CHAPTER 3

A REVITALIZED HELICOPTER PROGRAM

The Marine Corps Board

While HMX–1 was engaged in testing, evaluating, and demonstrating the new amphibious technique from the operational point of view, Marine Corps Schools was developing the concept from the academic standpoint. Back in June 1949, a major impetus had been injected into the Marine Corps' helicopter program when the schools presented to the Commandant the most broad and intensive plan for expansion since the program's initial submission in December 1946.

The Marine Corps Board, MCS, headed by Major General Oliver P. Smith, the Assistant Commandant and Chief of Staff, HQMC, had been instructed by the Commandant in late 1948 to undertake a new study. General Smith was directed to look into the matters concerning the "measures which the Marine Corps should take in order to fulfill its obligations in maintaining its position as the agency primarily responsible for the development of landing force tactics, techniques, and equipment." In compliance with its instructions, the board during the early part of 1949, examined reports of Fleet Marine Force postwar maneuvers and found "little if any advancement or improvement was being made in landing force tactics and techniques. The postwar maneuvers had tended to become stereotyped with the execution falling into mechanical patterns." The practices "which had been developed to such a high degree during World War II were more or less standard procedures and were employed without variation." [1]

In searching for a means to develop new concepts and techniques for FMF maneuvers, the Smith Board reasoned that the "lack of flexibility and originality in the FMF was due at least in part to limitations imposed by the equipment being employed." It was considered that "until some quantum advance was made in equipment, little new could be expected in the way of advanced tactics and techniques." [2]

The board had observed with great interest the employment of HMX–1 in support of the MCS landing exercises at Onslow Beach in Operations PACKARD II and III and felt that "those exercises had successfully demonstrated that the helicopter offered the most promising possibilities of being the quantum advance for which the Marine Corps had been searching." It was believed that "the time was rapidly approaching when operating helicopter squadrons should be organized and placed in support of FMF maneuvers." The board was convinced that in this way "a means would be provided for putting new life into the amphibious problems and thereby take it out of the stereotyped forms toward which it was tending." [3]

Four basic problem areas were cited by General Smith's board, all of which had to be solved before helicopter squadrons could be placed in support of FMF maneuvers. Allocation of necessary funds in the budget was listed first with procurement of a suitable type helicopter seen as a second obstacle. The third and fourth problems were provisions for a helicopter squadron in the CNO's operational plan and organization and training of operational helicopter squadrons.[4]

It was obvious that a carefully prepared and vigorously executed program extending over several years would be necessary before the realization of operational helicopter squadrons could be achieved. The first step in such a program was to obtain the allocation of the necessary funds in the budget. Since the preparation of the 1951 budget had already begun, the earliest fiscal year in which funds could be allocated was 1952. Therefore, the board stated, studies should be undertaken immediately by the Division of Aviation, HQMC, with the view in mind toward obtaining the necessary funds in fiscal year 1952." [5]

In relation to the second problem, the board's report explained:

> An entirely satisfactory transport helicopter does not yet exist. However, types which can be in production by 1952 have acceptable characteristics for initiating work with the FMF. The Board believes that this program should not be delayed until the ideal military requirements for a transport helicopter are met. The type which, in fiscal 1952, comes the closest

to meeting our requirements should be procured at that time.[6]

Since procurement of aviation materiel was a function of BuAer, the report mentioned that early studies should be undertaken by the Division of Aviation in conjunction with BuAer "to determine the most effective means by which provisions for the requisite helicopter squadron could be made in operation force plans." While this problem was purely an administrative one, it nevertheless was difficult and complicated. "The creation of operational transport helicopter squadrons will" the report continued, "require decisions as to what effect the activation of these squadrons will have on presently activated Marine Corps squadrons and what effect, if any, it will have on the ratio of aviation to ground strengths." [7]

It was estimated that a period of eight months to a year would be required for the organization and training of a transport helicopter squadron before it could be prepared to participate with the FMF in maneuvers. To ease the training load, and also because it was estimated that the production rate of new helicopters would be slow, it was considered more feasible that new "squadrons should be activated successively rather than simultaneously." General Smith's report terminated with only one formal recommendation: "that a transport helicopter program with the objective of activating one 12-plane squadron [on each coast] in 1953 and one such squadron in 1954 be initiated immediately." [8]

The Second Attempt to Procure a 3,000-Pound Payload Helicopter

General Smith's report was circulated at HQMC between two main action agencies: the Divisions of Aviation, and Plans and Policy. Meanwhile, Colonel Dyer initiated a request from HMX–1 to the Commandant stating that the "squadron's recent participation on Operation PACKARD III had proved that helicopter operations were highly successful within the limitations of the HRP–1, and therefore, development of a carrier-based transport was now justified."[9] He understood that the Navy and Air Force were developing jointly the Piasecki XH–16 and, since it would undoubtedly be of military usefulness, felt the project should be continued. Because of the time required to perfect fully such a large helicopter, and its doubtful ability to operate from small aircraft carriers, Colonel Dyer stressed that "it appears advantageous to proceed with an additional project for the development of a small helicopter which will meet our minimum requirements, which will be suitable for carrier operations, and might well be more easily and quickly obtained." [10]

In general terms, it was pointed out by Dyer that "such a helicopter should be designed for carrier-based operations . . . , capable of carrying a payload of about 3,000 pounds, (15 combat-equipped Marines)" and have "sufficient fuel for an operating radius of about 100 miles." He noted that "the specifications should meet the Marine Corps' immediate military requirements and present a reasonable goal for technical developments [of the helicopter]." The requirement specified that the helicopter be of a weight and size "to permit movement on the smallest flight deck elevators and of an overall height which would not prohibit storage on aircraft carrier hangar decks" [11]—a mandatory requirement if large numbers of helicopters were to operate from aircraft carriers.

Colonel Dyer's letter, dated 25 June 1949, his last to the Commandant on this subject as commanding officer of HMX–1, was endorsed by General Lemuel C. Shepherd, Jr., Commandant of Marine Corps Schools, who concurred with Dyer's recommendation and considered that "the development of such a helicopter should be in addition to the development now in progress on the XH–16." [12]

By 5 August Brigadier General Edwin A. Pollock, Director, Division of Plans and Policies (DivP&P) and Major General William J. Wallace, Director, Division of Aviation (DivAvn) agreed to form a joint study group at HQMC "to implement the execution of the program," [13] as recommended in General Smith's report. General Pollock had served, since 1945, successively as Commanding Officer of the Basic School; Executive Officer of the MCS; and Chief of Staff of the Marine Barracks, Quantico. In June 1948 he was ordered to HQMC as the Military Secretary to the Commandant, and when promoted to brigadier general, became Director, Division of Plans and Policies in July 1949. General Wallace, prior to assuming the post of Director, Division of Aviation/Assistant Commandant of the Marine Corps (Air) in 1948, was Commanding General, Aircraft, FMFLant and Commanding General, 2d MAW. Earlier he had been Commanding General, Aircraft, FMFPac/Deputy Commander FMFPac.

The Commandant, General Clifton B. Cates, appointed Lieutenant Colonel George S. Bowman,

DivAvn, as senior member of a seven-man study group. The membership was directed to convene "as soon as may be practicable to study and report on a program for the activation of transport helicopter squadrons within the Marine Corps" [14] and to determine the most effective means of complying with the four problem areas of concern outlined in General Smith's report of 3 June.

While Lieutenant Colonel Bowman's board was meeting, the Commandant responded on 19 August to Colonel Dyer's letter of 25 June. Colonel Frank H. Lamson-Scribner, a veteran of Attu, Tarawa, and operations in the Marshall and Gilbert Islands during World War II, and who had been most recently assigned to the DivAvn after serving as commander Marine Air WestPac in China, prepared the Commandant's reply. It stressed that time was not available to design and construct the proposed 3,000-pound payload helicopter prior to the estimated completion date of the first XH–16 in 1952. It explained that the Marine Corps was also investigating the feasibility of transporting troops from friendly bases to hostile beaches by assault seaplane transports, in addition to the ship-to-shore movement of troops by helicopter, and that the assault seaplane concept had resulted in an engineering study contract being awarded for a "flying LST" to the Consolidated Vultee Corporation, San Diego, California. It was considered that any new programs could not be approved at that time for it would require the expenditure of additional money when the Navy was still faced with a cut-back in funds for new aircraft procurement. However, in spite of the financial situation, it was explained to Colonel Dyer that a board was in session at the time at HQMC to study and submit recommendations on a transport helicopter program. The board was to consider, among other factors, the specific type of helicopter most suitable for Marine Corps use.[15]

The final paragraph was most important as it initiated action to consolidate Marine Corps support firmly behind one type of air assault vehicle. It was evident that this action was the proper course to pursue if the Marine Corps desired a suitable helicopter in production prior to the 1952 date established in General Smith's report. The paragraph directed:

> If the 3,000-pound pay-load helicopter is considered more desirable than the XH–16 or the AST (Assault Support Transport) or both, recommendations should be made to this Headquarters relative to the reassigning of priorities for these projects.[16]

Lieutenant Colonel Carey, continuing in the footsteps of Colonel Dyer, regarded the reassigning of priorities of the program, as mentioned by General Cates, as a matter that could best be accomplished by a joint conference where all pertinent information could be available. He suggested representatives should come from HQMC agencies, DivAvn, Military Requirements Section of CNO, BuAer, and members from his own squadron. In addition to proposing the joint conference, Carey elaborated further on Colonel Dyer's reasons for establishing a 3,000-pound payload transport helicopter program. He commented that such a helicopter appeared to be the most feasible model for operating from escort aircraft carriers, whereas the XH–16's size would make it doubtful. Additionally, the XH–16 represented a large step forward in helicopter technology and would require extensive component and flight testing after the anticipated completion date of the first test aircraft in 1952. This would preclude the construction of production models for an appreciable length of time since only two experimental aircraft were being built.

Carey contended that sufficient information was available to support further a new helicopter design. Modifying an existing helicopter was one course of action suggested while making a model based upon "proven" and existing configurations was the alternate proposal. It was considered that extensive expenditures of funds for research and development would not be necessary in the "growth" version since a large part of the basic design and engineering was already completed. Procurement dates provided by the helicopter contractors indicated that such helicopters could be produced in quantity by 1952, the proposed delivery date of the first XH–16 flight test article.[17]

The specific models of helicopters suitable for modification were omitted from Carey's letter. Again, Piasecki, an organization devoted exclusively to the design and production of military transport helicopters, had in the advanced stages of construction its PD–22 (Air Force YH–21), a "beefed-up" version of the HRP. Although the overall dimensions of the YH–21 and the HRP were almost identical and somewhat similar in appearance, the YH–21 weighed twice as much empty (9,148 pounds), and had three times the horsepower (1,425) and useful load carrying capability (5,556 pounds), while retaining approximately the same air speed. The Piasecki Helicopter Corporation, its new name since 1946, was developing the YH–21 as an Arctic rescue helicopter for the Air Force. Three other helicopter manufacturers were competing in the Air Force

evaluation with the initial testing of each company's entry to begin in November.

On 13 October 1949, General Cates approved Carey's recommendation for a joint conference. "The cognizant agencies have indicated their desire to attend the conference" the Commandant's letter stated, "which will be held as soon as practicable after the current Transport Helicopter Board has submitted its recommendations." [18]

The joint conference was not delayed by Bowman's board as General Cates received its report the following day. In considering the items before it, the board first determined the general requirements for a transport helicopter which could be procured in 1952–1953 and which would most nearly meet Marine Corps requirements. Based upon specifications submitted over the last two years the assumed general specifications were:

Range: 250 nautical miles
Payload: 3,000 to 3,500 pounds
Capacity: 13 to 15 combat troops @ 225 pounds
2 pilots @ 200 pounds
Stowage: To fit the elevator of a CVE-105-class aircraft carrier and be capable of being stowed and moved about the hangar deck.
Date Required: 1952-1953 [19]

The board studied characteristics of existing helicopters and formed an opinion that none of the current models would be of sufficient improvement over the Piasecki HRP–1 to justify procurement, nor would they even approximate the board's assumed required general specifications. Further investigation by the board disclosed that only one —the YH–21 Air Force Arctic Rescue model— had the potential of closely approximating the desired specifications. The main variation, though, existing between Air Force and Marine Corps requirements, was that the former had a greater range demand where the latter had a requirement for larger troop capacity. It was felt that favorable results of the forthcoming Air Force evaluation would have a direct bearing on the Marine Corps' ability to procure a suitable production model in the 1952–1953 period. It also appeared that the most effective means of obtaining money would be to select an existing type helicopter which could be modified with production funds— since the availability of research and development funds was extremely critical. Other significant opinions reached by the board were: 1. That "the XH–16 did not meet the restrictions imposed by operations from escort carriers [CVEs and CVLs] and would not be procurable in 1952–1953." 2. "That the minimum requirement for the Marine Corps is two assault transport helicopter squadrons, each capable of lifting one reinforced rifle company," [20] an opinion appearing for the first time in any helicopter study.

Other recommendations contained in Bowman's report urged the Commandant to request that the CNO examine the feasibility of modifying an existing helicopter and that the aircraft meet the general characteristics specified in his report. In addition, he stated, the CNO should "provide for two assault transport helicopter squadrons in 1953–1954 without reduction of Marine squadrons then in existence." Finally, that HMX–1 "be directed to prepare and submit [to HQMC] a tentative table of organization for the future assault transport helicopter squadron." [21]

The First Six Months of 1950

A vast amount of work remained for the Marine Corps at the beginning of 1950 if the prospects for continued advancement of the helicopter program were to be realized. Complete fulfillment of the original goal was impossible to achieve. The helicopter program was already two years behind the 1948 date established in 1946 for the commissioning of the first tactical helicopter squadron, and it was drifting even further behind schedule with the 1953–1954 dates proposed by General Smith's board. The pace had to be quickened. But how was the Marine Corps to accomplish this infusion of helicopter units into its aircraft wings while at the same time it was carrying out a schedule for a reduction in other areas of its wing forces? For example, during the past two years the Marine Corps had been required to decrease the number of its active combat squadrons from a July 1948 strength of 23 to 12 aircraft units by 1 July 1950—a reduction made necessary due to a lack of appropriations.[22] Research and development funds, production funds, as well as operational money for fleet squadrons had all been equally hard hit by the paucity of money. The complete spectrum of naval aviation, which includes Marine aviation, had felt the pinch, and the idea of forming new combat helicopter squadrons caught aviation planners at a time when they were being forced to think in terms of reducing strengths and expenditures rather than increasing them. Nevertheless, with no end in sight to the unfavorable fiscal trend, the Marine Corps continued with tenacity to pursue for its fleet forces the one new type of aircraft which it knew would be the key to success in maintaining

world superiority in the field of amphibious operations.*

On 12 January 1950, the Commandant made a request for the 13- to 15-man assault helicopter. General Cates asked that the CNO procure for the Marine Corps a helicopter with the characteristics identical to those drawn up by the Bowman Board. He pointed out that employment of helicopters from the CVE–105 class carriers was entirely feasible and practical. It was a rigid requirement that the aircraft not only be capable of operating on the flight deck, but also be able to move to the hangar deck for storage and maintenance. General Cates made it known that the "helicopters employed by HMX–1 [the HRPs, HO3Ss, and the HTL] did not possess the required minimum range, payload, and troop capacity for Marine Corps employment as assault helicopters." The XH–16's lengthy development period was seen as seriously retarding the Marine Corps helicopter program and although it was not desired to divert funds for its support, "emphasis should be placed on allocation of funds toward the proposed helicopter . . . and given number one priority." In respect to the number of aircraft assigned to assault squadrons, the Commandant increased the number in each of the two squadrons from 12 to 15 aircraft and urged that the squadrons "be provided for in addition to other Marine squadrons then in existence." [24]

Admiral Sherman acknowledged the Commandant's letter on 2 February with a short statement: "The importance of the assault helicopter program to the Marine Corps is recognized. Consideration of this problem by various OpNav Divisions and BuAer Branches is necessary and is being undertaken." [25]

The informal conference, as recommended by Carey, was held on 28 March 1950. Fourteen members were present from key CNO offices and Marine Corps agencies to determine the best approach to satisfy the requirements presented in the Commandant's letter of 12 January for the 13- to 15-man helicopter. The BuAer representative, Navy Captain Paul H. Ramsey, presented what the conferees apparently felt was the logical course of action. His opinion was that the Air Force's Arctic Rescue helicopter would be an unsatisfactory assault helicopter * and believed that the helicopter industry could now produce a helicopter capable of carrying 20 to 26 troops, go below decks of the CVE–CVL class carrier, and meet the other requirements established by the Marine Corps. The solution, as presented by Captain Ramsey, for obtaining the new assault helicopter for the Marine Corps involved five separate steps which at the time were the normal aircraft procurement procedures and represented nothing new nor expedited the procurement process. They were:

1. Establish an operational requirement for a 20-man helicopter.
2. Provide research and development funds for the procurement of experimental flying articles.
3. Solicit proposals from industry on a competitive basis.
4. Obtain and test the experimental assault helicopters.
5. Award a production contract to the manufacturer of the winning entry.[26]

It was his opinion that the time saved by obtaining the Arctic Rescue helicopter on the end of the Air Force contract would amount to about four months less than his proposed solution. It was also estimated that the first production aircraft, under this proposal, would be delivered sometime in 1954. The representatives concurred that the Marine Corps would benefit from the short delay by ultimately having a helicopter specifically designed and tested for the assault mission. His recommendation was accepted at the conference as the best solution for the helicopter program, but apparently no thought was given to meeting the requirements of the helicopter program during the intervening four years. It was pointed out, however, that before BuAer could proceed with the proposal, the Commandant would have to withdraw his previously submitted requirement for the 13- to 15-man helicopter as well as his support for the XH–16, both of which were seen as receiving favorable consideration. In matters of financing, the diversion of the remaining XH–16 Navy research and development funds was also viewed as meeting with CNO approval provided the Navy could be persuaded to terminate its support of the XH–16 project.[27]

The following week, the Navy's Air Readiness Division revised the operational requirements for an assault helicopter of the type specified in Gen-

* As an indication of the effect of the appropriation's cut, the Marine Corps was reduced from its peak strength of 485,000 in 1945 to 156,000 by 1 July 1946. Within another year the number had declined further to 92,000 and by June 1950 the total had dropped to a fraction under 75,000—of which only 28,000 were serving in the FMF. The remaining men were serving on board ships, at posts and stations, and in administrative billets at various locations throughout the world.[23]

* There is no evidence in the official records to indicate why Captain Ramsey supported this point of view, but as Colonel Harold J. Mitchener recalls, size and compatability with the carriers were his primary concerns.

eral Cates' letter of 12 January to reflect the recommendation of the conference of 28 March and transmitted it to BuAer for action. The specifications were contained in the Navy Research and Development Plan, Operational Requirement Number AO–17501 (Rotary Wing Assault Helicopter). The listed requirements were: "develop a rotary wing assault craft capable of transporting combat equipped troops (or the equivalent in combat equipment) from transport vessels to beachheads in support of landing operations . . ." and "that 20 combat equipped troops be transported with the weight of each man computed at 225 pounds." The assigned functions in AO–17501 for the helicopter were to "operate from a CVE or larger carrier, or between carriers and suitable equipped transport ships, carrying assault troops with their initial requirements in supply, communications and organic weapons . . . ." [28] Two of the main features listed were that it be multi-engine equipped and of an overall dimension compatible with movement on the elevator of the CVE–105 class carrier. Although the operational requirement did not assign a model designation, the twin-engine assault helicopter would subsequently bear the Sikorsky S–56 trademark and the Navy designation of XHR2S–1.*

Further Action by the Marine Corps Board

Still disenchanted with the progress of the helicopter program, the Marine Corps Board at Quantico submitted yet another report to the Commandant on 27 April 1950. This was the second report on the same subject in less than 10 months and was again signed by Major General Oliver P. Smith, the Assistant Commandant, as Chairman. The board reviewed the progress made since the helicopter program was initiated in 1946–1947 and was concerned about the trend of events that had taken place over the past years, and, in particular, the last year. Cited as a typical example of the delays encountered in the helicopter program was the recommendation made by the recent joint helicopter conference to "revert to the drawing board" for an assault helicopter rather than recommending procurement of an existing type which would come closest to meeting Marine Corps requirements. In summary, it was stated that the Marine Corps transport helicopter program faced two distinct problems. First, "a lack of availability or even prospects of availability in the immediate future of a new and modern helicopter with increased operating capabilities." Secondly, an ever increasing maintenance and availability problem with existing [aging] helicopters" in HMX–1. In stating the recommendations for solving the primary problem, the board stressed "the standard approach to this problem of implementing the transport helicopter program has failed. It is apparent that drastic action on the part of the Marine Corps is the only remaining recourse available." General Smith's report went on to say that "strong representation must be made to the CNO to obtain sufficient funds to implement this program. Unless these funds are made available now and a new helicopter is developed soon, 1953–1954 will arrive finding the Marine Corps again without operational transport helicopter squadrons." [29]

As a solution to solving temporarily the second problem, the board recommended, as an interim measure, that "an urgent effort be made to obtain all HRP–1s now in existence for the Marine Corps. With these additional helicopters it is felt that HMX–1 can continue its efforts towards the practical development of air tactics and techniques . . ." while awaiting the new assault transport helicopter.[30]

General Smith's report received immediate action and formed the basis for a letter from General Cates to the CNO, Admiral Sherman. The letter, written on 12 May 1950, stressed the urgency of obtaining new and adequate equipment for the Marine Corps to cope with the manifest threat of the atomic bomb to the conventional ship-to-shore movement. "The HRP," the Commandant said, "has never been considered as a service type helicopter, but rather a means to develop the techniques and tactics of this new art. The Marine Corps is now at the crossroads. It possesses the knowledge but not the means to apply this knowledge. If the art of amphibious warfare is to be pursued, adequate means must be provided." To stress his point further, General Cates said, "The Marine Corps is effectively curtailed from performing this new concept in amphibious assault by one factor—the lack of suitable helicopters." Finally, Admiral Sherman was requested to take urgent action on these points, primarily to: raise the priority for the XHR2S–1 from its presently CNO-assigned status of 1C to 1B, and additionally, "to see that experimental helicopters be procured and evaluated with a view to procuring

* Operational Requirement Number AO–17501 (Rotary Wing Assault Helicopter) may be referred to hereafter in the text as the XHR2S–1.

two 15-plane assault squadrons . . . as soon as possible." [31]

In order to find a method by which the Marine Corps could further expedite and improve upon the new assault concept during the period 1950 to 1954, and also, to be able to find a solution to the ever-increasing maintenance problems of the aging HRPs, another joint helicopter conference was held on 22 May 1950. Attending were members from: BuAer, DCNO (Air) Aviation Plans, DCNO (Air) Readiness, and HQMC. The Marine representatives were Major General Wallace (DivAvn) and Brigadier General Pollock (Plans and Policies).

After a discussion of the problem by the conference members, it was determined that the helicopter program of the future should be composed of two parts. First, and as the longer-range solution, the Marine Corps should continue with the program to obtain a carrier-based assault helicopter which would meet the requirements of AO–17501 (XHR2S–1), as was recommended by the March helicopter conference, and simultaneously attempt to persuade the Army and Air Force to cancel the XH–16 project and join with the Marine Corps in developing the XHR2S–1.[32]

Secondly, and the one related to immediate Marine Corps needs, was the proposal to procure an interim assault helicopter from the best design currently available. General Wallace's conference proposed that the most practical and expeditious way to obtain an interim helicopter, and accelerate the program's pace, was to establish a board to make a survey of all current designs and production helicopters which gave promise of meeting Marine Corps requirements. The survey board would examine the production capability of each helicopter manufacturer. The capability of a manufacturer to produce the required number of assault helicopters would be one of the prime considerations in the choice of design. Dependent upon CNO approval of the aviation plan calling for two Marine assault helicopter squadrons in 1953–1954, a production contract would be let for 40 off-the-shelf interim assault helicopters; 16 for each of the squadrons, and eight for support.[33]

The Marine Corps planners were also concerned that an attempt should be made to increase the number of total aircraft allowed in Marine aviation so that no cut-back in current fixed-wing aircraft would result from this program. However, it was agreed by Generals Wallace and Pollock "that if the numerical ceiling for Marine Corps aircraft could not be increased, they would accept a reduction in other type aircraft in order to have sufficient aircraft billets to provide for the two assault helicopter squadrons." [34]

Nine days after the conference, General Cates signed a letter addressed to the CNO outlining the two-step helicopter program as proposed by General Wallace. Admiral Sherman was advised that the delay involved in research and development for the XHR2S–1, while unavoidable, would prevent the delivery of an operational helicopter for about five years. The Commandant explained that it was necessary to provide "both Fleet Marine Forces with the means for training combat units in assault helicopter operations," and also necessary to provide the helicopters in order to "increase the combat readiness of the Marine Corps." The letter continued: "implementation of this program is considered to be of vital importance," and even though the "Army and Air Force are to be invited to join in the support of this project [XHR2S–1] . . . with or without their assistance, it is necessary to proceed concurrently with the procurement of the interim model." [35]

During June, the CNO replied to the Commandant's letter and in essence gave the Marine Corps a substantial sense of satisfaction. The response, originated by Vice Admiral John H. Cassady, DCNO (Air), outlined a specific program similar to the one suggested by General Cates. Cassady's letter specified that priority of AO–17501 would be evaluated by a special review board (within CNO offices) in relation to all existing priorities. Also, if agreement could be reached with the Air Force to discontinue support of the XH–16 project, the $200,000 remaining in the Fiscal Year 1951 funds would be applied to AO–17501 and design competition would be initiated for the XHR2S–1. It was reiterated that it would take five years before a production helicopter could be produced which would meet the requirements of AO–17501. Admiral Cassady stated that agreement had been reached within his offices to investigate the possibility of procuring an interim helicopter as requested by the Commandant, one which could be delivered in about 33 months. The Bureau of Aeronautics had also agreed to survey industry for the most suitable helicopter which could be modified to obtain the closest approximation of the XHR2S–1, and to secure the necessary information so as to award a contract prior to September 1950—only three months away. Finally, Cassady mentioned that the CNO had approved an aviation plan authorizing the two 15-plane squadrons with HMX–1 being redesignated as one of the future operational squadrons.[36] This re-

designation of HMX–1 did not set well with Marine Corps planners as they had hoped to retain the experimental squadron as well as gain the two proposed operational units.

During the first half of 1950, visible progress had been made toward accelerating the helicopter program. Events during the following six months, however, not only saw the two-step plan implemented, but expanded to an extent far beyond all expectations.

Initial Interest in the Kaman Helicopter

While the assault transport helicopter program was being worked out, and prior to its expansion, another development had been taking place which in the future would have an effect upon the Marine Corps observation squadrons. Only one month after CNO had published his 1949 aviation plan designating the Bell HTL as the observation helicopter for the Marine Corps, the BuAer's daily publication, *BuAer Log*, announced that the Kaman Aircraft Corporation, Windsor Locks, Connecticut, desired to show its new Model K–190 observation helicopter. The demonstration would be held at National Airport, Washington, D. C., where BuAer and Division of Aviation personnel would be given the opportunity to view and, if desired, fly in the helicopter. Later it was to be demonstrated at MCAS, Quantico, for members of the air station and HMX–1.

Charles H. Kaman, president of the company, had begun experiments in 1945 to develop a new type of closely intermeshed twin two-bladed rotors which he developed on a test rig made from a chassis of a 1933 Pontiac automobile. A novel feature was that the control of the rotor blades was executed through an aerodynamic servo flap which twisted the rotor blade as it passed through the air. In flight, the close proximity of the twin intermeshing contra-rotating rotors made the helicopter appear as a single rotored helicopter. The K–190, powered by a 190-horsepower engine, was capable of transporting three passengers. The aircraft was certified for its first flight by the Civil Aeronautics Administration on 15 April 1949.[37]

Since the Kaman machine possessed some advanced, unique, and desirable features not incorporated in the helicopters at HMX–1, on 14 September 1949, the Commandant directed that MCS and HMX–1 submit recommendations as to the desirability of adding another experimental type of helicopter to those then under consideration. It was made clear by the Commandant that procurement of the K–190 would be in addition to any procurement scheduled for types already under test.[38]

The Kaman K–190 featured twin, intermeshed, two-bladed rotors. Only one model was purchased by the Marine Corps (Kaman Aerospace Corp. photo).

BuAer had evinced interest in further development of the K–190 and was purchasing one for future technical tests. The bureau indicated that funds might possibly be made available for purchase of a second machine to be assigned to the Marine Corps, provided the Marine Corps was interested.[39]

On 6 October, the Commandant submitted a request for one Kaman K–190 to the CNO. "It was felt," the Commandant said, "that the Kaman 190 helicopter would prove to be of value to the Marine Helicopter Development Program." Although "it is not desired if it is to interfere with our present program by replacing any other type helicopter now scheduled for procurement and assigned to the Marine Corps." [40]

BuAer was directed by the CNO to provide the Navy's one K–190 to HMX–1 upon completion of the bureau's evaluation. In this case it was rea-

soned that the second K–190 would not be needed.[41] The Chief of the Bureau of Aeronautics, Rear Admiral Alfred M. Pride, responded to the CNO directive on 23 December 1949. He indicated that the overall evaluation program of the Kaman servo system (a major component of the flight control system) justified the purchase of an additional helicopter and that the bureau would initiate action for the procurement of one additional K–190 for the Marine Corps with delivery, unfortunately, not possible for some months to come.[42]

The Beginning in Retrospect

As the decade of the 1940s ended, it was obvious that the Marine Corps helicopter program was beginning to forge ahead. For 3½ years the Marine Corps had struggled to change the character of its World War II style of amphibious operation by introducing a new element of assault troop mobility, one which would eliminate the massing of ships closely off the coast and practically, if not entirely, eliminate the engagement of the adversary at the most vulnerable point of contact—the water's edge. The helicopter, with its ability to land troops and supplies inland in good order from ships to any relatively flat and clear terrain, provided the method to achieve the new three-dimensional concept. The change to "vertical envelopment," as it was also termed, had not been easy, nor had it been as swift as the planners and operators desired.

By the end of 1947, the new Marine program appeared to have a sense of direction and momentum. Organizationally, the first helicopter squadron had been formed in December for the purpose of determining the operational feasibility of the vertical envelopment concept. Plans for execution of the concept in terms of aircraft were based upon the eventual acquisition of a very large helicopter—the Piasecki XH–16. In preparation of a concept, the special group designated as the Helicopter and Transport Seaplane Board had been formed to develop a tentative doctrine for the employment of helicopters in amphibious operations.

Unfortunately, two years later, the whole process had reached a developmental plateau which jeopardized the entire helicopter program. Lack of continued progress could be attributed to the inability to realize that the helicopter manufacturers were unable to comply with their own predictions for meeting the specifications and requirements which they had so willingly accepted. Additionally, an exceptionally long developmental period was required once the decision on the type of helicopter was made and the money budgeted to coincide with its development.

In spite of the delays, and in reviewing the complete spectrum of progress for all the services during 1947 to 1950, the Marine Corps had certainly not been relegated to a second rate competitor in the helicopter field, but, rather, was the leader. Each service desired the helicopter for performing missions peculiar to its own needs. The development of amphibious vertical assault techniques made the Marine Corps the leader in its own area of endeavor, as the vertical envelopment operation entailed practically all aspects of helicopter applications.

The main interest of the Navy, as it had been since 1943, was in obtaining a helicopter with sufficient hovering capability to perform antisubmarine warfare missions. Of secondary importance to the Navy was the need for the utility helicopter, which for the time was being filled by the Piasecki HUP–1.

The Army Field Forces had used small helicopters since 1947. Army helicopters were used for tasks similar to those performed by the "jeep." The Army too saw the advantages of larger lift helicopters for use in the movement of heavy artillery pieces, bridging material, and the tactical movement of combat troops.[43]

After the Armed Services Unification Act of 1947, Air Force interest in helicopters was limited to the pursuit of a helicopter suitable for search and rescue services. Like the Air Force, the Coast Guard was also interested in a search and rescue helicopter and would most likely adopt one of the Navy's designs to meet its requirement.

Throughout this period each service was required to settle for far less lift performance from helicopters than planners desired. The list of experimental helicopters on both the drawing boards and in the various stages of development was exceptionally long, with most of the experimental machines supposedly capable of satisfying the most demanding specification of the military planners. In the interlude, though, this meant that the existing helicopters had to fill roles for which they were not designed. They served as an "interim" machine for rescue, ASW, assault, liaison, observation, or for whatever tasks were necessary and could be performed.

Credit for energizing the helicopter program in early 1950 can be attributed to the crusading zeal of the Marine Corps Board and the sub-

The Piasecki HUP–1, shown practicing a rescue lift, was one of the last helicopters introduced in the 1940s and was the first of the multipurpose helicopters (Marine Corps Photo 529604).

sequent actions by the Division of Aviation. The five-year waiting period for the ideal assault helicopter could not be reduced. On the other hand, the Marine Corps realized that the vacuum had to be filled during that period by an additional program which meant that a less-than-optimum assault helicopter had to be adopted to keep the concept and program viable.

CHAPTER 4

KOREAN WAR EXPANSION

Plans for an Accelerated Helicopter Program

United States military assistance to the Government of South Korea against invading Communist North Korean forces forced a change in Marine Corps helicopter development plans. The planned formation in 1953 and 1954 of two assault transport helicopter squadrons as authorized by the CNO was now unrealistic in view of the war. Before that timetable could be revised to an earlier date, however, a suitable helicopter would have to be selected and be available in definite quantities within a reasonably short period of time.

The Division of Aviation took the initial action for accelerating the pace. On 21 July 1950, General Wallace addressed a memorandum to the CNO's Air Readiness Division requesting that "necessary steps be taken to immediately procure 40 [interim] transport helicopters, preferably of the Sikorsky HO4S–1 type." [1] Admiral Cassady, DCNO(Air), acted promptly on the request, forwarding it to BuAer. The admiral's directive instructed the Bureau of Aeronautics to procure 40 HO4S–1 for equipping the two 15-plane squadrons. "The HO4S–1," Admiral Cassady erroneously indicated, "is capable of transporting 10 troops (225 [pounds] per man) for a distance of 150 miles. . . . Procurement is predicated on delivery commencing in six months after notification to the company." [2] In addition to the Marine Corps' immediate needs, Cassady stressed the point that the time-table should be rearranged and accelerated for future procurement of the 20- to 26-man ultimate assault transport helicopter defined in operational requirement AO–17501.[3] "The program," he said, "should be aimed at production commencing in 18 to 24 months from its initiation." He urged further that immediate action be taken by BuAer to initiate the program, which meant the solicitation of design proposals from the manufacturers. The initial purchase of no less than 40 new helicopters was considered to be minimum by the CNO after the design had been selected.[4]

The HO4S–1 was the Navy's designation for the Sikorsky commercial Model S–55. The helicopter was built by Sikorsky without the aid of government funds and first flown in November 1949. It had been designed originally to compete against Piasecki's PD–22 (H–21) for use as the Air Force's Arctic Rescue helicopter. In May 1950, after the Air Force had chosen the H–21, the Navy purchased 10 S–55s for use in an evaluation project to determine its value as an interim ASW helicopter.

The transport version of the HO4S–1 was redesignated as the HRS–1. Its design features included one Pratt and Whitney R–1340–57 600-horsepower engine installed behind clam-shell doors in front of the helicopter. Brigadier General Noah C. New in recalling this helicopter, states: "Placing the engine in the nose of the HRS–1, where it was easily accessible, was ingenious. It not only had tremendous advantages in servicing the aircraft, but it completely eliminated the critical center of gravity problems previously encountered by placing the payload directly below the rotor hub." [5] A drive shaft transmitted engine power to the three-bladed main rotor through the center rear section of the cockpit. The cabin, which had foldable seats for 10 passengers, was situated directly beneath the main rotor. The HRS's empty weight was 4,462 pounds with its gross weight originally predicted and listed as 8,070 pounds. The maximum forward airspeed was 90 knots. Other features included all metal main and tail rotor blades, instruments suitable for night VFR flight, and an external cargo sling and hook situated underneath the fuselage. The aircraft stood 14 feet high, had a rotor blade diameter of 53 feet, and measured approximately 42 feet long with its blades folded.[6] It was built upon similar, but enlarged, mechanical components of the HO3S–1. In appearance it was entirely different although it retained the typical Sikorsky single main rotor design.

The reason for the Marine Corps' choice of the

The HO5S–1 was used for observation in Korea (Marine Corps Photo A346328).

The Sikorsky HRS–1, also known as the HO4S–1, at Quantico, Va. (Marine Corps Photo 530002).

Sikorsky S–55 was readily apparent. Since Sikorsky had not received the contract for the Arctic rescue model, the company could commence production immediately on a first-come, first-serve basis with delivery of the first aircraft in six months. Piasecki, on the other hand, also had the capability of building an assault version of its H–21, the PD–22C, although delivery could not be made until approximately September 1951, a difference of eight months. The PD–22C's specification appeared somewhat similar to the HRS–1 as the model was predicted to have the capability to carry 15 combat troops or 3,400 pounds over a short radius of 50 miles. A three-months additional wait beyond the September date would have provided Piasecki with sufficient time to construct its proposed PD–22D; a version similar to the PD–22C except for the incorporation of a much larger engine. According to Piasecki, it would have been able to carry a load of 20 combat troops, or the equivalent weight in cargo, over an operating radius of 70 miles.[7] Time was of the essence to the Marine Corps, however, and the most readily available model was chosen, the HRS–1.

Meanwhile, the Marine Corps had activated the 1st Provisional Marine Brigade at Camp Pendleton, California shortly after the outbreak of the Korean War. The brigade was formed under the command of Brigadier General Edward A. Craig, a World War II veteran of Bougainville, Guam, and Iwo Jima. The new organization consisted of the 5th Marines and Marine Aircraft Group 33 (MAG–33). Commanding the MAG was Brigadier General Thomas J. Cushman who had recently been Commanding General, Aircraft, Fleet Marine Force, Pacific. General Cushman's MAG was composed of three Marine fighter squadrons and VMO–6.

The observation squadron, VMO–6, had been operating with eight OY–2 fixed-wing aircraft at Camp Pendleton, California, but was expanded in early July for deployment as a composite squadron by the addition of four HO3S–1s. Along with the four helicopters came seven officers and 30 enlisted men from HMX–1. Taking command of the newly reorganized squadron was Major Vincent J. Gottschalk. With the addition of the helicopters, VMO–6 became the first squadron of its kind. The squadron sailed from San Diego, on 14 July on board the USS *Badoeng Strait* (CVE–116) bound for Korea.

Within a month of its departure from the West Coast, the 1st Provisional Brigade plunged into the

The HRS–1 with its front-mounted engine was a breakthrough in helicopter design. These aircraft from HMR–161 land 4.5-inch rocket launchers at Panjong-ni, Korea, in 1952 (Marine Corps Photo A163934).

desperate battles of the Pusan Perimeter, reinforcing U. S. Army and South Korean United Nations troops. The brigade, maneuvering rapidly, repeatedly counterattacked the North Korean penetrations of the perimeter. In this series of improvised mobile operations, the helicopters of VMO–6 more than proved their worth. As General Craig put it:

> Marine Helicopters have proven invaluable . . . They have been used for every conceivable type of mission. The Brigade utilized helicopters for liaison, reconnaissance, evacuation of wounded, rescue of Marine flyers downed in enemy territory, observation, messenger service, guard mail at sea, posting and supplying of outguards on dominating terrain features and the re-supplying of small units by air.[8]

Colonel Gottschalk recalled another significant use of helicopters by the brigade. He declared:

> . . . perhaps the most important use of the helicopter in the early months of the Korean War concerned command and control. The flexibility provided the Brigade Commander to control his forces, change direction of movement, give personal instructions to subordinate commanders, and observe the resultant battlefield movement in a dynamic fast moving situation provided a new dimension to tactical control of the battlefield in a difficult terrain setting.[9]

The usefulness of the helicopters of VMO–6 led General Craig to call for more. He recommended that "a transport type helicopter squadron, equipped with Sikorsky 55 type aircraft" be sent to Korea or at least that "eight liaison and two transport type helicopters be added to the observation squadron for employment by Marine Divisions." Anticipating on a limited scale later airmobile tactics, he pointed out:

> . . . The mountainous terrain of Korea presents a difficult problem for security of flanks and rear and of bivouac areas. The troop carrier type of helicopter would be ideal for use . . . to post patrols on high, dominating terrain which it would take hours to climb and which quickly exhausts the troops. . . . It is believed their use would materially contribute to the effectiveness and security of our operations and insure the earlier defeat of the enemy. . . .[10]

Lieutenant General Lemuel C. Shepherd, Jr. Commanding General, FMFPac, after an inspection trip to the war zone during which he was briefed on and viewed the operations of the brigade and of VMO–6, echoed General Craig's praise of helicopters and repeated his call for more of them:

> There are no superlatives adequate to describe the general reaction to the helicopter. Almost any individual questioned could offer some personal story to emphasize the valuable part played by the five HO3S planes available.* Reconnaissance, liaison, visual flank security, movement of security patrols from one key locality to the next, posting and supply of security detachments and many more. There is no doubt that the enthusiasm voiced by the brigade is entirely warranted. Moreover the usefulness of the helicopter is not by any means confined to a situation such as encountered in Korea. No effort should be spared to get helicopters—larger than the HO3S–1s if possible —but helicopters in any form, to the theater at once —and on a priority higher than any other weapon.[11]

In view of General Shepherd's statement pertaining to the helicopter in Korea, Brigadier General Clayton C. Jerome, who relieved Major General Wallace as the Director of Aviation on 1 September 1950, sent a memorandum to Admiral Cassady in which he included General Shepherd's statement. General Jerome said "this emphasizes the [remark] I made the other day in connection with the requirements for helicopters, more helicopters, and more helicopters in the Korea Area." [12] Major General Lamson-Scribner recalled the period:

> Just prior to the receipt of General Shepherd's letter, General Jerome and I attended a conference [at] which Admiral Cassady, was chairman of the Navy Aircraft Procurement Program for Fiscal 51. The program was for only a relatively few helicopters. We insisted that we needed more than programed for purchase. Admiral Mel Pride, Chief of BuAir, remarked in essence 'If you know as little about helicopters as we do you would not get into one.' Admiral Cassady said, 'Mel, the Marines want them. Make some changes in the program to provide more helicopters for the Marines.' [13]

General Jerome's memo was only the latest of many attempts to convince the Department of the Navy to increase the Marine Corps' inventory of aircraft for the Korean buildup. On 19 July, General Cates submitted a request to the Secretary of the Navy for an additional four Marine fighter squadrons in an effort to increase the total to 12. Then, a month later, on 23 August 1950, General Cates made a further request to the CNO on behalf of the helicopter program. The Commandant explained the value of the helicopter to the Marine Corps in carrying out amphibious and land warfare. He quoted an excerpt from a letter written by General Craig which indicated the "incalculable value of the helicopter as an implement of present and future armed conflict" and further: [14]

> VMO–6 was flown to Pusan from Japan. These aircraft have been invaluable in reconnaissance and the helicopters are a Godsend in this type of terrain, not only for reconnaissance but for supporting of

* VMO–6 had received an additional HO3S after it had arrived in Korea.

Brigadier General Edward A. Craig, Commanding General, 1st Provisional Marine Brigade, in Korea (Marine Corps Photo A-1309).

> combat patrols in mountainous terrain; for supply of food, water, ammunition; but also for the evacuation of casualties. . . . By separate dispatch to you . . . a request has been made to bring out elements of the Helicopter Transport Squadron. It is believed that this innovation will meet with outstanding results in combat in this mountainous terrain for the landing of patrols on top of mountain ranges. . . . The helicopters presently available have been invaluable beyond expression . . . [However] I feel they will not be able to sustain all the demands.[15]

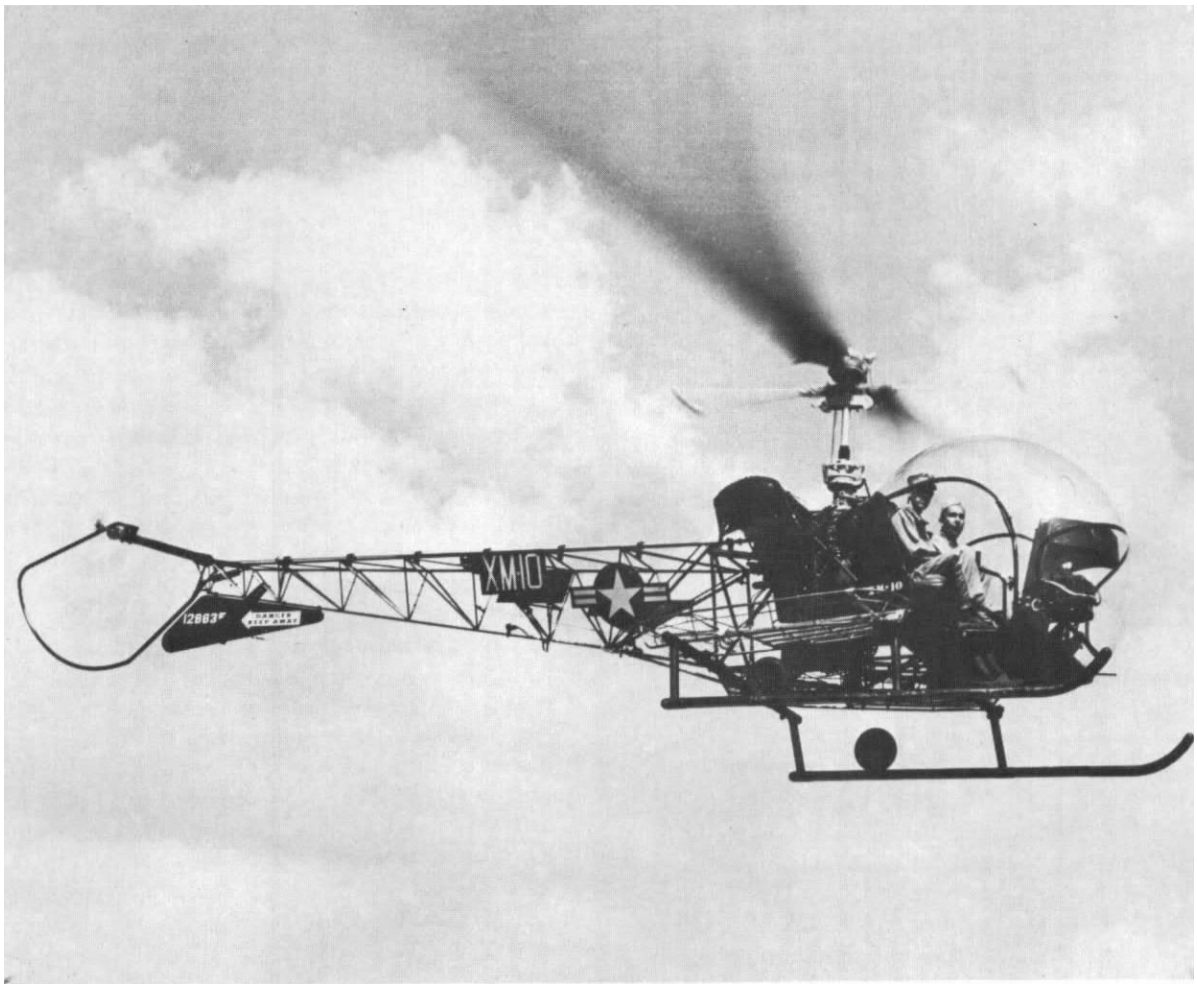
The Commandant also reiterated that BuAer, by production contract number 51–075, dated 17 August, had obligated the Navy to purchase 40 HRS helicopters for the Marine Corps and that Sikorsky anticipated delivering the first production aircraft sometime during February 1951. "In view of the extremely urgent need for helicopters," General Cates urged, "every effort should be made by BuAer and the Sikorsky Division to deliver the HRS (interim assault) helicopter as soon as possible." Moreover, the Commandant said ". . . [helicopters] are of such urgent nature that it is requested that BuAer be directed to authorize the Sikorsky Aircraft Division to increase deliveries to the maximum." [16]

Vice Admiral Cassady acted on General Cates' letter by requesting BuAer to contact all manufacturers who held, or whom BuAer contemplated holding, helicopter contracts to ascertain the kind of delivery rate which could be obtained by: "Increasing present contracts numberwise by 50 per cent . . . and by 100 per cent." [17]

Emphasis was also placed upon procuring observation helicopters as well as transport helicopters. The first contract of this sort provided for 12 Sikorsky HO5S–1s; four for each of the two VMO squadrons and four as replacements for the HO3S–1s in HMX–1. Delivery was expected to be at a rate of not less than three per month beginning in March 1951.[18] During July the number was raised from 12 to 22 aircraft [19] and shortly thereafter was again enlarged to 42.[20] This demand for observation helicopters was based on planning which called for replacing all OY fixed-wing aircraft in VMO squadrons with the helicopter. In addition, the number of aircraft per squadron was raised again to 12 from the original number of eight due to the activation of two force artillery battalions—which increased the requirement for observation missions.[21]

So far, the action taken by HQMC to procure more aircraft did not solve the immediate problem of providing additional helicopters to the 1st Provisional Brigade. Something had to be done to fill the gap until such time as the HRSs and the HO5Ss became available. Although the HO3S–1s were performing a valuable service and were practically indispensible to the brigade, the fact remained that they were not a suitable military helicopter due to their deficiencies in payload, range, flight instrumentation, and communication equipment. As a temporary measure to solve the problem, the Division of Aviation, as recommended in a letter from the Commanding Officer of HMX–1, initiated a plan which proposed the assignment of 10 Navy Bell-manufactured HTL–4s to the Marine Corps. The CNO subsequently approved the plan with the first three to be made available in October 1950 and the last one before the end of December. The Navy had only recently purchased 16 of the new models for training aircraft, but due to the urgency created by the Korean situation it was tentatively willing to release 10 of the 16. The HTLs were to be used in VMO–6 until production deliveries of the Sikorsky HO5Ss began.[22]

The HTL–4 was similar to the previous Bell models except for a few added refinements. Two features affecting its appearance were the removal of the tail boom covering aft of the cabin, which



The HTL–4 saw action as a medevac and observation aircraft in Korea (Marine Corps Photo 529982).

made the helicopter 156 pounds lighter, and the substitution of a skid type landing gear in lieu of its wheels. The cabin could accommodate two passengers besides the pilot, whereas all previous HTL models could carry only one passenger. The aircraft came equipped with provisions for carrying two external litters, each mounted parallel with the cabin across the top of the skid. The empty weight was 1,546 pounds with a maximum take-off weight of 2,350 pounds. Sea level air speed was restricted to 80 knots, almost identical to that of the HTL–3s.[23]

Although the Marine Corps was fortunate in its ability to procure the HTL for use by VMO–6, it was only beginning to view progress in obtaining the most sought-after of all helicopters—the ultimate assault transport.

A Bell HTL-5 demonstrates wire laying at Quantico (Marine Corps Photo KVI-4173).

Awarding of the First Assault Transport Helicopter Contract

Late in 1950, in response to BuAer's request, the helicopter manufacturers competing for the assault transport helicopter presented their proposals. Thereafter, in March 1951, the bureau selected two aircraft companies to build the helicopter, McDonnell and Sikorsky.

McDonnell Aircraft received a contract for two experimental models of an extremely advanced design. It incorporated the conventional single main rotor configuration; however, the power was to be provided by jet burners located in each rotor blade tip. Also unique in the McDonnell design, and a feature which made it a compound helicopter, was the installation of twin gas turbine propeller engines mounted externally in wings.[24] The compound helicopter was designated as the XHRH–1 (H-helicopter, R-transport, H-heavy) and was estimated to carry a useful load of 13,000 pounds at a cruising speed of 150 to 200 knots. The empty weight was estimated at a little over 26,000 pounds.[25] The flight technique for the HRH envisioned the machine taking off as a conventional helicopter, then as its airspeed increased it would convert to fixed-wing flight; with the reverse procedure for executing the landing phase.

Sikorsky Aircraft Company submitted two different designs. One, a basic helicopter referred to as XHRS–A, and a second design, a compound helicopter somewhat similar to McDonnell's although the propulsion for the main rotor was "conventional" wherein it did not propose the use of rotor blade tip burners.* The compound design was designated by Sikorsky as the XHRS–B.[26]

The proposed XHRS–A had twin engines located in wing-mounted external nacelles which transmitted their power to a single main transmission. The design called for a main rotor with five blades and a torque-compensating tail rotor of four blades; both rotors were of all-metal construction. Sikorsky claimed that the XHRS–A could carry 36 combat-equipped troops or an alternate amount of cargo in the 1,250-cubic-foot cabin. Loading and unloading of vehicles the size of jeeps could take place through clamshell doors which opened in the nose. This feature, however, restricted the helicopter's performance since it could not be flown with the doors open which delayed the loading/unloading operation, thus extending the time on the ground. Other features were: automatic blade folding, retractable landing gear, and a form of automatic pilot (automatic stabilization). The helicopter measured almost 88 feet in length and 20 feet high with the blades spread. Cruising speed was listed at 140 knots.[27]

The XHRS–B had essentially the same fuselage design with identical engines and transmission facilities. Increased performance over the XHRS–A was proposed by the addition of foldable outer wing panels extending beyond the engine nacelles and the incorporation of standard propellers on the front of the engines. These additional features of the HRS–B were proposed as a logical future development of the XHRS–A basic helicopter. Both the basic and compound designs could be powered by reciprocating or gas turbine engines, depending upon BuAer's desires. The first HRS–A aircraft was estimated to be available within 18 to 20 months from date of contract.[28]

The straightforward "pure" helicopter, the XHRS–A, was a much less complicated aircraft. It appeared to involve fewer problems of development, logistics, and maintenance in the field and was one which could be built in the shortest time. Therefore, BuAer awarded Sikorsky a contract for five experimental aircraft realizing that even with the simplest design there would be unforeseen problems and delays in the program.[29]

The awarding of dual contracts for the same operational requirement (AO–17501) appeared justified in view of the complexities involved in both McDonnell's and Sikorsky's proposals. The two-phase program was established in order to provide the Marine Corps with maximum protection in the event one of the designs failed to materialize. In this case, progress in the development of the assault transport helicopter was planned to provide two helicopters in logical sequence with the XHRH going beyond existing requirements. The procurement provided for the development of equipment to satisfy future requirements by taking advantage of technological progress beyond that incorporated in the HRS–A.[30]

Completion dates for Sikorsky's five experimental models were established; however, in McDonnell's case, the original contract did not specify such a date nor did the CNO assign a priority number. Later, on 9 April 1952, the CNO assigned a priority of 1C to the XHRH,[31] and subsequently BuAer published a proposed first flight date of December 1955.[32] The first HRS–A (later designated by Sikorsky as its S–56, and by the Navy as the XHR2S–1) had been given a priority

* This method of propulsion is also referred to as the "pressure jet principle." To produce thrust, compressed air is routed to each rotor blade tip where it is then mixed with fuel and ignited.

The HR2S–1 was the first large, cargo/assault helicopter used by the Marines. The first aircraft was received in September 1956 (Marine Corps Photo 529980).

of 1B and was predicted to make its initial flight during May 1953,[33] after which a period of experimentation would follow before a production contract would be granted.

Related Events to the Expanded Helicopter Program

Since the CNO had approved BuAer contracting for 40 HRS–1s as interim assault transport helicopters, the Marine Corps had to make plans for commissioning, locating, and manning the squadrons to which the helicopters would eventually be assigned. The first planning effort for the expanded program took place at a conference at HQMC in early September 1950. Representatives from the HQMC General Staff, (G–1, G–3, G–4), and Division of Aviation devised a comprehensive plan for implementing an enlarged helicopter program, initially as a basis for discussion with CNO, DCNO, and BuAer representatives.[34] After a slight modification and eventual approval by the Commandant, it was sent to the CNO on 19 October. The plan provided for the commissioning of two assault helicopter squadrons, referred to as HMR–1 and HMR–2, and the redesignation and conversion of Marine observation squadrons (VMO) to Marine helicopter observation squadrons (HMO) all during Fiscal Year 1951. Commissioning dates for the two HMR squadrons were set at 15 January and 1 April 1951 with the first unit to be formed on the West Coast and the second on the East Coast. A cadre of personnel was to remain at Quantico in order to accept, test, and ready the aircraft for delivery to the squadrons. It was also considered necessary that the units be commissioned on the coast where their operation and training was to be conducted. It was anticipated that the commissioning date established for each squadron would be approximately one month prior to the receipt of its first aircraft.[35]

To supply personnel for the additional squadrons, the Marine Corps improvised new training organizations. Until October 1950, the U. S. Navy had trained Marine helicopter pilots at Lakehurst, New Jersey, but the requirements of the Korean expansion exceeded the Navy's training capabilities. The Marine Corps, therefore, pressed its helicopter squadron, HMX–1, into service as a training command. The squadron, commanded from late 1950 to 1952 by Lieutenant Colonel Keith B. McCutcheon, trained the nucleus of pilots and mechanics for the first Marine Helicopter Transport Squadron (HMR) 161.* In turn, HMR–161 and the FMF squadrons that followed took over most of the development of tactics, for which they were better equipped than was HMX–1. Eventually, the Marine Corps planned to have all helicopter training conducted by the Naval Air Training Command at Pensacola so that the experimental and operational squadrons could concentrate on their primary missions.[36]

The new plan further anticipated that during Fiscal Year 1952, two additional squadrons, HMR–3, and HMR–4, would be formed on 1 July and 1 September 1951. All HMRs, 1 through 4, would be equipped initially with 15 HRSs. When the ultimate HR2S–1 assault helicopter became operational, HMR–5 and HMR–6 would be formed

* The designation HMR represents: H, helicopter, M, Marine, R, Transport.

with 15 aircraft each with commissioning anticipated sometime during the Spring of 1953. Eventually as the HR2Ss became more plentiful, they would phase out all the HRSs. According to the plan, therefore, by 1954 the Marine Corps expected to have an inventory of 148 helicopters: 90 HR2S–1s, 40 HO5S–1s, and a mixture of 18 experimental and operational helicopters in HMX–1.[37]

Marine Corps Air Station, El Toro, near Santa Ana, California, was selected as the location for the first HMR with MCAS Cherry Point, North Carolina, as the location for forming HMR–2. The pattern of alternating the commissioning site between the two coastal air stations was to be continued as each new unit was formed.

This completed the plans for expansion except for a third VMO squadron. Since VMO–1 and VMO–6 were already functioning squadrons, the formation of HMO–2 was to be delayed until January 1952. The redesignation of all the VMOs to HMOs was to become effective upon receipt of the HO5S–1s by the squadrons.[38] In respect to HMX–1's redesignation to an operational squadron, nothing further was mentioned in the plan.

In responding to the helicopter plan, the CNO approved the proposal for Fiscal Year 1951 in which the first two squadrons were to be formed. Approval of the program for Fiscal Years 1952 through 1954 was withheld pending further designation of forces for that period. Tentative plans, however, for Fiscal Year 1952 were indicated in the CNO's reply and fortunately coincided with those which the Commandant had requested for that period.[39]

By way of informing the Director of Plans and Policy as to the number designation and title of the helicopter squadrons, General Jerome stated that the first squadron to be commissioned on the West Coast would be designated "Marine Assault Helicopter Squadron 161," short designation "HMR–161" and the second squadron commissioned on the East Coast would be HMR–261. He explained that the "numerals were selected in an extension of the current numbering system of Marine aviation units. The highest digit previously used for Marine Aircraft Groups designation being 5 (MAG–15, 25, etc.), it is logical to use 6 as the group designator of the future HMR Groups." General Jerome concluded by explaining that "the first HMR organized in the First Marine Aircraft Wing becomes 161, and the first HMR in the Second Marine Aircraft Wing becomes 261." [40]

Coincidentally, however, as the Aviation Section of the Educational Center at the Marine Corps Schools was reviewing a related study on Marine aviation, it noticed that when reference was made to helicopter squadrons they were continually referred to as "Assault Helicopter Squadrons." It was pointed out in its comments on the study that the designation should be changed to "Helicopter Transport Squadron" and omit the word "assault." It reasoned that while the helicopter did in fact have the initial and primary mission of assault, it additionally had an equal "direct support" capability and responsibility in connection with missions involving observation, general utility, supply, medical evacuation, and many more tasks once the initial assault phase of the landing had been completed. Therefore, they commented the term "assault" would tend to limit its employment to the ship-to-shore phase and deny its use for the very important other day-to-day post-assault operations.[41]

The point was taken under consideration by the Division of Aviation and on 22 November 1950, the Plans and Policy Division was re-informed that henceforth the new HMR squadron designation would be "Marine Helicopter Squadron." [42] It was short-lived, however, as in early 1951 the Division of Aviation, referring to a CNO directive, changed the designation again to "Marine Transport Helicopter Squadron." [43]

The Tactics and Techniques Board Reports of 1951

If the Marine Corps was to employ effectively its anticipated six squadrons of helicopters, plans for their employment had to be made. The first step was contained in *Marine Corps Equipment Policy, 1950*, which proposed a concept of future amphibious operations based primarily on the employment of the assault helicopter. Salient aspects of the concept were:

1. Emphasis on tactical surprise, featuring a vertical envelopment by helicopter in ultimate conjunction with dispersed assaults capable of rapidly penetrating selected points in the beach defenses.
2. Commencement of the assault proper with the launching of assault troops in helicopters and amphibian vehicles from ships underway in cruising or other dispersed formations.
3. Landing of helicopter forces in landing zones from which one or more objectives might be seized.
4. Landing of further troop components by amphibian vehicles (taking advantage of success achieved by the helicopter borne troops) for beach approach and assault at dispersed points.
5. Early logistic support following the pattern of the assault itself, using helicopters to deliver supplies

to deep positions, and amphibian vehicles and trailers to transport heavy material across the beach to using units or dispersed interior units.[44]

The *Equipment Policy* recommended that development of an aircraft carrier-type ship be initiated to transport the troop elements and helicopters of the landing force. It was further proposed that the construction of helicopter platforms on other type ships involved in the amphibious operation also be studied.[45]

In view of the concept proposed in the *Marine Corps Equipment Policy, 1950*, and in particular the amphibious shipping aspects, General Cates informed the Commandant, Marine Corps Schools, that "the Navy had no firm plans at that time for providing properly configured ships for the employment of assault transport helicopters in accordance with the current concept." Therefore, it was requested that the MCS, based upon the use of both the HRS and HR2S, make separate determinations on the following for each type helicopter: [46]

1. The recommended size and composition of the helicopter landed elements of the landing force assuming the landing force consists of one Marine Division.
2. The most desirable means of embarking and transporting the troop elements and helicopters that are to execute the ship-to-shore movement in helicopters.
3. The technique of executing the ship-to-shore movement of helicopter landed troops.
4. The Marine Corps operational requirement for appropriate shipping to permit the employment of assault transport helicopters in accordance with the above [items].[47]

General Cates concluded by saying: "Due to the importance attached to this program, it is requested that this project be assigned a high priority and that the information requested . . . be submitted to this headquarters as it becomes available." [48]

The Landing Force Tactics and Techniques Board, Marine Corps Landing Force Development Center, Marine Corps Schools was tasked to conduct the study on the points delineated by the Commandant. The first interim report was submitted as early as 16 December with the final report dated 5 January 1951. The study was entitled *Employment of Assault Transport Helicopters.** The document was the first of its kind and was used extensively in conjunction with the Division of Aviation's helicopter plan as a guide for the next five years.

The task assigned to the board was difficult as it required translating a group of general premises into material sufficiently concrete to serve as a basis for future specific guidance and computations. The board studied deeply all four areas mentioned in General Cates' letter of instruction. In determining the composition of the helicopter-landed force, the study group proposed employing one Marine division consisting of two regimental landing teams, an artillery group, and a division command group, totalling 10,000 officers and men. It was determined that this force would require 3,000 to 4,000 short tons of supplies and equipment. The most desirable means of embarking and transporting the troop elements and helicopters was that the helicopter-borne troops, equipment, supplies, and the helicopters should be transported together in aircraft carrier-type shipping.[49]

In relation to the technique of executing the ship-to-shore movement, the board recommended that control be exercised by the landing force commander who would have in his task organization a control unit capable of providing adequate control of mass flights of helicopters. A flight of 10 helicopters was considered desirable to facilitate flight control and the flights formed into waves of two or more flights to satisfy the tactical requirements. But in this area no satisfactory control organization nor guidance system existed suitable for controlling mass movements of helicopters.[50]

The solution to the problem of determining the appropriate type and number of ships required to execute the ship-to-shore movement required considerable study. Earlier in the report it had been established that the number of helicopters required to lift the main force was no less than 520 HRS-type helicopters each carrying 8- to 10-men or 208 HR2Ss carrying 20 to 25 troops each. The shipping requirements to accommodate the 8- to 10-man helicopter was established at 20 CVEs. In addition, all CVEs had to be converted to have the capability to operate at least 10 HRSs on the flight deck and store 10 on the hangar deck, plus spares. Facilities were also needed on each CVE for 500 to 600 combat troops plus approximately 200 personnel of the helicopter squadron. Turning to the larger 20- to 25-man type helicopter, the board determined that eight newly designed ships or converted CVs (fleet aircraft carriers) **

* As in so many cases where only copies of the original report are available, the names of participating members are omitted, and in some cases, the senior member's name itself does not appear. Regrettably, this is the case in this particular study.

** The length of the CV class carriers varied from 739 feet for the *Yorktown* class CV to 901 feet for the larger *Lexington* class. Both CV class ships had a top speed in excess of 30 knots.

would be required; each one having the capacity to operate 10 helicopters from its flight deck and store 10, plus spares, in its hangar deck. In this case, 1,200 to 1,500 billeting spaces would be needed for the assault troops plus the helicopter personnel. Cargo requirements were also listed as 150 to 200 short tons for the CVEs and 450 to 550 tons for each of the new or converted CVs.[51]

In replying to the questions posed by General Cates, the board found other related points which it felt should be noted. The first was derived from a comparison of the abilities and requirements for the two types of helicopters studied. There was no doubt in the minds of the board members that the larger helicopter was far superior in every way, more so in proportion than its difference in size would tend to indicate. The number of helicopters, helicopter personnel, ships, landing areas, and the complexity of the guidance system all pointed to the strong desirability of concentrating on the larger helicopter. Another point was that a time limit was suggested for making a determination upon which type of ship program to pursue. The additional remarks stated that if design and procurement of the 20- to 25-man helicopter (HR2S) was found to be less than two years, then the larger program should be undertaken. If, on the other hand, an adequate number of HR2Ss could not be procured, then the CVE conversion and the 8- to 10-man helicopter courses should be followed. Regardless of the adopted path of action, the board urged "that aggressive efforts had to be made immediately to obtain and convert a sufficient number of CVEs for use in conjunction with the first HRS squadrons for operational testing and experimentation of the entire helicopter-borne concept." [52]

The board vigorously urged that immediate action be taken on the concept so that the lessons learned and the techniques developed could be incorporated in the future production program for both the helicopter and its associated shipping. The board felt strongly that the "entire future of the helicopter-borne concept depended largely on operational testing with suitable ships and operational helicopters." It believed that "no further substantial progress could be made in the field of helicopter operations on board ship and in the technique of executing the ship-to-landing zone helicopter movement unless a ship procurement program was established." [53]

Two months after the completion of the lengthy and detailed January study, the Tactics and Techniques Board was requested to conduct another study on a closely related subject which was to deal with the more immediate problems of the Marine helicopter transport program. The requirements were "to provide a comprehensive concept for the employment of currently authorized HMR squadrons in amphibious operations." Secondly, the board was "to determine Marine Corps operational requirements for Naval amphibious shipping which could be made available to support the currently authorized helicopter strength." [54]

As stated earlier, by this date the Marine Corps was planning to equip four HMR squadrons with the interim HRS and two additional units with the HR2S. However, the authorized force structure included only the four HRS squadrons. The board apparently had advance information that the CNO tentatively planned to approve immediate formation of all six Marine squadrons. In fact the CNO's Aviation Plan 11-51, published subsequent to the Tactics and Techniques Board's report, authorized commissioning of the last two of the six helicopter squadrons sometime during February 1952 in lieu of the original 1954 date.[55] This meant that the HRS would be used to equip all six projected helicopter squadrons.

The Tactics and Techniques Board completed its second report of 28 February 1951. Dates for commissioning and the employment of all six squadrons were laid out along with a proposed initial mission assignment for each unit. The dates nearly coincided with those previously requested in the Commandant's October 1951 plan, except for the last two squadrons. A major variance existed in this latest plan wherein it envisioned all units as being commissioned on the East Coast to work with the troops of FMFLant for test and evaluation. For five of the six squadrons, the following commissioning schedule was published: *

HMR–261 1 April 1951
(5 April 1951, MCAS Cherry Point)
HMR–162 30 June 1951
(30 June 1951, MCAF Santa Ana)
HMR–262 1 September 1951
(1 September 1951, MCAS Cherry Point)
HMR–163 15 November 1951
(1 December 1951, MCAF Santa Ana)
HMR–263 1 February 1952
(16 June 1952, MCAS Cherry Point) [56]

The first Marine transport helicopter squadron, HMR–161, had already been commissioned on 15 January 1951 at MCAS El Toro in accordance with previous planning. Lieutenant Colonel George W.

* For comparative purposes, the actual location and dates of commissioning are shown in parentheses. The major difference from the Tactics and Techniques Board recommendations was in the commissioning site.

Herring, a Georgia-born Naval Academy graduate, was the squadron's commanding officer. He had previously been assigned at HMX as its executive officer. The board recommended that HMR–161 be equipped with the HRS as rapidly as aircraft deliveries would permit and that on approximately 1 July, the squadron be deployed to Korea "for combat service evaluation with troops." The idea, due to the urgent need for helicopters in the 1st Marine Division, was that HMR–161 would serve in a dual role by operationally testing and evaluating the HRS, and the concept for its use, while concurrently supporting the 1st Marine Division. Although the squadron's primary amphibious mission would not be performed by HMR–161, it would, nevertheless, be used in a secondary role of supporting tactical elements incident to normal land warfare.[57] Later, on 15 August, HMR–161 departed for Korea, only six weeks after the recommended date established by the study group.*

The date of 1 September 1952 was established by the Tactics and Techniques Board as the target date for assembling the five squadrons on the East or West Coast to evaluate collectively the helicopter employment concept. "It is possible," the board reported, "to accomplish partial evaluation of this concept only if all five properly trained squadrons and their supporting . . . [shipping] are available at the same time and the same place." Only partial evaluation of the concept could be accomplished as the board felt that even if all five of the authorized squadrons were to be concentrated, they still would be inadequate to effect the main effort of one division in an amphibious operation. To be more exact in this respect, the board determined that all six HRS squadrons would be capable of lifting only two lightly reinforced infantry battalions, or the equivalent, within one hour. A time/distance factor of greater than one hour was considered undesirable. After completion of the operational testing, all squadrons were to be assigned individually or collectively to FMFPac or FMFLant, whichever command had an operational commitment wherein the helicopter squadrons could perform their primary or secondary missions.[58]

The shipping aspect of the study was investigated thoroughly. The erection of helicopter platforms on various types of amphibious ships revealed that on conventional transports, APA (attack transport) and AKA (attack cargo) ships, space for only one helicopter could be provided without seriously limiting the ship's normal amphibious capability. This type of ship was dismissed from further study as it would require an excessive number of vessels to operate a significant number of helicopters. The LSD (landing ship dock) was found to have the capability to transport up to 60 helicopters but it too could only launch one aircraft at a time without extensive modification resulting in the loss of its original function. The LST (Landing Ship Tank) had the capability to operate five helicopters from a modified deck or transport up to 30 and then only operate two simultaneously. However, since the LST was slow, extremely vulnerable, and was considered to be of reduced application in future operations, it also was not considered further by the board. Seaplane tenders, the board pointed out, could operate only one helicopter at a time while an oiler could handle three to five, but again it was doubtful that these ship types could be diverted from their primary mission. Therefore it was concluded that a modified CVE carrier or a helicopter transport vessel specifically designed for helicopter and troop transport was the best solution. The CVE requirement to support the approved program was determined to be a total of four ships in service by 1 September 1952, with the first ship needed by 1 November 1951.[59]

The type of CVE recommended for conversion to a helicopter carrier had been changed from the previously desired *Commencement Bay* class to that of the *Casablanca* class. The Tactics and Techniques Board's report of 5 January stated:

> . . . it had been discovered that the *Commencement Bay* (CVE–105) class aircraft carrier was being adapted to ASW missions and did not appear to be available for modification. Other class CVEs were in reserve, and as far as the board could determine, there was no immediate requirement for their use. Of these, the *Casablanca* class (CVE–55) appeared to be the best choice because of its greater speed, in addition to being available in larger numbers. In this light, the board's recommendation was for the Commandant to request the modification of the four carriers of the *Casablanca* class (CVE–55) or its equivalent.[60]

* Lynn J. Montross' *Cavalry of the Sky* is suggested as offering the best source of abundant detail covering the Korean operational history for both HMR–161 and VMO–6. Mr. Montross, a well-established writer and historian, was employed at HQMC for approximately 10 years, during which time he served as the Head of the Korean Histories Unit.

Activation of the 3d Marine Aircraft Wing

While the Tactics and Techniques Board was involved in laying out the future helicopter program, other planning had been underway for the mobilization of Marine forces to meet the demands of the Korean situation. Included in the overall buildup was the activation of the 3d Marine Aircraft Wing and the 3d Marine Division. The reduction of forces put into effect after World War II had left the Marine Corps with only two active Marine aircraft wings and divisions. The 1st Marine Aircraft Wing was located on the West Coast at MCAS, El Toro, California, and the 2d Wing was stationed at MCAS, Cherry Point, North Carolina, on the East Coast. For reasons of economy and availability of air base facilities and airfield complexes, the plan for the 3d Wing placed it also on the East Coast at a former naval air station at Miami, Florida. Planning called for the formation and commissioning of three additional helicopter squadrons in the 3d Wing at the Miami base.[61] Logic, however, dictated that helicopter squadrons be within reasonable flying distance of the ground FMF units which they were obliged to support. In view of the fact that the 3d Marine Division was forming at Camp Pendleton, California, the plan was changed to have the seventh through the ninth helicopter squadrons commissioned at MCAF, Santa Ana, California, in lieu of the Miami base.[62]

All previous planning had allowed the helicopter units to be formed and placed within the internal organization of the aircraft wing as special units without an intermediate command. On 15 June 1951, the Marine aircraft wing organization was reorganized to make it a balanced task organization and, for the first time, combined the helicopter units under a parent helicopter aircraft group headquarters. In addition to the headquarters squadron and the three helicopter units in the group organization, there were two supporting units: an air base squadron and an aircraft maintenance squadron. The Marine Helicopter Transport Group (MAG(HR)) structure was almost identical to the organization of fixed-wing groups. The new Marine aircraft wing, with its fixed wing and helicopter assets, was thus organized to support independently a Marine division.[63]

On 23 October 1951, the Commandant released Marine Aviation Plan 1–52 for Fiscal Year 1952. A cross-section of affected commanding generals and commanding officers of forces, units, and stations within the Continental United States were ordered to HQMC during November 1951 and briefed in detail on its aspects. As a result of monetary shortages, however, it was not until the next calendar year that implementation finally began.[64] As a consequence, changes were made which varied from the plan outlined in the November meeting and, as a result, a revision was published on 11 January 1952. Contained within its provisions were proposed commissioning dates and locations for the three helicopter aircraft groups. MAG(HR)–16 was scheduled for commissioning during February with MAG(HR)–26 and –36 dates set for the following June. Also, the helicopter groups (headquarters squadrons) had a proposed allowance of four aircraft; two fixed-wing transports and two utility helicopters. The four group aircraft were in addition to the number and types in custody of the subordinate three tactical squadrons. In this connection, aviation plans for both 1951 and 1952 indicated that each tactical squadron was also to have two utility helicopters besides the 15 transport helicopters.[65] On 31 January 1952 the Commandant announced that the revision to Aviation Plan 1–5 had been approved by the CNO and that it represented the official guideline for the expansion of Marine aviation.[66]

During the past year, 1951, the transport squadrons had been commissioned very near the date recommended by the Tactics and Techniques Board. Under the revised Aviation Plan 1–52, the three new helicopter squadrons of MAG (HR)–36 and HMR–263 of MAG(HR)–26 were designated for commissioning during 1952 as follows: *

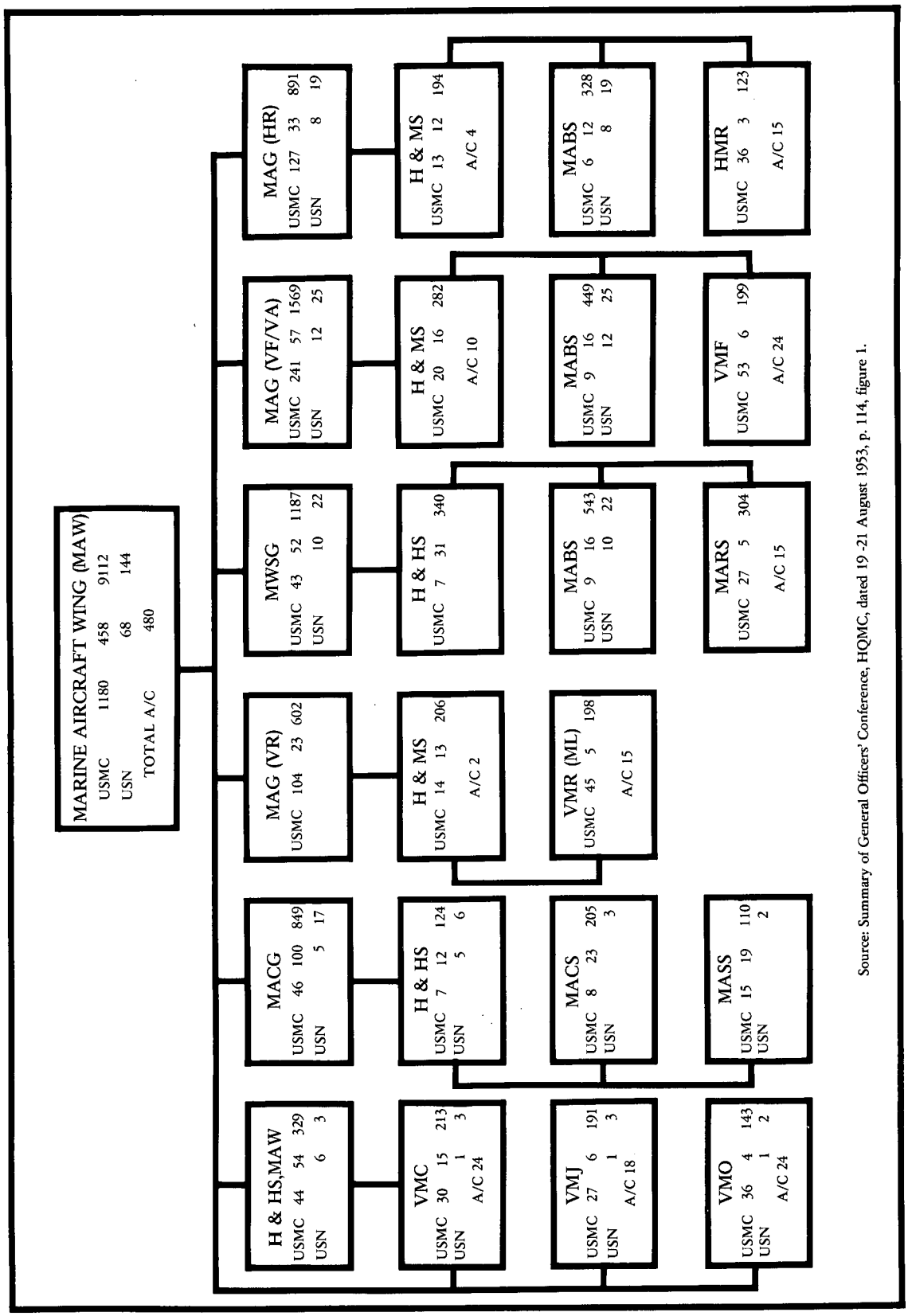
HMR–361	February 1952	(25 February 1952)
HMR–362	April 1952	(30 April 1952)
HMR–363	May 1952	(2 June 1952)
HMR–263	June 1952	(16 June 1952)

The planned and actual dates for commissioning of each group headquarters squadron along with its air base and maintenance squadrons took place on: [97]

MAG(HR)–16	1 March 1952
MAG(HR)–36	2 June 1952
MAG(HR)–26	16 June 1952

Thus on 30 June 1952, Marine aviation was comprised of three aircraft wings, each composed of three fixed-wing aircraft groups and a helicopter group of three tactical squadrons. In addition, each wing had a fixed-wing transport group of two squadrons, plus a photographic, a com-

* For comparative purposes the actual dates of commissioning are indicated in parentheses.



Source: Summary of General Officers' Conference, HQMC, dated 19 -21 August 1953, p. 114, figure 1.

The K–225 was the first turbine-powered helicopter. Built by Kaman, it was powered by a Boeing 502–2 free turbine (Kaman Aerospace Corp. Photo 115–1).

posite, and an observation squadron.* [68] (Figure I).

The formation of the last helicopter group and squadron, MAG(HR)–26 and HMR–263, meant the planned growth of the helicopter program had been achieved. However, reaching the goal of nine tactical units did not mean that Marine Corps planners would relent in their effort to increase the maximum assault lift capability of the three helicopter groups. If an additional capability was desired in the near future, it would have to be achieved by different means than by increasing the number of helicopter transport squadrons.

1952 Aircraft Plans for the Future

While plans were in effect for the forthcoming HR2S to replace the HRS interim assault transport helicopter, procurement of utility (HU) and observation (HO) aircraft was not quite as definite. Nevertheless, plans were being made to obtain both types. The evaluation of the Kaman K–225 observation helicopter—the model purchased by BuAer in lieu of the earlier K–190—found the design to be superior in its flight characteristics, particularly in stability, control, and ease of flying. Since Sikorsky's HO5S–1 was not meeting its expected performance ratings due to the low horsepower output of its engine, BuAer awarded a production contract during 1952 to Kaman Aircraft Company for 46 K–225s as an eventual replacement for the HO5S–1. The Kaman machine would be designated as the HOK–1 (H-helicopter, O-observation, K-Kaman) with the first of them expected to be delivered to the Marine Corps during 1954.[69] The HOK–1 had two side-by-side main rotor shafts with a two-bladed rotor attached to each shaft. The blades intermeshed and turned in opposite directions. Four people could be carried: pilot, copilot, and

* Even though these units were commissioned, they still experienced an extreme shortage of personnel and equipment.

two passengers. The Pratt and Whitney R–1340–48 engine was installed behind the cockpit/cabin and produced 600 horsepower. The left side of the cockpit plexiglass bubble opened to allow loading of two litters one above the other, fore and aft in the cockpit; however, the copilot's seat and flight controls had to be removed. The actual weights, as the aircraft eventually evolved, amounted to 4,334 pounds empty with a maximum allowable of 5,995 pounds. Maximum sea level airspeed was restricted to 88 knots.[70]

The selection of a utility helicopter was extremely important as the Marine Corps desperately needed an all-around utility aircraft. It was not recognized at the time, but the choice would eventually have a definite influence upon the entire Marine helicopter program. The small HO3Ss and the HTLs were being used in a utility role since there were no other helicopters available. The Marine Corps desired to assign two new and larger utility aircraft to each helicopter MAG headquarters squadron for carrying cargo and bulky aircraft replacement parts. Also, two utility helicopters were to be assigned to each Marine aircraft wing headquarters squadron, each major air station, and air facility.[71] Then, as a secondary mission, the utility aircraft could be used to transport combat troops and evacuate wounded personnel.[72]

On 5 December 1952, the CNO informed BuAer of the Marine Corps' utility helicopter requirement. It was explained that in order to meet the specification, it appeared that modification to an existing Navy program would be desirable in the interest of economy rather than initiate a new design. In this respect, the CNO was referring to a new Navy ASW model, one being developed by the Sikorsky Aircraft Company.[73]

The origin of the new Sikorsky design began in 1951 when the Navy was searching for an ASW helicopter capable of operating from battleships and cruisers. The Bell-manufactured XHSL–1 helicopter was chosen originally in lieu of a Sikorsky aircraft in 1950 to meet this requirement, but had been in the developmental stage for well over a year. Many problems arose during the XHSL–1's construction which resulted in an increase in weight and size to the point where it became completely unacceptable to the Navy. At this point Sikorsky submitted its design to BuAer as a solution to the Navy's waning ASW program. The helicopter was described as a HRS–4; a modified HRS with a larger engine and cabin in addition to a differently designed tail cone and landing gear. But as the design evolved, so many changes were made to the basic HRS that it could not be considered a modification, but rather a completely different helicopter.

Basically, the Navy's requirement for an ASW helicopter specified that it be capable of carrying a pilot, copilot, sonar equipment and ordnance, and two crewmen. It was to have a three-hour flight duration and be compatible for storage in, and operating from, the same class of ships (battleships and cruisers) as the XHSL.*

By February 1952, the CNO had become convinced that the Bell XHSL–1 would not meet the ASW specifications nor be ready for delivery within an acceptable length of time. On the 27th, he directed BuAer "to proceed without delay with a program for the development of the Sikorsky HRS aircraft with the large engine—ASW configured." The first flight of Sikorsky's HRS–4 was predicted to occur in November 1953 with the delivery of the first production aircraft scheduled for January 1955.[74]

The HRS–4 had to be modified to meet the utility requirements of the Marine Corps which consisted largely of rearranging the interior of the cabin. The necessary changes involved removal of the ASW equipment, installation of a cargo deck with tie-down rings, provisions for carrying 8 litters or 12 combat equipped troops, a 400-pound rescue hoist, and a 5,000-pound external cargo hook.[75] The basic weight of the utility version was 8,598 pounds with a maximum take-off weight eventually approved at 13,300 pounds. This allowed for a payload of approximately 4,000 pounds without fuel. The forward air speed was restricted to 123 knots. The 65-foot diameter 4-bladed main rotor was driven by a

The HOK–1 was the production version of the K–225. It was also known as an OH–43D (Marine Corps Photo A35013).

* According to Navy plans, a much larger twin-engine helicopter was to perform the ASW mission from aircraft carriers.

A HOK–1 from VMO–2 during Operation SEAHAWK at Pohang, Korea, 1960. The HOK–1 was used for reconnaissance (Marine Corps Photo A182678).

1,525-horsepower Wright engine where the smaller HRS had a 600-horsepower engine propelling only 3 main rotor blades. The Navy's official designation for the HRS–4 later became the HSS–1 and the Marine version the HUS–1 (H-helicopter, U-utility, S-Sikorsky). Sikorsky designation was the S–58.[76]

When the CNO instructed BuAer to develop the HUS–1 for the Marine Corps in December 1952, he also defined its procurement status. Fortunately in this respect, the Fiscal Year 1954 aircraft procurement list was revised by the CNO to allow for the modification of 33 HSS–1s to HUS–1s. This meant only that money would be available for beginning its fabrication. Delivery of the first production HUS–1 to the Marine Corps was initially estimated as occurring sometime during 1955.[77]

Initial planning documents defining aircraft requirements for the fiscal year 1954 and 1955 also were submitted to the CNO during 1952. Both documents indicated a Marine Corps requirement for nine HR squadrons, each with 15 transport helicopters for a total tactical inventory of 135 aircraft. The VMOs were to stay at 12 fixed-wing and 12 observation helicopters, and HMX–1 was to operate 12 transports and six observation aircraft. The total Marine helicopter requirements planned through 30 June 1955 were: 147 transport (HR), 36 utility (HU), and 48 observation helicopters (HO).[78] In the fall of 1953, the helicopter procurement program was slightly modified by the CNO in order to stay within the Marine Corps total operating limit of 1,425 aircraft. HMX–1 was reduced to an inventory of nine HR and three HO aircraft and each group headquarters

The HUS–1 by Sikorsky was the first major Marine utility helicopter. Its forerunner was the HRS–1 (background) (Marine Corps Photo 529979).

squadron was denied its two utility helicopters. Subject to budgetary, production, and engineering restrictions, 144 HRs, 39 HOs, and 36 HUs were approved for the Marine Corps by the end of June 1955.[79]

In the interim between submission and approval of plans for these requirements, the Division of Aviation was reviewing its tactical assignment of the forthcoming HUSs. On 18 September 1953, Colonel Edward C. Dyer, who was now assigned as deputy assistant director of the Division of Aviation after graduating from the National War College, prepared a memorandum for the Commandant concerning the helicopter program. "The HUS–1," the memorandum read, "is being procured to meet utility helicopter requirements. Initially, however, it will be used as a transport helicopter. Upon replacement by the HR2S, the HUS will revert to utility billets." [80]

Internal documents of the Division of Aviation indicated that changing the role of the HUS from utility to troop transport had been under consideration since the early part of the year. A graphic presentation of the desired complement for nine helicopter squadrons was prepared on 7 April 1953 and depicted how the progression from all HRS squadrons to an all HR2S program was anticipated. Figure 2 also illustrates chronologically where the HUSs were intended to be used.[81]

Yet amidst all the planning for future years, the Marine Corps had by this time substantially increased its helicopter inventory. Although near the end of 1952 the operating squadrons were not up to their authorized strengths, the total number of helicopters, including those assigned to short activities (non-FMF), had reached 166. The types reflected in the total were 106 HRs, 39 HOs, 18 trainers (HT), and 3 tired HRPs. By the end of 1953, and with the Korean War over, the number of helicopters on hand had steadily increased to a total of 202 with models of the HRS accounting for 141 of the total.[82]

Peripheral Aspects of the Period

During this period, the helicopter program had grown at an unprecedented rate compared to the painfully slow pre-Korean War pace. In this same period, a few helicopter programs met with failure. These unsuccessful ventures cannot be ignored since many of them were viewed as being equally essential to the Marine Corps' amphibious mission as were those which eventually proved to be worthwhile.

One of the more notable projects was the re-

Squadrons	1954	1955	1956	1957	1958
HMR–1	HRS	HUS	HUS	HR2S	
HMR–2	HRS	HUS	HUS	HR2S	
HMR–3	HRS	HR2S			
HMR–4	HRS		HR2S		
HMR–5	HRS		HR2S		
HMR–6	HRS		HR2S		
HMR–7	HRS		HR2S		
HMR–8	HRS		HR2S		
HMR–9	HRS			HR2S	

Figure 2

quirement and subsequent development of a one-man helicopter. It was viewed as a machine for use within infantry units and one which could be piloted by an average combat Marine after minimal training. The potential of the light-weight device made it extremely attractive for performing missions of observation, liaison, rescue, and the most promising of all, maneuvering of small tactical units.

Although the experimental one-man helicopter project survived for many years, others were not so successful. The McDonnell XHRH–1 was one in particular. Its short life was attributed to an economy move which required the diversion of its funds to a similar and equally unsucecssful helicopter, the Navy's XHCH–1 (H-helicopter, C-cargo, H-heavy). The XHCH was designed to carry loads for very short distances as a flying crane with the capability of operating off aircraft carriers and being used for replenishment operations, lifting unflyable aircraft, and in general support of amphibious operations. Its payload was expected to be 15,000 pounds lifted over a distance of 20 miles, and in an "overload" condition, capable of carrying 25,000 pounds.[83] Its demise, like that of the XHRH–1, eventually came as a result of insufficient funds to carry out development of the power plants, rotor head, and rotor blades.

During the developmental period of the XHRH–1, General Cates had made repeated requests to CNO for the continuance of development funds as the helicopter appeared to offer the Marine Corps a greater assault lift capability than the HR2S. Nevertheless, the CNO had remained impervious to the Commandant's requests and pinned all hopes for success of a heavy helicopter on the XHCH.

Throughout the past years, Piasecki had continued the development of its XH–16, originally the Marine Corps' hope for a large assault transport helicopter. However, it too—although still under construction during this period—would soon join the list of unsuccessful ventures.

Disregarding the unfruitful endeavors, the fact must be recognized that the Marine Corps accepted the "successful" helicopters of less than desired performance and aptly applied them, while never giving up hope for obtaining those experiencing developmental difficulties. The problem which Marine planners had encountered, and would continue to face in future planning, was that the Marine Corps helicopter concept, for the most part, was based on the aircraft meeting the specifications listed in the operational requirements and not on the resultant flight article. A marked difference is revealed when comparing the original requirement against the finished product. Of course, the planners had no idea how a certain helicopter would vary from its proposed design. The difference can be explained somewhat by examining a CNO policy statement, wherein he recognized that modifications would exist between the original design and the production model:

> In all material developments, the Chief of Naval Operations considers timely availability and suitability of first importance. The performance factors given in [the] requirement are goals, except where specifically noted as minimums. During the course of preliminary design or development it may be found that in meeting these goals a large and complex article will result; whereas it may be possible to develop a much simpler and therefore, more readily available and suitable equipment short of the ultimate specified, but which nevertheless will constitute a considerable advance over presently available equipment. When this situation arises, the developing agency shall so inform the Chief of Naval Operations in order that consideration may be given to making an appropriate modification of the operational requirement.[84]

The next major step taken by the Marine Corps in developing its helicopter program would be derived from the products of a study group at Quantico called the Advanced Research Group. The material produced by the assemblance of 10 Marine colonels, most of whom were destined for the rank of brigadier general, would have a profound impact upon the helicopter program, and in general, the future course of the entire Marine Corps amphibious concept.

CHAPTER 5

SEEKING A NEW ORDER OF MOBILITY

A Concept for Future Amphibious Operations

On 17 July 1951, the Commandant proposed to the CNO a Marine Corps concept for future amphibious operations. Certain conceptual aspects had appeared in both *Equipment Policy 1950* and in the studies submitted by the 1951 Tactics and Techniques Board. The Commandant declared that the time had come to settle on a fairly definite concept for employing helicopters in amphibious operations. He recommended the initiation of a program to develop the detailed techniques for large-scale ship-to-shore movement, one which would provide the fleets with some measure of ability to exploit the growing helicopter capability. In this respect, General Cates remarked to the CNO that it would be "prudent, practical, and timely to provide within the fleets the capability to land by helicopter the assault elements of one Marine division in continuous echelons." In accepting the optimistic troop-carrying capacity of the HR2S–1, as predicted by Sikorsky, General Cates also mentioned that the helicopter industry would soon produce a 36-man helicopter and that 144 of these aircraft could land the desired number of troops in execution of the concept. "Studies and past experience," he continued, "indicate that the most desirable type of assault shipping for such a force will be ships which can accommodate the necessary embarked troops, the helicopters to land them, and the crews to operate and maintain the helicopters." General Cates concluded: "It is becoming increasingly urgent to commence a ship conversion or building program that will parallel the availability of . . . the 36-man helicopter." [1]

The Commandant's letter also defined the specifications for transport shipping, an essential element of his future doctrine. From the landing force viewpoint, the most effective tactical landing would consist of a helicopter-borne attack mounted from a transport ship capable of embarking approximately 1,500 assault troops and operating at least 18 of the 36-man transport helicopters from the same ship. A ship with a minimum flight deck capacity of 10 such helicopters was considered to be acceptable.[2]

In a letter to the Commandant on 13 August 1951, the Acting Chief of Naval Operations, Admiral Donald B. "Wu" Duncan, approved the Marine Corps' concept of landing one division by helicopter. He questioned, however, whether the state of development of transport helicopters justified settling, at that time, on a definite method for conducting such operations and beginning a ship conversion or building program. He feared acceptance of the Marine Corps' concept of transporting troops, equipment, stores, and helicopters all in the same ship would automatically require radical changes to existing types of ships or the construction of specially designed new types. Either course would involve a large expenditure of funds. The decision rendered by the Acting CNO was that further experimentation and investigation should be conducted into the matter. Laying aside the Commandant's shipping request, Admiral Duncan declared, "The CNO will determine whether it is feasible, within the limits of ships and funds available, to commence . . . the program during the current fiscal year [1952]." [3]

Initial Determination of the Marine Corps' Helicopter Aircraft Carrier Requirements

Long before July 1951, the Commandant had made Marine Corps shipping requirements known to the CNO. As early as February, General Cates had recommended that one helicopter aircraft carrier of new construction, or one converted from a CV or CVL, be included in the Navy's shipbuilding program for the next fiscal year, *i.e.*, 1952. The Commandant pointed out that development of amphibious ships of all types had lagged in recent years and the time had arrived when

constructive progress in this area was becoming necessary. In April 1951, the Director of Marine Aviation, General Jerome, told the Deputy Chief of Naval Operations for Air (Op–5B), that the Marine Corps needed a prototype amphibious troop/helicopter transport ship and that it was essential that such a ship be developed from the keel up. That part of the Marine Corps concept which required troops, equipment, helicopters, and reasonable maintenance and operational facilities be combined in one type of ship was also pointed out. Four days later, the Commandant submitted to the CNO a request for the use of a CV or a CVE in evaluating the employment of assault transport helicopters. Unfortunately, all requests appeared to have been made in vain as the Ships Requirements Board failed to provide funds for the construction of a new ship or the conversion of a CVE in the shipbuilding programs for Fiscal Years '52 and '53.[4]

On 12 October 1951, the CNO initiated action to settle the questions raised by the Commandant's concept of future amphibious operations. Although there had been general agreement that in an assault elements of one Marine division would be landed by helicopter, yet to be determined was the type of platform the assault would be launched from. To this end, the CNO directed the Commander in Chief, United States Atlantic Fleet "to evaluate the capabilities of transport helicopters and to develop doctrine, techniques and procedures for ship-to-shore movement of helicopter transported troops." [5]

Representing the Marine Corps in the conduct of this evaluation was General Graves B. Erskine, Commanding General, Fleet Marine Force, Atlantic, a much-decorated veteran of World War I and a pioneer in the development of amphibious warfare doctrine. In the early years of World War II he had been Chief of Staff, V Amphibious Corps and later commanded the 3d Marine Division on Iwo Jima.

To develop the assault helicopter concept in FMFLant, on 20 December 1951 General Erskine convened a board with Major General Field Harris, the Commanding General, Aircraft, FMFLant as the senior member. General Harris' board met on 2 January 1952 and decided that the best method for obtaining a solution to the problem was to hold a series of ship-to-shore exercises during the early part of the year. As a result, HELEX I and II took place between 20 January and 28 February. Participating in both exercises were the newly formed helicopter squadrons HMR–261 and –262. Operating from the deck of the USS *Siboney* (CVE–122), the two squadrons lifted troops of the 1st Battalion, 8th Marines into landing zones at Camp Lejeune. In addition, the squadrons airlifted their own personnel and equipment ashore after the tactical portion of the exercise had been completed.[6]

General Harris' board made two major determinations from the results of HELEX I and II. The first conclusion was that the CVE–105 class carrier could adequately handle aircraft, personnel, and logistically support a vertical envelopment from the sea. Secondly, the board evaluated the employment of a mix of two different types of ships, *i.e.*, a helicopter transport and a troop transport with a helicopter deck, and concluded that such combination of ships was tactically unsound. The factors militating against the use of separate ships were found in the limited troop-carrying capacity of the HRS and the additional time required for the aircraft to land, load with troops, and relaunch from the troop transport.[7]

On 5 March 1952, shortly after the termination of HELEX I and II, General Cates requested that General Erskine make additional recommendation on three related items which could be derived from the recent tests. Two of the subjects had not been addressed in prior reports but the third had been treated by the Tactics and Techniques Board in February 1951. The three areas to be considered were:

> 1. The suitability of the CVE class carrier and any modifications necessary to make it more suitable for assault helicopter operations.
> 2. The general characteristics required for a helicopter transport vessel for future construction.
> 3. Based upon 1. and 2. above, the shipping requirements to support helicopter operations involving the assault elements of one Marine division.[8]

General Harris' board responded to the Commandant's request on 29 March 1952. It determined that the CVE–55 class carrier, with a few modifications, appeared to be suitable for assault helicopter operations with the HRS. For operations with the HR2S, additional modifications would be necessary. In this connection it was recommended that a design study be conducted in order to determine the extent of the alterations needed to make the ship compatible for HR2S operations.

No determination was made on the second objective as the board believed that additional helicopter assault exercises should be held prior to settling on the general characteristics for such a ship. The estimated shipping requirements for transporting the assault elements of one Marine

division (12,000 to 14,000 troops and related helicopter personnel) were given as 20 CVE–55s if the HRS was the only type helicopter used. If the HR2S was to be employed in lieu of the HRS, then 13 CVEs would be necessary. However, as an immediate course of action, since there were not enough HRSs available to land the divisional assault elements, General Harris recommended that only four CVE–55s be modified for helicopter operations and suggested that only a minimum modification be accomplished. In any case each ship should be modified to accommodate at least 20 HRSs, 850 troops, and 75 tons of supplies.[9]

General Harris' report was forwarded through appropriate headquarters to the CNO. General Cates concurred with the recommendations and stated in his endorsement on 28 April that modification of four CVE–55 class aircraft carriers was considered satisfactory as an inaugural step in implementing the development of the helicopter assault capability. He mentioned that additional conversions would be necessary at an early date to fill the desired requirements. General Cates concluded by stating that the ship modification measures "are viewed as essential in maintaining the momentum of the helicopter program [and] to insure early availability of a Fleet Marine Force helicopter assault capability in connection with fleet amphibious operations." [10]

Following the Commandant's request, the CNO, on 8 September 1952, directed the Chief, Bureau of Ships, to undertake a study to determine the feasibility of modifying a CVE–55 class aircraft carrier. Two months later, the CNO was advised by BuShips that the feasibility study had been completed and the CVE–55 class appeared to be an excellent ship for such use and the suggested conversion to rotory-wing operation was recommended to permit service evaluation.[11]

Unfortunately, by the time BuShips had completed the study it was too late to have the modification included in the 1954 Fiscal Year budget. To ensure incorporation of the four Landing Platforms for Helicopters (LPHs) in the 1955 budget, the Commandant, on 26 November, repeated his request for the conversions of the CVE–55s. Soon thereafter, on 5 February 1953, General Cates revised his shipping requirements. He informed the CNO that the Marine Corps now had a specific need for a total of 16 LPHs instead of 12; four modified CVE–105s and 12 CVE–55s. These requirements were taken from a study completed earlier by the Tactics and Techniques Board at Quantico. The 16 helicopter aircraft carriers were the minimum number of ships which the Tactics and Techniques Board felt could accommodate the assault elements of one Marine division.

Therefore by early 1953 the CNO had not only been appraised in general terms of the Marine Corps' shipping requirements—that of paralleling helicopter production but also of the specific types and numbers needed to make the vertical assault concept an effective tool of amphibious warfare. In short, while certain preliminary steps had now been taken by the Commandant to obtain helicopter platforms from which to expand the helicopter concept, the Marine Corps, in actuality, had no ship in sight from which to operate and no ship scheduled for either construction or conversion.[12]

The Advanced Research Group

Among the functions for which the Marine Corps was responsible, according to the amended National Security Act of 1947, was the development of those phases of amphibious operations that pertain to the tactics, techniques, and equipment used by landing forces. This responsibility was of paramount concern to senior Marine officers at both Headquarters Marine Corps and the Marine Corps Schools, especially in those agencies involved with development, planning, and programming.

Although Marines were still fighting in Korea, there was an obvious requirement to determine the shape and posture of the post-Korean War Marine Corps. Equally obvious was the fact that helicopters were to play a major role in the composition of the postwar Corps and in the amphibious warfare techniques employed by the Marines.

When he assumed the Commandancy on 1 January 1952, General Lemuel C. Shepherd, Jr., who relieved General Cates, touched in his inaugural address on the successes achieved by the helicopter and the role it played in the Korean War when he said:

> Seven years have passed since the development of the helicopter as a troop carrier was begun, but in the fall of 1951, in the bleak Korean countryside, the worth of the ungainly looking craft was finally proved. Just as the amphibian tractor came to the fore as a troop carrier over the reefs of Pacific atolls during World War II, so the helicopter became the greatest single innovation during the Korean conflict as a tactical and humanitarian medium of transportation. . . .

> The fact that we have a suitable helicopter transport now in sight, . . . [leaves us] with a sense of confidence. I believe that the Marine Corps, with our skilled close air support and our own helicopters to pave the way for the amphibious landing, is capable of following up an atomic attack with the most powerful assault punch possessed by any nation in the world today.[13]

General Shepherd had good reason to sound confident in his statement. By late 1953 the helicopter program had expanded to the point where the Marine Corps was capable of undertaking a more positive step in developing further its helicopter concept. In this respect, the Marine Corps had more experience in helicopter operations, possessed more helicopters, trained pilots, and crewmen than any other military organization in the world. Brigadier General Noah C. New recalled:

> Even as early as 1951, HMX–1 had experimented with mounting machine guns and 2.75 inch rockets on the HTL–4, but there was little interest in developing a helicopter for the close air support role. Many pilots with Korean combat experience were definitely against arming the helicopters. Also the ceiling limit of 1425 aircraft mitigated against procuring a lightly armed and vulnerable helicopter to substitute in the place of a fixed wing close air support aircraft.[14]

The combination of these factors led General Shepherd to form a special study group of highly experienced Marine officers to expand upon the 1951 concept. As one of its main tasks, the group would have the objective of deriving an ultimate concept for the conduct of future amphibious operations.

There was also another reason for forming such a group. On 19 January 1953, General Shepherd informed General Cates, who was now at Quantico as the Commandant of Marine Corps Schools, that within the Marine Corps educational structure there were no provisions beyond the Senior Course for intellectual development of Marine officers in matters relating specifically to special problems of the Marine Corps. He believed that the deficiency did not permit formalized advanced study in the field of amphibious operations, nor did it ensure the adequate and uniform indoctrination of senior Marine officers in considerations affecting formulation of Marine Corps policy. In order to correct this situation the Commandant stated:

> [I] desire to establish a Marine Corps Advanced Research Group . . . [which] will comprise a small group of officers performing original research in the interest of their own professional development and for the purpose of achieving solutions to certain of the Marine Corps' basic problems.[15]

The Commandant's directive defined the mission of the Advanced Research Group as "to provide opportunity for advanced study and original research for Marine Corps officers of the rank of colonel." * [16] One major item under the outline of study for the Advanced Research Group (ARG) was the "advancement of theories and practices related to landing operations." As a matter of policy, however, the basic project problems were to be selected by the Commandant. Each nine-month session of the group was to correspond with the academic year of the Marine Corps Schools.[17]

Accordingly, the group met at Quantico in the fall of 1953. In the original outline of study for the group, the Commandant assigned three specific research projects, all of which were to be solved during the academic year. General Shepherd further directed that a fourth project be selected by the group, which could be on any subject so long as it was a matter of significant concern to the Marine Corps. As the first of the three projects, General Shepherd directed the 10 colonels to:

> Develop a concept of future amphibious operations that will require maximum utilization of the Fleet Marine Force as a mobile force in readiness. Based upon this concept determine the validity and adequacy of the current tactical doctrines, organization, equipment development policies and training programs within the Marine Corps.[18]

The Advanced Research Group stated that the solution to this problem had to be based on the realities of the day, and on such developments as could reasonably be expected during the next decade. A challenging objective had to be established; a definite long-range target towards which the Marine Corps could strive in the following years. This was of paramount importance because all areas involved in future amphibious operations had to be easily discernible and provide a common approach to the problem. The concept arrived at by the group consisted principally of the following:

> 1. The high speed movement of helicopter assault forces to the objective area, in company with a fast carrier task force.
> 2. The use of nuclear weapons to destroy hostile air within tactical aircraft range of the objective area, and to neutralize the landing area.

* One of the prerequisites stated that members could not be within four years of selection to brigadier general. The group of 10 relatively junior colonels chosen for the session during 1953-1954 were: Thomas J. Colley, John P. Condon, August Larson, Joseph N. Renner, Carson A. Roberts, Samuel R. Shaw, George R. E. Shell, Eustace R. Smoak, William J. Van Ryzin, and Richard G. Weede. It is interesting to note that eight of the 10 officers retired as general officers.

3. The rapid exploitation of atomic preparatory fires by helicopter assault forces, from the sea, seizing key terrain features within the objective area.

4. Maneuver by helicopter troops, with the use of atomic support, to extend the area of amphibious troop control within the objective area.

5. Use of helicopter forces, teamed with combat air and atomic and conventional support, and intensive air reconnaissance combined with vigorous patrolling, to maintain, consolidate and extend the area.

6. Use of helicopters for logistic support during the assault phase.[19]

These objectives had several promising features which, if exploited to the fullest, would provide a Fleet Marine Force with a force-in-readiness capability far beyond that previously envisioned. The "all-helicopter" assault would give the landing force mobility, flexibility, and speed which would permit the commander to mass, reinforce, or redeploy task forces of division size. It was considered that even if tactical nuclear weapons were not used, or in Marine operations short of all-out war, the concept would still result in a much more powerful amphibious assault than was possible at the time.

While the ARG proposals could not be achieved immediately, they were ones which the Marine Corps could attain in the foreseeable future. The Commandant approved, on 27 April 1954, the basic proposals realizing that progressive steps had to be taken for the development of the techniques and procedures to be employed in an "all-helicopter assault." In doing so, General Shepherd directed that these new concepts now represented the long-range objective of the Marine Corps.[20]

The approval of ARG Project I led to a consideration of fields in which long-range orientation programs would be required. The areas of organization, equipment, training and techniques, and procedures would be affected. The Marine division would be required to segregate, or remove from its organic structure, those elements whose normal functions were not compatible with the new concept. In the area of equipment, emphasis had to be shifted to development of amphibious shipping which could support an all-helicopter assault.

Further, Marine Corps techniques and procedures for the conduct of amphibious operations as well as the training program which refined them did not meet the requirements of the atomic era. Atomic weapon systems had to be made available and become organic to the ground units and made totally helicopter transportable. The logistical supply system needed equal attention and revision if it was to be responsive to needs of the division. During the forthcoming years, therefore, a series of programs had to be promulgated by the Marine Corps in order to reorient and accelerate development in these fields.

As the result of these considerations, Marine Corps Test Unit No. 1 (MCTU #1) was activated at Camp Pendleton, California, on 1 July 1954. Colonel Edward N. Rydalch was designated commanding officer of the regimental-size unit and later officially took command on 2 September.[21] The statement of missions assigned to Colonel Rydalch required the test unit to delve into practically all aspects of the major areas of concern brought about by the adoption of the new concept.

One of the core areas in which MCTU #1 would be active was in the determination of the feasibility of conducting amphibious operations with atomic weapon support. In order to prove these techniques, the test unit would participate with troops and helicopters in a series of atomic tests to be conducted at the Nevada Proving Grounds.

The first test of this nature, however, had already taken place the previous year, 1953, involving the 2d Marine Corps Provisional Atomic Exercise Brigade, at about the same time as the ARG's Project I was being conceived. Brigadier General Wilburt S. "Bigfoot" Brown, Commanding General, Force Troops, FMFPac, a combat veteran of both World Wars, the Nicaraguan campaign, and Korea, was assigned additional duty as commanding general of the Camp Pendleton-based brigade.

Helicopter support was provided by HMRs–361, –162, and –163 of Colonel Harold J. Mitchener's MAG(HR)–16. A total of 39 HRSs participated in the exercise with a few aircraft augmenting from MAG(HR)–36. Code named DESERT ROCK V, the exercise solidly proved that helicopter-borne forces could be used to support the main effort of an amphibious assault in relatively close proximity to a nuclear explosion. In the forthcoming years, MCTU #1's participation in subsequent DESERT ROCK exercises would substantially expand the data obtained during DESERT ROCK V.[22]

Advanced Research Group Project IV

Throughout the academic year of 1953–1954, the ARG generated many possible subjects for Project IV. The original solution to Project I opened a number of areas which required further detailed study before the concept could be effectively

implemented. Some of the problems brought to light were:

1. The tactics and techniques of helicopter operations ashore.
2. The Marine Corps helicopter requirements.
3. The development of tactics and techniques of fighter escort and close support of transport helicopters.
4. Shipping requirements.

After careful consideration of all the subjects for Project IV, the group chose to study the one relating to helicopter requirements. They realized that combat helicopter requirements, in terms of number and type, were not now clearly defined inasmuch as the Commandant had only recently approved the new concept presented in Project I. It became apparent that Project IV had to deal with helicopter requirements, with emphasis placed on a transition period—if the Marine Corps was to meet the long-range objective of an "all helicopter" assault capability. The Advanced Research Group, therefore, identified its fourth project as "Marine Corps Transport Helicopter Requirements for the Immediate Future." [23]

The statement of the problem as written by the group was to "develop the Marine Corps' transport helicopter requirements for the immediate future as a step toward achieving the ultimate objective of the concept of future amphibious operations." The initial goal was to achieve the capability of lifting the assault elements of one Marine division and the related elements of one Marine aircraft wing. Thereafter, as conditions would permit, and as requirements dictated, the Marine Corps would expand its capability to meet its potential under the concept.

The group appreciated fully that, as in landing craft, several types of helicopters would be required to execute effectively the several operations of lifting cargo, vehicles, and personnel. Also helicopters would be needed for reconnaissance, casualty evacuation, pathfinding, and the exercise of command and control. For these operations there was seen a definite requirement for a "family" consisting of HR2Ss for heavy equipment and large personnel loads and a need for the HUSs and HRSs in lifting lighter loads of equipment and troops. While the Marine Corps had considerable numbers of the lighter helicopters, the shortcoming was in the quantity of the heavier transport helicopter—the one most essential to any significant landing operation. For this reason the colonels devoted their study to consideration of the larger transport helicopter only.[24]

A comparison was made between the existing helicopter lifting capability and that which was programmed for 1957—the time when all nine Marine transport helicopter squadrons would be equipped with the HR2S. It was figured that it would take seven hours in 1954 to land the assault elements of one battalion landing team (BLT) with one MAG (HR) consisting of three 15-plane HRS squadrons. By 1957, the increased lifting capability of the HR2S would permit the same size MAG to land a complete Marine division in approximately 15 hours. The comparison was made using the "K" series Table of Organization (T/O) with supplies sufficient for three days' operations. The radius of assault for the HRS helicopter group was 15–20 miles whereas the HR2S MAG was figured at a radius of 50 miles. An average load for the HRS was computed at 1,300 pounds and at an amazing 8,000 pounds for the HR2S.[25]

In a close analysis of the HR2S–landed division, however, it was determined that the number of helicopters was still inadequate. It was felt that the minimum assault force should consist of four battalion landing teams landed simultaneously with additional support provided on the second wave. Also, it was calculated that sufficient helicopters would not be available for providing support for tactical operations ashore while concurrently executing the ship-to-shore movement. These deficiencies could be remedied, the group stated, "by increasing Marine Corps transport helicopter units to a total of 12 squadrons with a combined strength of 180 aircraft." In addition, it would be necessary for the helicopters to be capable of carrying "an emergency payload of 35 passengers or 12,500 pounds for the initial assault and for heavy lifts." The increase of 45 HR2Ss, the group believed, would meet the initial lift requirement and provide tactical support ashore during the early phases of the assault. In the case where helicopters were needed in operations ashore during the early phase, the overall time to land the complete division would then be on the order of 12 to 14 hours.[26]

Resupply requirements of the division, combined with the total requirements necessary for lifting a Marine aircraft wing, were examined next with the view of determining the capability for landing a division-wing team with the 180 HR2Ss. By allowing 217 trips per day for resupply of the division, the wing could be moved ashore with 30 days supply in a period of 50 hours, provided the wing equipment was helicopter transportable. This period would be increased to 70 hours should

one MAG of HR2Ss be employed to support operations ashore after the initial landing.[27]

As a matter of false optimism, the Advanced Research Group members had been led to believe that the HR2S could be modified to have the capability to lift 12,500 pounds. The only change to their planned field trips during their session was the addition of a visit to the Sikorsky Aircraft Company.[28] Considering this, it can be inferred from studying their report that during the course of their visit to Sikorsky a means had been proposed to them by which the lifting ability of the helicopter could be increased.* [29] The group listed in its report three ways this could be done: "By installing engines of sufficient power . . . by increasing the rating of the present engines to 2,500 horsepower . . . or by installing rotor tip jets." [30] The group knew that the importance of obtaining a payload of 12,500 pounds could not be over-emphasized as it would then be possible to helicopter-lift the most crucial heavy pieces of division property: the 155mm howitzer and the two and one-half ton truck.

The board's Project IV report to the Commandant concluded that 180 HR2S–1 helicopters were needed to meet the interim transport helicopter requirements. After reviewing the study, General Shepherd gave his approval on 22 July 1954 but directed that "a new study be initiated immediately to determine the feasibility of achieving the helicopter-landed wing" portion of the division-wing team.[31] It had been indicated in the Division of Aviation's comments on the study that in the initial stage of the concept it might not be necessary, nor desirable, to helicopter transport all the elements of a Marine aircraft wing to a shore base during an amphibious operation.

Following his approval of Project IV, General Shepherd submitted his request to the CNO for the additional number of helicopters on 23 October 1954. "The validity of the concept outlined in [the letter of 17 July 1951]," he stated, "has been borne out by events which have since transpired. It now appears that we are ready for —in fact, obliged to take—the next step in logical progression toward development of our helicopter capabilities. . . ." The general continued, "I propose that each of the nine Marine helicopter transport squadrons be provided with 20 HR2S aircraft ** at the earliest practicable time." He further pointed out to the CNO that this would represent an increase from 135 helicopters in the present program to a total of 180.[32]

Landing Force Bulletin Number 17

Following the Commandant's approval of the Advanced Research Group's Project I, action was taken to obtain a Navy Department policy statement supporting the concept. Although this was not forthcoming until late in 1955, the Commandant, in the meantime, had been guaranteed Navy Department support. In a letter to the Commandant of Marine Corps Schools, General Shepherd stated that in this matter, "the CNO has already assured us of Navy support of the concept, and has so instructed his staff and the bureau chiefs." [33] The CNO, Admiral Arleigh A. Burke, gave his formal concurrence to the new concept on 8 December 1955. He concurred with the Marine Corps' ultimate goal of conducting future amphibious operations by the means of vertical envelopment utilizing ship-based helicopters, although he realized that complete achievement of the goal was not readily apparent in the immediate future. Admiral Burke agreed that "plans must be laid for a gradual transition from World War II concepts of landing entirely over the beaches to the ultimate goal of landing all the assault elements by VTOL *** type [helicopter] transport aircraft." [34]

The CNO outlined the areas which were regarded as intermediate goals and attainable within 5 to 10 years:

> 1. Preliminary softening up and isolation of the area by fast carrier task force and long-range shore-based aircraft and guided missiles.
> 2. Elimination or reduction to a minimum of advance force operations to increase the element of surprise. Reconnaissance of landing areas to be accomplished by photo planes and personnel operating from submerged submarines.
> 3. Seizure of all initial objectives, including beach defenses, by troops landed in helicopters and supported by naval gunfire and carrier-based aircraft.
> 4. Clearance of obstacles from beaches and beach

* This assumption is supported by a statement contained in a memorandum from the Director of Aviation to the Chief of Staff on 8 April 1954. Although commenting on ARG Project I, the Director of Aviation mentions:

> This T-56 [gas turbine engine] growth potential of the HR2S would provide an aircraft capable of the performance noted on page 13, Part II: 12,000 pound payload, 100 nautical mile radius, 130-150 knot speed. However, that would be about the growth limit of the HR2S.

** Adding five additional HR2Ss to each of the nine helicopter squadrons would be equal to forming one additional MAG (HR) with three 15-plane squadrons.

*** Vertical takeoff and landing.

approaches and preparation of beaches to receive landing ships and landing craft by:

a. Personnel landed by helicopter.

b. Minesweepers.

5. Landing of supporting troops, heavy equipment and supplies over the beaches.

6. Continued employment of assault helicopters to land reinforcements and to provide tactical mobility and logistic support to troops engaged in expanding the beachhead.

7. Use of the sea echelon concept to eliminate concentration of shipping in the vicinity of beaches.

8. Adherence to principles of dispersion of ships, landing beaches and troop elements to provide maximum practicable passive defense against enemy atomic attack.[35]

Admiral Burke concluded his letter to General Shepherd by mentioning that the rate of progress towards achievement of the ultimate goal would depend on many factors. "One of the most important," he stated "is the amount of money which is made available by the Congress for implementation of the Navy's annual shipbuilding and conversion program. Therefore, it is believed that a reappraisal of the goal outlined above . . . should be made at least annually." [36]

In the meantime, Marine Corps Schools had prepared a landing force bulletin outlining the concept which had been proposed in the ARG's Project I. The school had been tasked with the project in mid-1954 and had submitted a proposed bulletin to HQMC during December. After undergoing extensive revision, the Marine Corps officially published its concept of future amphibious operations on 13 December 1955 in *Landing Force Bulletin Number 17*, only nine days after formal recognition of the concept by the CNO.

Landing Force Bulletin Number 17 (LFB–17) elaborated on the CNO's position and paralleled the concept delineated in Project I. The last paragraph summarized in the following manner:

> This concept has as its ultimate goal an all-helicopter assault which will endow the amphibious attack with maximum impact and maximum freedom of action. We have already progressed to a point at which our doctrine embraces a powerful two-pronged attack, one prong a vertical envelopment * by helicopter, the other a surface assault across the beach by conventional means, with the latter constituting the main effort. In the future, while improving our still-essential beach-assault ability, we must adapt our organization and equipment, and our tactics, techniques, and training, so as to place major stress on the helicopter assault. Later, as new amphibious ships join the fleet, and as helicopters with greater load capacity become available in quantity, the beach assault can be reduced still further. Eventually, when the concept is fully realized, the beach assault can be eliminated altogether, leaving only follow-up troops and supplies, exploitation forces, and base-development units and material to be landed over beaches or through ports in the beachhead area.[37]

The latest improvements in amphibious tactics and techniques had been promulgated in two other Marine Corps documents during the period, both of which complemented the concept outlined in LFB–17; *Landing Force Bulletin Number 2* ("Interim Doctrine for the Conduct of Tactical Atomic Warfare") and *Landing Force Manual 24* ("Helicopter Operations"). These two documents gave wide circulation to the most important specific elements of the new concept and made possible the inclusion of new material in local training programs. Operating forces were thus enabled and encouraged to participate more actively in the development and refinement of new ideas and to augment the efforts of the Advanced Research Group, Marine Corps Test Unit Number 1, and the Marine Corps Development Center.

The Smith Board

The requirements for a medium helicopter, which were intentionally omitted from the ARG's Project IV, were taken up by a board which convened later at HQMC in January 1955. General Shepherd had directed, on 23 December 1954, that a board of general officers be appointed to study the composition and functions of Marine aviation in order that a determination could be made on the relative apportionment of personnel strengths between ground and aviation organizations. Lieutenant General Oliver P. Smith was appointed as the senior member. Major Generals Robert O. Bare, Director of the Marine Corps Education Center, Homer L. Litzenberg, Inspector General of the Marine Corps, and Brigadier General John C. Munn, who was on duty at the time with General Smith as Assistant Commanding General, FMFLant, were the additional board members.[38]

General Smith was fully familiar with the helicopter program as he was one of three generals on the Commandant's special board which drew up the original helicopter program in 1946. Between 1948 and 1950, General Smith had been Assistant Commandant and Chief of Staff, HQMC. He took command of the 1st Marine Division in June 1950 and during the Korean War he led his

* This appears to be the first case where the term "Vertical Envelopment" appears in an official Marine Corps document. It had appeared earlier in the MCS's draft copy of LFB–17 to CMC in December 1954.

division in its epic breakout from the Chosin Reservoir. After his return to the U. S. in May 1951, he commanded the Marine Corps Base at Camp Pendleton and in July 1953 became Commanding General, FMFLant.

General Smith's board reported, in relation to the smaller helicopters, that it was concerned with the emphasis being placed on the large transport helicopters at the expense of the medium types, such as those being operated by the nine transport squadrons. The HR2S–1, the board said, was a large aircraft which would require a much larger, level landing area than the HRS. Open level areas capable of receiving a squadron of HR2Ss were comparatively rare in many types of terrain. They felt that one of the advantages of the medium size helicopter was its ability to land in almost any type of terrain. An organization with only large helicopter transports would not have the flexibility in the selection of landing zones that was enjoyed by the HRS squadrons. In stating its position in this matter, the board said, "we foresee a definite and continuing requirement for medium size helicopter transports (HRS, HUS, or equivalent) and believe that one squadron per wing is an absolute minimum." [39]

General Smith's board, in making its recommendation stated that "each Marine aircraft wing [should] contain one group of three squadrons of 20 large [HR2S] rotary-winged transports, and one squadron of 15 medium [HRS/HUS] rotary-wing transports." The total number of 180 HR2Ss was reaffirmed by the board as the appropriate number of heavy transport helicopters.[40]

On 24 May 1955, the Commandant officially announced his decisions on the recommendations made by the Smith Board. In matters relating to the helicopter program, General Shepherd not only approved the idea of adding medium helicopters to the aircraft wing organization, but increased the number from one medium squadron to two such units per aircraft group. By his action General Shepherd thereby approved for planning purposes the first additional expansion to the helicopter program since its initial massive enlargement in 1951.[41]

Although the May 24th letter officially published General Shepherd's position, the CNO had been apprised of his decision nine weeks earlier. On 1 April 1955 the Commandant requested that "the need for a vehicle to rapidly shuttle supplies to the forward elements, to execute tactical movements of small units, and to evacuate battle casualties points to the use of a utility helicopter such as the HUS." General Shepherd pointed out that the problem had been closely studied by the Marine Corps and "that it had been determined that two squadrons of 15 HUS helicopters each will be required to support each Marine division, or a total of six squadrons and 90 HUS helicopters to support the three Marine divisions. I cannot overemphasize," the Commandant continued:

> . . . the importance I attach to the helicopter for the employment by the Fleet Marine Force in the future. I strongly urge that every means be taken to increase the Marine Corps helicopter lift capability as rapidly as possible. The favorable prospects of additional production capacity becoming available at the Sikorsky's plant makes feasible the procurement of additional HUS helicopters in the Fiscal Year 1957. The requirements of the Marine Corps for the HR2S aircraft are in no way altered by this letter. A recent study of the entire Marine Corps aviation by a board of Marine Corps generals, is still under review, however, preliminary analysis indicated that the addition of 90 HUS helicopters . . . can be achieved within the present aircraft ceiling *assigned* to the Marine Corps.[42]

On 2 May the Division of Aviation had alerted the Vice Chief of Naval Operations as to the proposed aircraft group organization envisioned for accommodating the new utility helicopter squadron. "Relative to the commissioning of HMR units equipped with the HUSs," the memo stated, "it is intended to designate the new groups as MAG (HR) Light, and the squadrons as HMR (L). Upon transitioning from HRSs to HR2Ss, it is intended to redesignate the existing groups as MAG (HR) Medium, and the squadrons as HMR (M)." [43]

The three light helicopter groups, each composed of two HUS squadrons, a headquarters and maintenance squadron (H&MS), and a Marine air base squadron (MABS), were programmed for commissioning between 1 April 1956 and 1 July 1958. The three medium helicopter groups were similar to the existing MAG structure with each group having three HR2S squadrons, a H&MS, and a MABS. The dates set for commissioning ranged from November 1956 through August 1959.[44]

On 16 June 1955 the CNO replied to General Shepherd's previous requests for 180 HR2Ss and 90 HUSs. The CNO's answer presented a less desirable program than the Commandant had hoped to obtain. It approved an increase in the total number of helicopters, although on the other hand it made a compensatory reduction in the number of Marine fixed-wing aircraft. He approved an operating program for Fiscal Year 1959 of 180 HR2S helicopters and 45 HUSs.[45]

On 19 August the Commandant appealed to the

CNO requesting that the original number of 90 HUS helicopters be purchased and no reduction be made in the total number of fixed-wing aircraft. The CNO answered General Shepherd on 11 October 1955 declaring that his letter had not been received in sufficient time to have the request for the additional 45 HUSs included in the Fiscal Year 1959 budget. The CNO stated that "it is requested that the Commandant of the Marine Corps submit justification for the increase of forty-five (45) helicopters in the 1959 operating program. This should encompass the present helicopter program and any changes in numbers or organization that are contemplated." [46]

A Reduced HR2S Program

As correspondence relating to procurement of the HR2S continued between the Commandant and the CNO, the program underwent drastic revisions. The first action taken by the Commandant occurred on 19 October 1955 when he informed the CNO that information then available to him indicated that actually there were two versions of the HR2S being considered for initial production, and that both fell considerably short of meeting the specifications set forth by BuAer. Three problem areas in particular were of concern: the combat radius had been reduced two-thirds and the ability to hover out of ground effect * had decreased to approximately half the altitude specified. While the two foregoing problems were directly related to an excess in weight, the third difficulty involved the inability of the helicopter to automatically fold its blades. These shortcomings severely restricted its operational use.

In view of these problems, the Commandant recommended that the CNO restrict deliveries of the HR2S to 15 aircraft and that production and delivery of the HUS–1 be accelerated to the extent necessary to provide the Marine Corps with an operating inventory of 90 HUSs by the end of 1957. These two recommendations of General Shepherd were made to afford a longer interval of time for the development of the HR2S. In the interim, the HUS would partially fulfill the urgent lift requirements of the Marine Corps.[47]

Shortly thereafter, on 23 November 1955, the Commandant again modified his recommendations concerning the desired operating strengths for both the HR2S and the HUS. In his correspondence with the CNO, General Shepherd mentioned it had been discovered through informal discussions with BuAer and Sikorsky Aircraft, that two of the factors affecting the actions which he recommended the previous month had changed considerably. Mainly, these factors centered around the fact the turbine version of the HR2S had now been delayed two years and that the results of a recent weight reduction conference on the HR2S revealed it was possible to accomplish sufficient reductions in weight to provide improved performance of the first production models. In view of this, General Shepherd requested that the recently curtailed delivery rate of the HR2S be increased from 15 to 60 helicopters by the end of 1958. He also favored an increase in the numbers of HUSs, since both the Army and Navy versions of the S–58 (H–34 and HSS–1) were proving to be a highly satisfactory aircraft.[48] In fact, it had been reported to the Commandant that the Army was increasing the number of seats in its H–34s from 12 to 18 and that the Army aircraft was consistently carrying loads ranging from 3,750 pounds to 4,000 pounds with over an hour's fuel on board.[49] Realizing 60 HR2Ss was far from the original number of 180, General Shepherd desired that the CNO make a further compensatory acceleration in the HUS procurement which would provide for an operating strength of 140 helicopters by the end of 1958.[50]

In reply, a review of the procurement program for the HR2S was made by the CNO and presented to the Commandant on 12 April 1956. Tabulated in Figure 3 was the CNO's summary as it related to

* Ground effect is encountered when a helicopter is hovering at a height above the ground of less than its rotor diameter.

Figure 3

FY 1957 Budget Cycle		*Fiscal Year Procurement Programs*					
Step	*Date*	*1953*	*1954*	*1955*	*1956*	*1957*	*TOTAL*
1	Jun 1955	7	12	43	36	30	158
2	Oct 1955	7	12	43	36	30	128
3	Oct 1955	7	12	43	0	0	62
4	Nov 1955	7	12	15	0	0	34

the Fiscal Year 1957 budget cycle and to overall procurement of the HR2S–1. It is interesting to note that the total number of HR2Ss had declined in a series of actions from a total of 158 aircraft in June 1955 to only 34 by November the same year. The drastic reduction was explained in the following manner:

> In June 1955 the FY 1957 HR2S–1 procurement submitted to OB&R [Office of Budget and Review] consisted of sixty (60)—[see Step 1.] OB&R review, and as agreed to by BuAer because of deficiencies . . . uncovered in the HR2S–1, resulted in reducing the quantity to thirty (30) [for FY 57]. This quantity (30) was submitted to OSD [Office of the Secretary of Defense] for review—Step 2. OSD review, again as a result of [the helicopter's] mechanical deficiencies, resulted in eliminating both the thirty (30) HR2S–1 in the FY 1957 program and the thirty-six (36) in the FY 1956 program—Step 3. In late October [the Marine Corps] requested that the number of HR2Ss . . . be held to a maximum of fifteen (15). . . . Accordingly, total procurement was further reduced—Step 4—and this procurement program, as thereby finalized, was incorporated in the President's budget. Subsequently, [in November, the Marine Corps requirement] for an operating strength of sixty (60) was received. However, it was impossible to incorporate this revision in the Budget at that late date.[51]

Also in the reply, signed by Vice Admiral Thomas S. Combs, Deputy Chief of Naval Operations, was the statement of views relative to future procurements of the HR2S–1. He indicated that present planning contemplated the purchase of 12 additional helicopters, thereby increasing the overall HR2S–1 total to 46. The last 12 were necessary in order to provide for sufficient FY 1958 "follow-on re-order lead time." It was felt that if and when the HR2S–1 demonstrated, by actual test, it could satisfactorily meet BuAer specifications, the procurement program would be accelerated and would be designed to meet the Marine Corps operating requirements. However, Admiral Combs stressed, "until this circumstance occurs it is considered only prudent to restrict procurement to that level which will provide an adequate test quantity and a minimum production line which can be accelerated." It was pointed out that irrespective of procurement planning, Marine Corps requirements would never be met until the HR2S–1 actually proved its capability to perform its designed mission. In conclusion Admiral Combs said, "It is therefore considered that present HR2S–1 procurement is sound as present conditions permit. The CNO is fully aware of the Marine Corps' need for the HR2S type helicopter and will take action to meet this need as soon as possible." [52]

Admiral Combs' letter firmly placed the number of HR2Ss at approximately one-fourth of the desired 180. Disappointing as it was, the Marine Corps' overall helicopter program was far from bankrupt. This turn of events did, however, establish a trend in which the Marine Corps began to adopt the light, but more trouble-free, helicopter as its main assault transport. The prospects of obtaining the smaller HUS–1 appeared to be brighter at this time due to the developmental problems in the HR2S program and the fact the HUS was a much less expensive aircraft. Resistance to the reduction in quantity of the HR2S was only a natural reaction since Marine Corps planning for the execution of its new concept was based on using the larger helicopters as the main assault transport. Although the numbing agent to this stinging blow had been provided earlier in the year in the form of CNO approval for procurement of nearly 140 HUSs, it did, nevertheless, subsequently require the reorientation of the entire helicopter program.