore. It can be tailored for any intensity of combat and to any geographic environment. The ground element of a MAF is usually a reinforced division. The aviation combat element is usually an aircraft wing organized to conduct all types of tactical air operations. The combat service support element of a MAF can be a single entity or can be composed of a logistic support element and an engineer support element. The MAF may include an organic MAB or MAU as a separate element in order to conduct air-ground operations sufficiently in space or time from other MAF elements.

The MAGTF worked well in the past and particularly in the immediate past, Vietnam. The doctrinal experience of the MAGTF, an experience not shared by any of the Armed Forces, demonstrates great flexibility in task organization and satisfies generally any operation requirement.

Vertical/Short Take-Off and Landing

V/STOL has, in one form or another, interested the Marine Corps for over 25 years. The Marine Corps' introduction and development of the helicopter into military operations after World War II only pointed out the need for increasing the possibilities to extend V/STOL capabilities into high performance, tactical fixed-wing aircraft. The Marine Corps believes that it has the answer to the need in the British-built Hawker-Siddeley Aviation Corporation jet aircraft called the Harrier. The Harrier is a single seat, single fan jet aircraft powered by a Rolls Royce Bristol Pegasus 103 engine of 21,500 pounds thrust. By utilizing four rotatable exhaust nozzles, enough thrust is available to have the jet operate like a helicopter.

Vertical/Short Take-off and Landing Aircraft (Hawker-Siddeley AV–8A "Harrier") used by Marines. (Photo courtesy of Naval Air Test Center, Naval Air Station, Patuxent River, Md.)

The United Kingdom had been experimenting with a V/STOL aircraft called the P–1127. With substantial improvements to the P–1127, then called the Kestrel, a successful flight occurred 21 October 1960. By 1968, the P–1127 Kestrel, now Harrier, was in the process of being adopted by the Royal Air Force. At the same time, in mid–1968, Lieutenant Colonel John Metzko, then Head, RD&S Section, Air Weapons Systems Branch of Headquarters Marine Corps, requested the Marine Corps to take a hard look at the new improved Harrier. "Recognizing the value of such an aircraft for the Marine Corps, Major General Keith B. McCutcheon, Deputy Chief of Staff (Air) directed efforts to obtain approval for two pilots to participate in a short flight evaluation of the Harrier." [40]

Colonel Thomas H. Miller and Lieutenant Colonel Clarence M. Baker departed for the United Kingdom in September 1968 and completed flight evaluation tests by October. After

20 sorties which involved all flight modes of the Harrier's operational capabilities, Colonel Miller stated:

> In addition to the unique take-off and landing capabilities afforded by the vectored thrust concept used by the Harrier, there are several inflight maneuvering advantages. For instance, during glide bombing runs the nozzles can be moved to the reverse thrust position to provide unprecedented speed control in the dive. Another advantage is the ability to rapidly reduce speed and increase turn rate during air-to-air combat maneuvering.[41]

Colonel Miller pointed out that an unprecedented potential in the advantages of the Harrier could lead to a complete overhaul in aircraft tactics and procedures.

In 1969, the Defense Department approved the Marine Corps request to purchase an initial increment of 12 Harriers during Fiscal Year 1970 with another 18 authorized during Fiscal Year 1971.[42] The Marine Corps designated the Harrier as AV–8A, and after testing and modifying it to fire Sidewinder missiles, established the first Harrier squadron, VMA–513, at Marine Corps Air Station, Beaufort, South Carolina. By mid–1971, VMA–513 had the first five AV–8A Harriers and the potential to add whole chapters to Marine tactical air doctrine.

In 1965, the then Commandant of the Marine Corps, General Wallace M. Greene, Jr., in discussing the Long Range Marine Corps Concept (addressing the period 1975–1985 time period), envisioned the value of Marine Air-Ground teams and V/STOL as follows:

> The primary amphibious assault capability of the landing force will consist of fully V/STOL-mobile Marine air-ground teams, launched and supported from mission designed amphibious shipping, under all conditions of weather and visibility. This will be complemented by a surface assault capability utilizing high speed surface craft, either water or air cushion borne able to project troops, equipment, and supplies onto the beach beyond the high water line.[43]

APPENDIX A

NOTES

Chapter I

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[3] Margaret Leech, *In the Days of McKinley* (New York: Harper & Brothers, 1959), p. 468.

[4] Willis J. Abbot, *Soldiers of the Sea: The Story of the United States Marine Corps* (New York: Dodd, Mead and Company, 1918).

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[6] *Washington Post,* 4 December 1908.

[7] *Washington Times,* 15 January 1909.

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[9] *Ibid.*

[10] *Washington Herald,* 27 March 1909.

[11] *Washington Star,* 17 February 1909.

[12] *Baltimore Sun,* 27 March 1909.

[13] *Boston Transcript,* 2 December 1908.

[14] RAdm Albert Gleaves, USN, *Life and Letters of Rear Admiral Stephen B. Luce, U.S. Navy* (New York: G.P. Putnam's Sons, 1925), p. 238.

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[22] Adm George Dewey ltr to Secretary of the Navy, dated 6 October 1900 (Record Group 127, National Archives).

[23] *Ibid.*

[24] Adm George Dewey ltr to Secretary of the Navy, dated 1 November 1900, *ibid.*

[25] RAdm A.S. Crowninshield ltr to Secretary of the Navy, dated 1 November 1901 (Record Group 127, National Archives).

[26] *Ibid.*

[27] Brigadier General Commandant endorsement of 15 November 1901 to General Board ltr, dated 1 November 1901 (Record Group 408, OAB, NHD).

[28] *Annual Rpt of CMC, 1903,* p. 26.

[29] General Board memo, dated 15 May 1915 (Record Group 408, OAB, NHD).

[30] William Reynolds Braisted, *The United States Navy in the Pacific, 1897–1909,* (Austin: University of Texas Press, 1958), p. 192, hereafter Braisted, *U.S. Navy in the Pacific.*

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APPENDIX B

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A Note about Sources

For this writer, and as is generally the case, the primary source material for the book is the most valuable. The titles of record sources listed below are self-explanatory. There are, however, three particular sources worthy of special mention. Within the Naval History Division Operational Archives, there is a complete record of the correspondence of the General Board of the Navy. Record Groups 432, pertaining to the Marine Corps in general, and 408, pertaining to advanced bases, overlap by the nature of their contents. General Board correspondence was most important inasmuch as it was little used by previous Marine Corps writers and researchers. With only a cursory glance at these records, the reader will become aware of the Marine Corps' position in its relationship to the Department of the Navy during the first 45 years of this century. Another source is the Historical Amphibious File (HAF) at Breckinridge Library. Containing nearly 1,000 documents, the HAF encompasses material from original doctrinal reports to personal reports, observations, and letters. The HAF is a must for any writer-researcher in the field of amphibious warfare. The third source most worthy of mention is contained in the "Monographs, Reports, Letters, and Memoranda" list. Some of the reports on landing exercises, particularly during the fleet exercises of the 1920s, are already contained in the HAF. However, miscellaneous reports and memoranda were found in the Records of the U.S. Marine Corps (Record Group 127) at the National Archives and the General Correspondence files of Marine Corps Schools (Accession No. 62A-6573).

The list of secondary sources of books and magazine articles is not exhaustive but rather selective for the range of this book. The value of secondary sources to the writer is that they give him an appreciation of other viewpoints and approaches in telling a story.

Suffice it to say, the critical comments by the reviewers of the draft manuscript were of supreme importance. Most of the reviewers had participated in nearly all of the period of Marine Corps history discussed. Their personal experiences in a specific exercise or development of doctrine of weapon cannot be underestimated. Their valuable comments bolster the dictum that there is no substitute for personal experience.

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REVIEWERS OF DRAFT MANUSCRIPT

Major General Norman J. Anderson, USMC
Lieutenant General James P. Berkeley, USMC (Ret.)
Brigadier General William N. Best, USMC (Ret.)
Lieutenant General Thomas E. Bourke, USMC (Ret.)
Lieutenant General Alpha L. Bowser, USMC (Ret.)
Major Lance J. Burton, USA
Lieutenant Colonel Thomas M. Burton, USA
Colonel Eugene F.C. Collier, USMC (Ret.)
Major General John P. Condon, USMC (Ret.)
Lieutenant General Edward A. Craig, USMC (Ret.)
Professor Philip A. Crowl, University of Nebraska
Brigadier General Gale T. Cummings, USMC (Ret.)
Professor William A. Darden, U.S. Naval Academy
General Raymond G. Davis, USMC
Lieutenant General Pedro A. del Valle, USMC (Ret.)
Brigadier General Edward C. Dyer, USMC (Ret.)
Major General Paul J. Fontana, USMC
Lieutenant Colonel James L. Fowler, USMCR
Brigadier General Gordon D. Gayle, USMC (Ret.)
Colonel George C. Hamner, USMC (Ret.)
Colonel Archibald Hanna, USMCR (Ret.)
Colonel Robert D. Heinl, Jr., USMC (Ret.)
Brigadier General Frederick P. Henderson, USMC (Ret.)
General Robert E. Hogaboom, USMC (Ret.)
Major General Louis R. Jones, USMC (Ret.)
Lieutenant General William K. Jones, USMC
Colonel John Kaluf, USMC (Ret.)
Lieutenant General Victor H. Krulak, USMC (Ret.)
Lieutenant General Robert B. Luckey, USMC (Ret.)
Brigadier General Arthur T. Mason, USMC (Ret.)
Lieutenant General Keith B. McCutcheon, USMC
Lee McFarland, Food Machinery Corporation
Lieutenant General John C. McQueen, USMC (Ret.)
Major General Louis Metzger, USMC
Lieutenant General Herman Nickerson, Jr., USMC (Ret.)
Colonel Franklin B. Nihart, USMC (Ret.)
General Alfred H. Noble, USMC (Ret.)
Major General DeWitt Peck, USMC (Ret.)
Major Thomas P. Redden, Jr., USMCR
Lieutenant Colonel Theophil P. Riegert, USMC
Major General William W. Rogers, USMC (Ret.)
Professor William H. Russell, U.S. Naval Academy
Major General Michael P. Ryan, USMC
Colonel Edward N. Rydalch, USMC (Ret.)
Brigadier General Ronald D. Salmon, USMC (Ret.)
Colonel John A. Saxten, USMC (Ret.)
Professor Robert Seager II, Washington College
General Lemuel C. Shepherd, Jr., USMC (Ret.)
Lieutenant General Merwin H. Silverthorn, USMC (Ret.)
Brigadier General Edwin H. Simmons, USMC
General Oliver P. Smith, USMC (Ret.)
Lieutenant General Edward W. Snedeker, USMC (Ret.)
General Gerald C. Thomas, USMC (Ret.)
Lieutenant Colonel Wilcomb E. Washburn, USMCR
Major General Frank D. Wier, USMC (Ret.)
Colonel Herbert H. Williamson, USMC (Ret.)
Colonel Roger Willock, USMCR (Ret.)
Lieutenant General Louis E. Woods, USMC (Ret.)
Lieutenant General Thomas A. Wornham, USMC (Ret.)

APPENDIX C

Glossary of Abbreviations

AC/S	Assistant Chief of Staff
Adm	Admiral
AEF	American Expeditionary Force
AKA	Attack Cargo Ship
ALO	Air Liaison Officer
ALP	Air Liaison Party
Amphib CPX	Amphibious Command Post Exercise
AO	Aerial Observer
ARG	Advanced Research Group
ARG/SLF	Amphibious Ready Group/Special Landing Force
ARVN	Army, Republic of Vietnam
ASRT	Air Support Radar Team
AWC	Army War College
BASIC	Battlefield Area Surveillance Communication
BGen	Brigadier General
BLT	Battalion Landing Team
Bu	Bureau
B-W	Borg-Warner (Corporation)
CAC	Combined Action Company
CAP	Combined Action Platoon
Capt	Captain
CARE	Cooperative for American Relief Everywhere
CAS	Close Air Support
Cdr	Commander
CG	Commanding General
CH-46D	Sea Knight, medium transport helicopter manufactured by Boeing-Vertol
CH-53D	Sea Stallion, heavy transport helicopter manufactured by Sikorsky
CMC	Commandant of the Marine Corps
CMCS	Commandant of Marine Corps Schools
CNA	Center for Naval Analyses
CNO	Chief of Naval Operations
CO	Commanding Officer
Col	Colonel
C&R	(Bureau of) Construction and Repair
CRS	Catholic Relief Services
CVE	Escort Carrier
DASC	Direct Air Support Center
DCNO	Deputy Chief of Naval Operations
DC/S	Deputy Chief of Staff
DOD	Department of Defense
ECEF	East Coast Expeditionary Force
FAC	Forward Air Controller
FMC	Food Machinery Corporation
FMF	Fleet Marine Force
FMFLant	Fleet Marine Force, Atlantic
FMFPac	Fleet Marine Force, Pacific
FSCC	Fire Support Coordination Center
FSR	Force Service Regiment
FTP	Fleet Training Publication
FY	Fiscal Year
G-3	G-3 Division (Assistant Chief of Staff, Operations and Training)
G-4	G-4 Division (Assistant Chief of Staff, Logistics)
GO	General Order
GVN	Government of Vietnam
HAF	Historical Amphibious File
Hdqtrs	Headquarters
HistBr	Historical Branch
HD	Historical Division
HMM	Marine Medium Helicopter Squadron
HMX	Marine Experimental Helicopter Squadron
HQMC	Headquarters Marine Corps
HRP-1	Rescuer (Flying Banana), transport helicopter manufactured by Piasecki
HRB	Historical Reference Branch
HRS	Historical Reference Section
HRS-1	Observation helicopter, manufactured by Sikorsky
HTL-2	Training helicopter, manufactured by Bell
JASCO	Joint Assault Signal Company
JCC	Joint Coordinating Council
JCS	Joint Chiefs of Staff
LFASCU	Landing Force Air Support Control Unit
LANTAGLEX	Atlantic-Air Ground Landing Exercise
LCdr	Lieutenant Commander
LCM	Landing Craft, Mechanized
LCVP	Landing Craft, Vehicle, Personnel
LFB	Landing Force Bulletin
LFM	Landing Force Manual
LHA	Amphibious Assault Ship (Multi-Purpose)
LPD	Amphibious Transport, Dock
LPH	Amphibious Assault Ship (Helicopter Transport)
LSD	Dock Landing Ship
LSM	Landing Ship, Medium
LST	Landing Ship, Tank

LtCol	Lieutenant Colonel
LtGen	Lieutenant General
ltr	letter
LVT	Landing Vehicle Tracked
LVTP	Landing Vehicle Tracked, Personnel
MAB	Marine Amphibious Brigade
MACV	Military Assistant Command, Vietnam
MAF	Marine Amphibious Force
MAG	Marine Aircraft Group
MAGTF	Marine Air-Ground Task Force
Maj	Major
MPQ-14/TP	Mobile Ground Multi-Purpose Radar
MAU	Marine Amphibious Unit
MAW	Marine Aircraft Wing
MBT	Main Battle Tank
MCB	Marine Corps Base
MCDC	Marine Corps Development Center
MCDEC	Marine Corps Development and Education Command
MCEB	Marine Corps Expeditionary Brigade
MCEC	Marine Corps Education Center
MCEF	Marine Corps Expeditionary Force
MCLFDA	Marine Corps Landing Force Development Activities
MCLFDC	Marine Corps Landing Force Development Center
MCM	Marine Corps Manual
MCO	Marine Corps Order
MCOAG	Marine Corps Operations Analysis Group
MCS	Marine Corps Schools
MCTU	Marine Corps Test Unit
MEDCAP	Medical Civic Action Program
MLRP	Marine Corps Long-Range Plan
MMROP	Marine Corps Mid-Range Objectives Plan
MOREST	Mobile Aircraft Arresting System
MS.	Manuscript
MTDS	Marine Tactical Data System
NAVMCO	Navy-Marine Corps Order
NCO	Noncommissioned Officer
NDRC	National Defense Research Committee
NGF	Naval Gunfire
NHD	Naval History Division
NOA	Naval Operational Archives
NVA	North Vietnamese Army
NWC	Naval War College
NWP	Naval War Publication
OAB	Operational Archives Branch
OCMH	Office of the Chief of Military History
OIC	Officer in Charge
ONI	Office of Naval Intelligence
ONR	Office of Naval Research
OpO	Operation Order
Op(s)	Operation(s)
O&T	Operations and Training
OV-10A	Bronco, light armed reconnaissance aircraft manufactured by North American
PacFlt	Pacific Fleet
PAT	Political Action Team
QM	Quartermaster
RAdm	Rear Admiral
RLT	Regimental Landing Team
RD	Revolutionary Development
R&D	Research and Development
RD&S	Research, Development, and Studies
RDT&E	Research, Development, Test, and Evaluation
Regt	Regiment
Rev	Revised
rpt	Report
RVN	Republic of Vietnam
SATS	Short Airfield for Tactical Support
SecNav	Secretary of the Navy
SID	Seismic Intrusion Detector
SOP	Standing Operating Procedure
Sqdn	Squadron
STATE	Simplified Tactical Approach Terminal
TACC	Tactical Air Command Center
TAF	Tactical Air Force
TAOC	Tactical Air Operations Center
TDCC	Tactical Data Communications Central
T/E	Table of Equipment
TIC	Target Information Center
TIPI	Tactical Information Processing Interpretation Systems
T/O	Table of Organization
UH-1E	Utility Helicopter, manufactured by Bell
UH-1G	Huey Cobra, helicopter gunship manufactured by Bell
USA	United States Army
UNAAF	Unified Action Armed Forces
USAID	U.S. Agency for International Development
USFs	United States Fleet series
USHS	United States Hospital Ship
USMC	United States Marine Corps
USN	United States Navy
USS	United States Ship
v.	volume
VAdm	Vice Admiral
VC	Viet Cong
VMO	Marine Observation Squadron
V/STOL	Vertical, Short Take-Off and Landing
WCEF	West Coast Expeditionary Force
WNRC	Washington National Records Center

APPENDIX D

Commandants of the Marine Corps in the Twentieth Century

Major General Charles Heywood	1891–1903
Major General George F. Elliott	1903–1910
Major General William P. Biddle	1911–1914
Major General George Barnett	1914–1920
Major General John A. Lejeune	1920–1929
Major General Wendell C. Neville	1929–1930
Major General Ben H. Fuller	1930–1934
Major General John H. Russell, Jr.	1934–1936
Lieutenant General Thomas Holcomb	1936–1943
General Alexander A. Vandegrift	1944–1947
General Clifton B. Cates	1948–1951
General Lemuel C. Shepherd, Jr.	1952–1955
General Randolph McC. Pate	1956–1959
General David M. Shoup	1960–1963
General Wallace M. Greene, Jr.	1964–1967
General Leonard F. Chapman, Jr.	1968–1971
General Robert E. Cushman, Jr.	1972–

APPENDIX E

Commanders at Quantico

Commanders, Marine Barracks, Quantico, Virginia

Maj Chandler Campbell	14 May 1917–24 May 1917
Maj Julius S. Turrill	25 May 1917– 8 Jun 1917
Col Albertus W. Catlin	13 Jun 1917–26 Sep 1917
BGen John A. Lejeune	27 Sep 1917–23 May 1918
Col Smedley D. Butler	24 May 1918–20 Jun 1918
BGen Charles A. Doyen	21 Jun 1918– 5 Oct 1918
BGen Albertus W. Catlin	6 Oct 1918–11 Nov 1918
Col Dion Williams	12 Nov 1918–14 Nov 1918
BGen John T. Myers	15 Nov 1918–26 Oct 1919
MajGen John A. Lejeune	27 Oct 1919–29 Jun 1920
BGen Smedley D. Butler	30 Jun 1920– 4 Jan 1924
Col Ben H. Fuller	4 Jan 1924–10 Jan 1924
Col Charles S. Hill	11 Jan 1924–26 Feb 1924
BGen Dion Williams	27 Feb 1924–12 Aug 1924
MajGen Eli K. Cole	13 Aug 1924– 2 Jun 1927
MajGen Wendell C. Neville	3 Jun 1927–11 Dec 1928
BGen Harry Lee	12 Dec 1928–30 Jan 1929
MajGen Wendell C. Neville	31 Jan 1929– 4 Mar 1929
BGen Harry Lee	5 Mar 1929–23 Apr 1929
BGen Smedley D. Butler	24 Apr 1929–30 Sep 1931
BGen Randolph C. Berkeley	1 Oct 1931– 7 Nov 1931
Col James J. Meade	8 Nov 1931–27 Nov 1931
LtCol Andrew B. Drum	28 Nov 1931–30 Nov 1931
BGen John H. Russell	1 Dec 1931–29 Jan 1933
BGen James C. Breckinridge	30 Jan 1933–28 Feb 1933
BGen Harry Lee	1 Mar 1933–13 May 1935
Col Henry M. Manney, Jr.	14 May 1935–19 May 1935
BGen Thomas Holcomb	20 May 1935–17 Jun 1935
BGen Charles H. Lyman	18 Jun 1935–23 Jun 1937
MajGen James C. Breckinridge	24 Jun 1937–24 Sep 1939
MajGen Louis McC. Little	25 Sep 1939–31 Jan 1942

Muster Rolls do not show a commanding officer or commanding general for the period 1 Feb 1942 to 2 Oct 1942. BGen Samuel M. Harrington is shown as CMCS. BGen Julian C. Smith is shown as Commanding General, TTC.

MajGen Philip H. Torrey	2 Oct 1942–31 May 1946
MajGen Clifton B. Cates	1 Jun 1946–30 Dec 1947
BGen Oliver P. Smith	31 Dec 1947– 4 Apr 1948
MajGen Lemuel C. Shepherd, Jr.	26 Apr 1948–31 May 1948

Commandants, Marine Corps Schools, Quantico, Virginia

MajGen Lemuel C. Shepherd, Jr.	1 Jun 1948–16 Jun 1950
MajGen Franklin A. Hart	1 Jul 1950–22 Feb 1951
LtGen Franklin A. Hart	23 Feb 1951–31 Dec 1951
LtGen Clifton B. Cates	1 Jan 1952–30 Jun 1954
LtGen Gerald C. Thomas	1 Jul 1954–31 Dec 1955
LtGen Edwin A. Pollock	1 Jan 1956–22 Jul 1956
LtGen Merrill B. Twining	13 Sep 1956–30 Oct 1959

LtGen Edward W. Snedeker	31 Oct 1959–30 Jun 1963
LtGen Frederick L. Wieseman	1 Jul 1963–30 Jun 1966
LtGen James M. Masters, Sr.	1 Jul 1966–31 Dec 1967

Commanding Generals, Marine Corps Development and Education Command, Quantico. Virginia

LtGen James M. Masters, Sr.	1 Jan 1968–30 Jun 1968
LtGen Lewis J. Fields	1 Jul 1968–30 Jun 1970
LtGen Raymond G. Davis	1 Jul 1970–11 Mar 1971
LtGen William G. Thrash	12 Mar 1971–30 Jun 1972
LtGen Robert P. Keller	1 Jul 1972–

APPENDIX F

Outline of the Development of the Landing Operations Manual*

1921—OPlan 712—Advanced Base Operations in Micronesia—Major Earl H. Ellis.

1925—Major S.M. Harrington—compiled study of small wars entitled "The Strategy and Tactics of Small Wars." This publication presented certain principles of landing operations as they applied to small wars. Only 5 percent of instruction at MCS concerned itself with landing operations of any kind.

1926—By this year instruction in landing operations increased to 49 hours and increased thereafter.

1927–1928—MCS completely revised and expanded courses on landing operations.

Early 1927—MCS recommended establishment of an advanced course for the study of expeditionary operations pertaining to USMC. CMC approved but owing to lack of personnel, course not established.

Early 1929—CMC directed that in September 1929 a class of four field officers be assembled at the MCS for study and preparation of plans for small wars and expeditions. In July, however, the CMC found that no officers were available and thereby disapproved of the establishment of this class.

1930—Map problems of Oahu, Southern California, etc., were now changed to be included as landing operations and coordination with the Naval War College had begun. NWC assumed that when an advanced base was to be seized it would be seized by Marines.

No detailed consideration of the seizure had been given.

At the MCS it had been assumed that the Marines in effecting a landing would be supported by naval gunfire.

The Field Officers Course general problem was to solve the occupation and defense of a naval base. This problem was presented to the Field Officers Course by NWC in advance so that the solution of the schools could be forwarded to the NWC in time for incorporation in the naval problem when discussed by the classes there.

1931—A banner year for MCS. A special board was appointed in 1931 for the express purpose of critically examining the entire curriculum of the schools. Classes continued to meet in their normal manner while the board prepared its recommendations for changes and improvements.

In 1931, a considerably revised schedule was adopted for the following school year (1932). Instruction based on material of the Command and General Staff School at Fort Benning was discarded or revised to conform with Marine Corps organization and material. Instruction was based on all levels of command, from the attack force down through the force, division, brigade, regiment, and battalion.

Instructors at MCS were directed to rewrite all their material and gear it to the Corps' T/O and T/E. Instruction material in pamphlet form was written, but not a single manual.

During the remainder of 1931 and 1932 this writing and other revolutionary measures, although modified considerably before they were adopted, had a far-reaching effect upon the schools. The CMC summarized this small revolution in his annual report to SecNav for the FY ending 30 June 1933:

> Problems were based on Marine Corps units and equipment.
>
> Certain personnel were designated to prepare text books and pamphlets to cover fields of service for which no Marine texts existed. Support by naval gunfire and other naval agencies was developed in greater detail, and a closer relationship with the NWC was maintained. More effort was placed on the development of comprehensive courses on landing operations and small wars.
>
> Recommendations of a special board on naval gunfire in support of landings were the basis of future experimental firings conducted by the Navy.
>
> Units of measurement for computing cargo requirements for military equipment.
>
> A system of cargo measurements and classification of equipment to facilitate the determination of cargo requirements and the loading of a ship to meet tactical requirements.
>
> Preparation of reference data sheets.
>
> Establishment of standard boat capacities for landing operations based on specific data.

1933—The Gallipoli operation had formed an important part of the background in research on landing operations. Early in 1933, each student was issued a copy of the British official history of the Gallipoli Campaign. The book, being the latest and most accurate publication on the subject, was used as a source book.

The Gallipoli Course was organized, 3 March to 5 April 1933, to acquaint the students with the Gallipoli Campaign, to train them in military research, and to provide the schools and through them the Marine Corps with material of value on a campaign which was in many respects of the type that the Marine Corps was expected to be expert in.

Between 1919 and 1933, the Joint Army-Navy Board had promulgated several manuals prescribing methods for Army and Navy cooperation in joint overseas expeditions. ("Joint Army and Navy Action in Coast

*War Plans Section, Division of O&T, HQMC (Box 3, Accession No. 65A-4939, WNRC, Suitland, Md.).

Defense") ("Joint Action of the Army and Navy"—23 April 1927) ("Joint Overseas Expeditions"—12 January 1933)

The 1933 pamphlet's purpose was to "present a set of general principles for the planning and conduct of joint overseas expeditions in order to insure the most effective cooperation and coordination between Army and Navy forces participating therein." The directives contained in the manual were concerned with the techniques and agencies for cooperation and with the respective functions of each service in the conduct of joint operations. But a manual on landing operations (that is, how to do it) was still lacking.

29Sep33—CMC recommended that all classes be discontinued and that students and staff alike devote all time and effort towards the production of a landing operations manual.

30Oct33—CMCS received a directive from CMC to prepare a manual on landing operations as expeditiously as possible and to commence work not later than 15 November.

14Nov33—Classes were discontinued and the staff and students commenced work on the manual.

How it was done:

a. Instructors/students wrote out a chronological, itemized list of the things to be done from the inception to the tactical completion of a landing operation.

b. Committee of nine was appointed to consider these papers and to draw up a consolidated list embracing all recommendations and to group them under headings. Each member of the committee formulated his own list based on the results of his study of all papers submitted.

c. Each of these lists was in turn studied by another committee of five, who further consolidated the recommendations and produced a rough outline for the manual.

9Jan34—Officers from FMF, HQMC, and Quantico participated in a conference with respect to the outline. The outline/manual was based on experience, both personal and that culled from reports of landing operations, experimentation, and the evolution of instruction and problems at the MCS. Some 70 officers from lieutenants to brigadier generals attended the meeting—including four Navy officers and one Army officer.

Following the conference, the manual was divided into six subsections and responsibility for writing those sections was assigned to various committees. The bulk of the manual was grouped under three general headings: (1) Tactics, which included landing and defense of bases, prefaced by a general discussion of landing operations and the purpose of the manual; (2) Staff Functions, Logistics, and Plans and Orders; and (3) Training. In addition, separate sections were assigned on naval activities and aviation, plus the usual appendices attendant to such a manual.

28Mar34—Committees that had been at work in earnest submitted to the CMC the first parts of the manual.

13Jun34—Last chapters submitted to CMC. For the school year (1934–35) the "Tentative Manual for Landing Operations" was used at MCS for all theoretical instruction in landing operations. This 1934 edition was in mimeograph format.

Jul34—Title changed to "Manual for Naval Overseas Operations" and published by Navy Department.

15May35—Board for Revision of Manual was convened at MCS headed by Lieutenant Colonel Charles D. Barrett.

9Jul35—A revised manual with photographs, better sketches, etc., was approved by the CNO 25 May 1935 and distributed by the CMC throughout the Marine Corps, Navy, and outside agencies with a "Restricted" classification. This 1935 edition became the first widely distributed, official publication of the *Tentative Landing Operations Manual.*

15Jun36—A board headed by Lieutenant Colonel Keller E. Rockey (including Lieutenant Colonels Archie F. Howard and Alfred H. Noble) was convened to revise the *Tentative Landing Operations Manual.*

26May37—CMC sent to CNO report of Board on Revision of *Tentative Landing Operations Manual.*

21Jun37—Complete with revisions, the *Tentative Landing Operations Manual* was issued under the technically correct new title of *Landing Operations Doctrine, U.S. Navy, 1937.* (This edition does not seem to have had a general distribution.)

15May38—A Marine Corps board for revision of *Landing Operations Doctrine, U.S. Navy, 1937,* was convened to make recommendations for new printing of the manual for FY 1939. Heading the board was Lieutenant Colonel Alfred H. Noble, with Captain Francis M. McAlister, and Quartermaster Clerk Percy H. Uhlinger (A&I), also recorder of original board).

25Nov38—CMC authorizes destruction of *Tentative Landing Operations Manual.* This manual, the 1935 version, and the technically correct edition entitled *Landing Operations Doctrine, U.S. Navy, 1937* were superseded by the issuance of the *Fleet Training Publication* (FTP) #167. FTP #167 was also known as *Landing Doctrine, U.S. Navy, 1938.*

APPENDIX G

Students and Instructors Who Were Assigned to MCS During Preparation of Tentative Landing Operations Manual— November 1933 through May 1934*

BGen James C. Breckinridge	CMCS
Col Ellis B. Miller	ACMCS
Col Edward W. Banker	Student (Joined Jan34)
LtCol Calhoun (N) Ancrum	Student
LtCol Lauren S. Willis	Student
Maj Cecil S. Baker	Instructor (Joined Apr34)
Maj David S. Barry, Jr.	Student
Maj Robert Blake	Instructor
Maj Henry M. Butler	Student
Maj Woolman G. Emory	Instructor (Joined Apr34)
Maj Louis E. Fagan, Jr.	Student
Maj George C. Hamner	Director of Correspondence Class
Maj Earl H. Jenkins	Instructor (Joined Apr34)
Maj Roy D. Lowell	Student
Maj John Marston	Director, First Year Class
Maj Charles J. Miller	Chief of Section F-3
Maj Harold L. Parsons	Director, Second Year Class
Maj Roger W. Peard	Student
Maj DeWitt Peck	Instructor
Maj Harold C. Pierce	Student
Maj Lowry B. Stephenson	Instructor (Joined May 34)
Maj Thad T. Taylor	Student
Maj Wilbur Thing	Student
Maj Thomas E. Thrasher, Jr.	Chief of Section F-1, F-2
Maj Samuel A. Woods, Jr.	Instructor
Capt Edward L. Burwell, Jr.	Student
Capt Eugene F.C. Collier	Instructor
Capt Ralph W. Culpepper	Student
Capt Gale T. Cummings	Instructor
Capt Thomas B. Gale	Instructor
Capt Alexander Galt	Instructor (Joined May 34)
Capt Charles C. Gill	Instructor
Capt John Kaluf	Instructor (Joined Feb34)
Capt Robert M. Montague	Officer in Charge Reproduction
Capt Stewart B. O'Neill	Student (Joined Jan34)
Capt Albert W. Paul	Instructor
Capt Edward S. Shaw	Student
Capt Norman E. True	Student
1stLt Samuel S. Ballentine	Student (Joined May34)
1stLt William O. Brice	Student
1stLt Pierson E. Conradt	Student
1stLt William H. Doyle	Student
1stLt Roy M. Gulick	Student
1stLt Ernest E. Linsert	Student
1stLt Louis E. Marie	Instructor
1stLt Arthur T. Mason	Instructor

*Muster Roll of Officers and Enlisted Men, Marine Corps Schools Detachment, Marine Barracks, Quantico, Va., 1 November 1933 to 31 May 1934 (HRS, HD, HQMC).

1stLt Vernon E. Megee	Instructor
1stLt John C. McQueen	Instructor
1stLt Lyman G. Miller	Student
1stLt Edwin A. Pollock	Instructor
1stLt Frank D. Weir	Student
1stLt Walter W. Wensinger	Instructor

APPENDIX H

List of Participants in Conference Held at Quantico, Virginia on 9 January 1934 for Purpose of Discussing Tentative Landing Operations Manual*

Conference convened at 0900.

Present:

From Headquarters, Marine Corps, Washington, D.C.
- LtCol Bennet Puryear, Jr.
- Maj Charles D. Barrett
- Maj Roy S. Geiger
- Maj Ralph J. Mitchell
- Maj Allen B. Turnage
- Maj LeRoy P. Hunt
- Maj Harry E. Pickett
- Capt Thomas E. Bourke
- Capt Francis F. Mulcahy

From Fleet Marine Force, Quantico, Va.
- BGen Charles H. Lyman
- LtCol Robert L. Denig
- Maj Harold S. Fassett
- Maj Leander A. Clapp
- Maj Alexander A. Vandegrift
- Maj Lloyd L. Leech
- Capt Henry D. Linscott
- Capt Bernard Lutel

From Post Headquarters
- LtCol Philip H. Torrey
- Maj Earl I. Buse
- Capt Chaplain G. Hicks

From Marine Corps Schools
- BGen James C. Breckinridge
- Col Ellis B. Miller
- LtCol Calhoun Ancrum
- Maj David S. Barry, Jr.
- Maj Robert Blake
- Maj Henry M. Butler
- Maj Louis E. Fagan, Jr.
- Maj George C. Hamner
- Maj Roy D. Lowell
- Maj John Marston
- Maj Charles J. Miller
- Maj Harold L. Parsons
- Maj Roger W. Peard
- Maj DeWitt Peck
- Maj Harold C. Pierce
- Maj Thad T. Taylor
- Maj Wilbur Thing
- Maj Thomas E. Thrasher, Jr.
- Map Samuel A. Woods, Jr.
- Capt Edward L. Burwell
- Capt Eugene F.C. Collier
- Capt Ralph W. Culpepper
- Capt Gale T. Cummings
- Capt Thomas B. Gale
- Capt Charles C. Gill
- Capt Robert M. Montague
- Capt Albert W. Paul
- Capt Edward S. Shaw
- Capt Norman E. True
- 1stLt William O. Brice
- 1stLt Pierson E. Conredt
- 1stLt William H. Doyle
- 1stLt Roy M. Gulick
- 1stLt Ernest E. Linsert
- 1stLt Louis E. Marie
- 1stLt Arthur T. Mason
- 1stLt Vernon E. Megee
- 1stLt John C. McQueen
- 1stLt Lyman G. Miller
- 1stLt Edwin A. Pollack
- 1stLt Frank D. Weir
- 1stLt. Walter W. Wensinger
- LCdr Thomas V. Cooper, USN
- LCdr Clifford G. Richardson, USN
- Lt Harold E. McCarthy, USN
- Lt Joseph H. Seyfried, USN
- 1stLt John H. Stadler, USA

*Correspondence File 1520-30-120 (Record Group 127, National Archives).

APPENDIX I

Fleet Marine Force Organization and Composition Board (Hogaboom Board) Members(*)

MajGen Robert E. Hogaboom—President
BGen Ronald D. Salmon
Col Cliff Atkinson, Jr.
Col Frederick P. Henderson
Col Henry H. Crockett
Col Norman J. Anderson
Col William K. Jones
Col Allan Sutter
Col David W. Stonecliffe
Col Odell M. Conoley
Col William R. Campbell
Col Herbert H. Williamson
Col Keith B. McCutcheon
Col Bruce T. Hemphill
Col Lewis W. Walt
Maj Frank R. Young—Recorder

*CMC ltr to CG's FMFLant, FMFPac, dtd 30 April 1956, AO3A-cec, 03C9756.

APPENDIX J

Citation to Accompany the Award of The Medal of Merit to Donald Roebling

DONALD ROEBLING, for exceptionally meritorious conduct in the performance of outstanding services to the United States. Mr. Roebling conceived, developed, and perfected an amphibian vehicle capable of traversing both land and water, presented it to the Government of the United States and released it for manufacture without compensation. Conceived originally in December 1934, for humanitarian purposes as a means of carrying emergency supplies to inundated and isolated areas in Florida during the hurricane seasons, and completed after 5 years of intensive research, tireless effort, and tremendous personal expense, his fourth model, the "Roebling Alligator" is the forerunner of all amphibian tractors constructed for the Navy, the Marines, the Army, and Lend-Lease. The Roebling Amphibian Tractor contributed to the success of our armed forces in Africa, and in addition, rendered valuable service during landings on the Pacific Ocean Islands, and with its unique ability to negotiate surf and beach terrain, moved supplies and equipment to otherwise inaccessible locations, broke trails through the jungle and formed pontoons for temporary bridges permitting the passage of troops. Mr. Roebling's unselfish devotion to the perfecting of an effective war weapon, released without thought of benefit to himself, was a vital and inspiring contribution to the defense of his country.

/S/ HARRY TRUMAN

THE WHITE HOUSE
December 18, 1946.

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"There is one resource of the Marine Corps that has always been fully developed: the individual Marine. What made a good Marine during the Revolutionary War still makes a good Marine. A competent, loyal, highly motivated Marine is an asset far exceeding in value all the developments of a technological age."

General Oliver P. Smith, USMC (Retired)