To be transferred to helicopters seemed an odd reward, but General Anderson, well aware of the second-class syndrome, had no intention of having his program turn into a method for culling out weak pilots from fixed-wing units. Not widely known at the time, "to maintain the desired quality level," he had ordered that the final approval of each nomination be made only by his staff at DC/S (Air).\textsuperscript{58}

The pilots were to receive a total of 46 hours of classroom instruction, followed by 65 hours of flight in the UH–34.\textsuperscript{59} At the completion of the course, they would be designated as co-pilot. The training was to be conducted in two squadrons, one on each coast. HMM–362, which in August had arrived back in the United States after completing its duties on SHUFLY, was designated at Santa Ana. The new commanding officer, Lieutenant Colonel Robert H. Brumley, had to reorganize the unit and set up the program by 5 November when the first transition pilots were due to arrive. In the east coast squadron, HMM–262, Major Wilbur O. Nelson’s similar efforts were interrupted by the Cuban missile crisis, but he was able to be ready for the first students on 3 December. Every month for almost the next two years, 10 fixed-wing pilots would be ordered to each of the squadrons for forced transition.

General Anderson planned “that the initial graduates will be used to raise the squadrons to an acceptable strength as expeditiously as possible.”\textsuperscript{60} As more pilots completed the transition it:

\ldots will permit the assignment of a portion of the existing helicopter population to several hundred other billets and thereby provide a more normal career assignment pattern than has been possible heretofore. Eventually this transition training capability should provide sufficient graduates to [even] permit the reassignment of a . . . number of the existing helicopter population [back to] fixed wing duty.\textsuperscript{61}

With the program in full swing he estimated that by June 1964 the relative percentage of pilots available compared to the number required would be 86 percent for helicopters, 85 percent for jets, and 90 percent for transports.

To a former jet pilot, the transition into helicopters was a shock. He immediately recognized that flying a helicopter was not quite as simple as he had been led to believe. The first attempt to perform a simple maneuver, such as keeping the aircraft in a steady hover in gusty winds, generated a certain amount of humility. After landing at night in a confined area surrounded by trees, the jet pilot began to reevaluate his opinion of helicopter pilots. They might fly low and slow, but they definitely were not second class. In many ways the learning process was a two-way street. The fixed-wing aviators brought with them knowledge of other techniques and tactics which could be employed in helicopters. The cross-fertilization of ideas, and the growth of understanding between the two elements within Marine aviation was one of the most significant achievements of the forced transition program.

Even more so was combat training. Many of Archie’s Angels and the pilots from the squadrons that followed on SHUFLY were assigned as instructors in HMM–362 and HMM–262. They brought with them the latest developments from Vietnam. The result was that the Marine Corps built up a force of pilots who were experienced in both fixed-wing and helicopters and who had been instructed in the lessons of operations in South Vietnam. It was a fortunate and timely combination which was to prove invaluable in the coming years.

Training

Gentlemen. You have studied subsonics, transsonics, supersonics, and hypersonics in some detail. We shall now discuss a different regime of flight: Micronsonics.

Presentation on helicopters by Naval Air Test Center, 1962.\textsuperscript{62}

Regardless of the source of pilots, they had to be trained to fly aircraft. Colonel Carl simply had learned the fundamentals from a friend at the test center and then taught himself. He was the type of talented and versatile aviator who could do it. Colonel Dyer, prior to the commissioning of HMX–1 in December 1947, was invited by Fred Dawson, then the assistant general manager of Sikorsky “to come up and take pilot training.\textsuperscript{63} “So I got Temporary Additional Duty orders from the Marine Corps and came up to Connecticut and took my first helicopter training at the Sikorsky plant at Bridgeport. My instructor was Jimmy Viner . . . the chief test pilot.”\textsuperscript{64} Major DiLallo had learned to fly them in 1946 at the Navy’s Helicopter Development Squadron Three (VX–3) at Floyd Bennet Field, in New York. The same unit later was relocated to Lakehurst, New Jersey and provided a source of training for most of the first Marine pilots. These included First Lieutenant Roy L. Anderson, Captains Robert A. Strieby and Charles D. Garber, and Major Russell R. Riley. The four were among the officers who had responded to Colonel Dyer’s first recruiting efforts and became the nucleus of HMX–1 as the squadron was formed. They represent in the lineal list of Marines designated as helicopter pilots numbers two, three, four, and five respectively.\textsuperscript{65} All were assigned as instructors to HMX–1 where “initial operations consisted strictly of pilot training.”\textsuperscript{66}
In June of 1948 the CNO published a new directive requiring formal training of all helicopter pilots "due to the inherent instability . . . and the different nature of control techniques employed." 67 "Only those pilots previously qualified by VX–3 or the U.S. Coast Guard or those qualified after 1 July 1948 under the provisions of the order "will be permitted to solo helicopter type aircraft." 68

Colonel Dyer did not meet these requirements so "I went back up to Lakehurst and took a check flight, which I passed successfully and I was given my card as a qualified helicopter pilot." 69 Neither did Colonel Carl have the formal certification, but at the time he neglected to receive a check flight. Thus, even though he was the first Marine to learn how to fly a helicopter, it is Major DiLalio who is recognized as the first Marine to be officially designated. The same CNO order established a training syllabus which had to be completed prior to qualification. As all aviators learning to fly helicopters at the time were already experienced in fixed-wing aircraft, the instruction was devoted to only the differences in the types of airplanes.

The course consisted of 39.6 flight hours. The primary stage included practice in a hover "handling stick only" and hovering "handling pitch only." 70 The third stage was operational flying. One flight was devoted to a cross-country navigation over a distance of 100 to 200 miles. Five hours of flight time were allotted, an indication of the speeds of the machines then available. The final check required many maneuvers which were a bit different from those the fixed-wing pilots were accustomed to, such as making "a backward vertical take-off." 71 Or, "At five feet altitude, fly a 50-foot-square pattern keeping heading constant at all times. Fly forward on one leg, sideward on second leg, backward on third leg and sideward to starting point." 72 Landings within 12 inches of a predetermined mark were also part of the check.

Surprisingly, many of the basic maneuvers specified 25 years ago still remain today an effective method to teach pilots to fly helicopters. Numerous new ones have been added but the original list remains in use.

By the end of 1949, VX–3 and HMX–1 had qualified a total of 34 Marines including three enlisted pilots. Master Sergeants Arnold G. Fisher and Leonard J. Mounts were designated as of 1 April 1948; and Master Sergeant Samuel R. Wooley on 26 October 1949. 73 They were the 12th, 13th, and 31st Marine helicopter pilots.

As the helicopter program continued to expand, an increasing amount of the available time at HMX–1 was devoted to nothing but training new pilots. The commanding officer, Lieutenant Colonel Edward V. Finn, complained in September 1952 that "80 percent of flight hours are in training and there isn't enough time for the development work." 74 General Shepherd assured him that efforts were being made to have the Navy take over all training, but until such time as it did, the next classes ordered to HMX–1 would be reduced to six students. 75

VX–3 had its own problems with the expansion. The squadron's helicopters caused increased congestion in the mat area at Lakehurst, and their flights interfered with those of fixed-wing aircraft. The squadron needed a new home. The Navy found one for it at Naval Auxiliary Air Station (NAAS) Ellyson, an unused base near Pensacola, Florida. Built during the construction programs just before World War II, Ellyson had suitable area for practice flights and was located near the Navy's other pilot training facilities at Pensacola. For the next 22 years, it would be a familiar sight for Marine helicopter pilots.

Helicopter Training Unit One (HTU–1) was commissioned on 4 December 1950 and moved to Ellyson 2 January 1951. 76 The commanding officer, Commander Ben Moore, Jr., started out with four officers and four enlisted men. By the time the first class of nine students reported on 15 January, he had three helicopters assigned. The unit was scheduled to grow to 20 officers and 252 men with 20 aircraft. A student class of 24 pilots a month was planned and the first one graduated on 14 March the same year. 77

Marines arriving later that year for training at Ellyson were confronted with a total of 59 helicopters—of eight different types. Most of them were small. Typical of these trainers, the Hiller-built HTE–2 (OH–23), first introduced into use in January 1951, had a larger engine than the previous model, the HTE–1. (Helicopter Trainer Hiller) 78 The new Franklin 0–335–6 engine could develop 200 horsepower, 22 more than the older aircraft. Even with this increase in power, the performance of the helicopter was slightly less exhilarating. With 168 pounds of fuel, it could carry an additional 613 pounds of crew or cargo up to its designed limits of 2,400 pounds. Fully loaded, the highest altitude the aircraft could hover out of ground effect was exactly zero. At the same time its maximum rate of climb was also zero. If ground effect or translational lift could not be utilized, someone had to get out or the aircraft could not fly. The designers of the first syllabus had aircraft like the HTE–2 in mind when they established the flight time for the navigational cross country, for it cruised at 67 knots and had a top speed just five knots faster. Fortunately for the heftier Marine pilots, by the end of 1952 the HTE–2s were no longer used.

Most of the other aircraft were members of a long line of Bell Aircraft light helicopters. Bearing the des-
ignation of HTL (Helicopter, Light, Bell), H–13, the first of the series, had flown in February 1946. This HTL–1 (Sioux) had been followed by successive models up to the HTL–7. With the HTE–2 gone, 1 January 1953 saw the squadron with eight HTL–4s and 34 HTL–5s. All of them were typical Bell designs with two-bladed main and anti-torque rotors and a clear plastic bubble cockpit.79

The first three members of the series had a covering on the tail structure. It was removed in the 4s and 5s to gain an additional 156 pounds of lift capability. Commercial models of the series were widely used and many of the small helicopters seen in motion pictures and television are nothing more than an adaptation of the H–13s. In size and horsepower they were all similar to the HTE–2. The “five” was typical. It was 41 feet long overall with a 35-foot main rotor. The Aircooled Motors 0–335–5 engine could produce 200 horsepower. Fully loaded with 174 pounds of fuel and 606 of payload, it could hover out of ground effect and actually climb at 850 feet per minute.

From 1954, for another 15 years, one variety or another of the H–13 series was to remain the primary aircraft for all helicopter basic training. It was not until February 1969 that the last one would leave Ellyson.80 In that time, it had built up a legion of anecdotes among Marine pilots. One of the most often told concerned the helicopter’s sensitivity to any shifts in weight from side to side. If the student pilot was to conduct a solo flight, sand bags had to be placed in the aircraft to compensate for the absence of the instructor’s weight. Periodically a student would manage to get airborne on a solo without the sandbags. The helicopter immediately tipped to the right. The hapless pilot was doomed to nothing but a right hand circle until he could swoop low enough for ground crewmen to throw sandbags into the aircraft and correct the balance.81

Some of the TH–13s were equipped with skids, others with conventional landing gear. There was a hearty competition among students to obtain one with wheels. Otherwise the pilot would have to lift the aircraft into a hover and carefully “air-taxi” through the parking apron to the takeoff point. At best, for a fledgling aviator, this is a difficult maneuver. In the close proximity of other helicopters creating their own

The HTL series was used extensively for training of helicopter pilots. This HTL–4, at Quantico in 1951, is rigged for medical evacuation missions.
rotor down wash while taxiing, it was guaranteed to receive critical appraisal from the instructor. It was much easier with wheels.

Advanced training was conducted in a variety of aircraft. Initially there were HRS–1 and —2s (early models of the CH–19) and HUPs. The HUP was a Piasecki-designed, tandem-rotor utility helicopter that was a direct, if distant, ancestor to the CH–46.

The year 1963 marked a turning point in the training of Marine Corps pilots. By that time most of the advanced training was accomplished in the ubiquitous UH–34. The original requirement that only experienced aviators could receive the specialized helicopter training had been dropped in the early 50s. Helicopters were now an advanced phase of normal flight training. The students who reported to Ellyson had received almost 200 hours in fixed-wing propeller trainers. Many were cadets, though the number of officers was increasing. The syllabus which had been set at 60 hours—half in the TH–13, the rest in the UH–34—was to be expanded up to 80 hours “as personnel, and aircraft availability permit.”

The year also marked the last time more new Marine pilots would be trained in fixed wing than in helicopters. In July 1964, at the General Officers Symposium, Brigadier General Louis B. (“Ben”) Robertshaw, DC/S (Air), explained the program. General Robertshaw, a graduate of the U.S. Naval Academy in 1936, and captain of its football team, had served as an infantry officer for six years prior to entering flight training in August 1942. He had replaced General Anderson in October 1963. He explained that in FY 64 only 40 percent of the pilots needed by the Marine Corps were in helicopters. In three years, however, the total would be 60 percent. “The result is a complete reversal of the distribution ratio of pilots.”

The changes in the ratio in training “were necessarily gradual in order to avoid radical changes in the training command.” In FY 64, 51 percent of the new pilots were to be helicopter qualified. An additional eight percent would be added in FY 65 and by FY 67 almost two-thirds of all pilots would be trained in helicopters. He went on to explain that even this would not meet all the requirements but that the forced transition program had been successful. It provided an additional source.

Training of helicopter pilots had come a long way since Colonel Dyer and his officers had made the first attempts at HMX–1. But there was other training to do. Once again it was the pioneers at HMX–1 who started it all.

Crew Training

Helicopter maintenance requires a high caliber mechanic. No man can bluff his way through this kind of maintenance. The helicopter mechanic must know much more about fundamental mechanical principles and be able to put them into practice. The pilot's safety depends on practically every small part . . . of the helicopter.

As Colonel Dyer was explaining the helicopter program to prospective pilots in 1947, he also was attempting to obtain the necessary enlisted Marines. He remembered that “I drew up a table of organization and although my ideas were cut down considerably by HQMC, I nevertheless ended up with approximately 81 enlisted men.”

“These were all people who were former aviation mechanics, electronics people, parachute men,” and other specialists drawn from other aviation units. The helicopter presented new and complex machinery. The new technicians had to be trained. Colonel Dyer arranged for the Marines to attend the Sikorsky Aircraft service school as well as to study at Lakehurst. The first aircraft mechanic assigned to a Marine helicopter squadron was Technical Sergeant Robert V. Yeager, who joined HMX–1 on 21 January 1948. He arrived from Lakehurst two weeks before the Marine Corps received its first helicopter. From this tiny nucleus was to grow a major educational effort. HMX–1 continued to train mechanics, but it soon became apparent that additional sources were necessary. The Naval Air Technical Training Command at Memphis, Tennessee began to teach helicopter mechanics. By early 1952, the Class “C” School in helicopter fundamentals lasted eight weeks and included 320 hours of instruction. In July 1956 it was further expanded. In addition to the standard eight-week school in reciprocating engines, there was a four-week course emphasizing helicopter fundamentals.

Even this was not enough. Starting on 5 February 1958 the training was reorganized. The new 12-week instruction was designed solely for helicopters and had major new material in “engine principles and flight transmissions and controls.” The school was unusual in several respects. It was the only one like it in the Navy and was staffed entirely by Marines. Master Sergeant John P. Maughan, with four years of experience in helicopters, was in charge of the operations. He and his fellow instructors had devised a schedule which required a total of 464 hours of instruction, 314 of which were spent on actual application of the classroom

* Master Sergeant Mounts, one of the NAPs, also carried the occupational specialty rating of aircraft mechanic.
knowledge. As helicopters became increasingly complex, the length of the schools grew correspondingly. In 1965 it was 23 weeks. The same year the Marine Corps had a requirement for 1,465 reciprocating helicopter mechanics just for the HR2S and the UH–34. A program to retrain these Marines into the new helicopters with jet engines had been started.

Regardless of where they were trained, helicopter mechanics were—and are—a unique breed of Marine. The intricacies of the rotor systems demanded a new level of dexterity. As constant attention to proper lubrication was required, most mechanics spent much of their time balanced precariously on top of the aircraft, grease gun in one hand, holding on with another and simultaneously operating the lubricating pump. The power blade folding of the “Deuce” was but one of the ways they could be unexpectedly drenched in red hydraulic fluid. They learned a little bit about electrical systems, hydraulics, avionics, and even metal-smith procedures.

One advantage—in their eyes at least—they did have: they got to fly in the product of their labors. The mechanic normally served double duty as the airborne crew chief of his aircraft. Here they were called upon for still further demonstrations of their versatility. When carrying a load externally underneath the aircraft, the pilot could not see the cargo, and the crew chief, acting as an observer, carefully guided the pilot to the precise location necessary to pick up or drop the load. Likewise, when landing in a confined area, the crew chief kept careful watch to the rear of the helicopter to insure the rotors were clear of the trees.

The close coordination and cooperation necessary between the crew and the pilots occasionally got reinforcement. Master Sergeant Jerome P. Sullivan, a crew chief on both the “Deuces” and the UH–34s in the early 1960s as well as later helicopters, recounted a typical mission: “We had to fly an HR2S from New River up to Norfolk to put on a short demonstration. On takeoff from New River, one of the tires on the left landing gear blew out.” This could be a problem, but since there were two wheels on each side, “the pilot decided to go on to Norfolk and ask for a precautionary emergency landing. On touch down, the other left tire blew out. I tried to find another tire but there weren’t any to fit.” Sergeant Sullivan and the pilots completed the demonstration anyway and without relanding headed back to New River. Shortly after leaving the Norfolk area the pilot called and announced that the temperature of the oil in the main transmission was rising at an alarming rate. “That meant that the strainer (for the lubricating oil) was clogged and we had to make an immediate emergency landing. The only clear spot we could find was in the middle—of all things—a pig pen.”

But the pilot “made a safe landing and shut down. Then we drained the oil, cleaned the strainer and put fresh oil back in the transmission.” The flight continued, but shortly was interrupted again. The radios failed. Still without tires on the left side, the pilot diverted to the Coast Guard Air Station at Elizabeth City, North Carolina, and made another emergency landing. “We went over to the maintenance people,” Sergeant Sullivan remembers:

... and we got the radio fixed and took off. We called ahead to let New River know we didn’t have any tires on one side and would land in the grass. Somehow the word got scrambled, and when we got to the field all the crash trucks were out for an emergency landing.

“You know,” the crew chief mused, “it isn’t every airplane crew that can have four emergency landings on the same mission in a single day, and still get the job done.”

Sometimes the cooperation among the crews was not the result of mechanical difficulties. A typical, if not routine, mission occurred in 1961. A piece of classified equipment had fallen off a fixed-wing aircraft over the water near the island of Hawaii. Four UH–34s from the Kaneohe-based HMM–161 were dispatched to search for the device. Once again Sergeant Sullivan found himself in austere conditions. “Our base was on an old lava flow near the beach. There was no way you could set up a tent, so we all, pilots and mechanics, just lived and slept in the airplanes together.”

For two weeks the pilots and crews “would go out and fly all day, and come back and land on the lava. Then everyone pitched in to conduct the required maintenance on the airplanes before crawling inside to go to sleep.”

Crew chiefs became very possessive of the helicopter assigned to them. Most christened their aircraft with nicknames, such as the Road Runner, Champagne Lady, and Coyote—or any other one that struck their fancy. A crew chief always referred to a helicopter in a personal fashion as “my airplane,” or “Corporal Smith’s airplane.” They were usually prepared for the worst and “always carried shaving gear because when you went out on a normal mission you never knew when you might be out for a couple of days.”

The feats of helicopter crew chiefs are legendary. They casually performed miracles of repairs in the middle of isolated clearings. They leaped from hovering helicopters to rescue injured persons. They guided the pilots into landing zones that seemed impossibly small. And through it all, they remained consistently cheerful. The tight-knit team of pilots and crew chief
"ASE"* flies the airplane, the instruments steer.
We do all the fighting and maintain the gear.
We give our two pilots the courage it takes,
To face one more day of the same old mistakes."

Marine helicopter crew chiefs were—and are—ingenious, inventive, universally talented, totally dedicated, and prodigious workers. No pilot has ever served with them and not come away amazed at the caliber of men who maintain the aircraft.

Flight on Instruments

If there ever was one single point in the development of helicopters where all the difficulties came together, it was flight on instruments. The basic aerodynamics of the machines, the training of the pilots, and the foregone conclusion of a second-class status all combined to produce a problem that challenged even the most perceptive proponents of vertical amphibious assaults.

The pilots of the early helicopters did not fly in clouds or at night except in extreme emergencies. The assumption was that they did not know how. Much to the contrary, as experienced fixed-wing pilots, all of them were well trained in instrument flight techniques and were perfectly capable.

The truth of the matter was that the aircraft themselves were so unstable that no one could control them without seeing outside the cockpit. Flying by utilizing only the instruments in the aircraft by its very nature requires small deliberate corrections of the controls. Any drastic changes became self-compounding and the result is usually what is termed "an unusual attitude." In a fixed-wing aircraft, there are emergency procedures which can be utilized to recover back to normal flight. In an early helicopter there was "virtually no such thing as recovery from an unusual attitude."\(^{95}\)

HMX–1 and the Navy squadrons all conducted experiments in the early 1950s to establish methods to conduct instrument flight. The progress was discouraging. The problems of instability defeated all but the most modest attempts. One report noted that "future helicopters will be provided with automatic pilots which will equip the helicopter with 'mechanical' stability and relieve the pilot of the stress and strain now existing in controlling instrument flight."\(^{96}\)

Any significant capability would have to wait until the design and introduction of helicopters with stability systems. The first two to meet those requirements with any degree of success were the mighty "Deuces" and the UH–34, but the problem was not yet solved.

\(^*\) The term HAC, pronounced "hack," is a Helicopter Aircraft Commander. ASE, pronounced "ace," is the Automatic Stabilization Equipment on an UH–34.
No instruments were available which recognized that helicopters are different. Instead, instruments designed for fixed-wing aircraft were used. Two were particularly important. The artificial horizon appears as a primitive visual aid has been provided to augment the earth. The replica of the airplane moves exactly as does the aircraft itself. The background, however, contains a powerful gyroscope so that it always remains parallel to the ground. The effect is similar to what a pilot would be observing outside on a clear day, his aircraft moving against a fixed horizon. In a conventional airplane such an arrangement accurately portrays the attitude of the fuselage and thus of the wings. In a helicopter, with the rotor constantly moving in different planes, particularly when maneuvering, the fuselage seldom is pointed in the same direction as the rotary wings. The artificial horizon indicated the relationship of the cockpit to the ground, but not the rotor blades, yet the rotor blades controlled the flight. Thus the helicopter pilot found his most valuable instrument usually inaccurate and sometimes grossly so. No one but a helicopter pilot would have accepted an airplane for instrument flight with such a situation existing. Helicopter pilots had to. It was the only thing available.

The second instrument was the air speed indicator. Valuable at any time in flight, this instrument becomes critical on landing and takeoff. In both a fixed-wing aircraft and a helicopter, the pilot requires an exact knowledge of how fast he is going to accomplish a successful maneuver. Once again the helicopters were equipped with an instrument which was designed for fixed-wing aircraft. In this case, the down-wash from the rotor would render the airspeed indicator almost useless below 40 knots—just when the information was most critical. At low speeds it was impossible to tell if the aircraft was moving forward, sideways, or even backward. Other instruments installed in helicopters were similar. Attempts to provide instruments specifically designed for helicopters were continually frustrated by high costs, weight, or unacceptable complexity.

In spite of the limitations of the stability systems and instruments, by the late 1950s UH-34s and HR2Ss could be found flying in the clouds, particularly up and down the east coast. The situation at Santa Ana was somewhat different. Any aircraft which flies on instruments usually proceeds along a regular route structure. These highways in the sky are controlled by the Federal Aviation Agency (FAA) and are subject to strict rules and regulations. One of them is that an aircraft must be at least 2,500 feet above any mountains which border the airway. Located in the Los Angeles basin, Santa Ana is ringed with mountains. With the additional height required by FAA, the minimum altitude a helicopter could fly on instruments often reached almost 10,000 feet. Even if the helicopter could fly at that altitude—and most could not—the ever-present effect of the thinner air reduced its payload and controllability to a marked degree. The pilots on the West Coast were, for all practical purposes, limited to a small stretch from San Diego to Los Angeles to practice instrument flight on airways. In addition, the presence of the slow moving helicopter created coordination problems with faster fixed-wing aircraft. Most controlling agencies preferred that the helicopters practice somewhere else.

Training on airways was vital, but it ignored a very basic point. Airways flight presupposed that the helicopter would take off and land at an airport. If an airport was available, why utilize a helicopter? Fixed-wing aircraft could do the same task more economically and certainly with more speed and comfort.

If the unique characteristics of a helicopter were to be used, the aircraft had to fly on instruments and land in a small unprepared clearing. Such a mission was an entirely different one than flight on airways. The difficulty was complicated in mountainous terrain. Where a conventional aircraft seldom operated below the tops of the mountains on instrument flight, a helicopter—if it was to perform fully its assigned mission—was seldom going to fly above the tops. It had to be able to navigate at night, in the rain, amid narrow valleys and hills, locate a zone, and make a successful landing. If the pilot committed an error, the result was the same as for his fellow aviator flying jets. All were dead.

By the end of December 1959 enough progress had been made to require all helicopter pilots to be fully rated for instrument flight. The problem of precise navigation off the airways remained.

Several solutions were proposed. In December 1961 the ever-inventive Colonel Archie Clapp described his latest ideas in an article in the Marine Corps Gazette entitled “The Missing Link: All Weather Terminal Guidance for Helicopters.” As of now,” he wrote, “helicopter operations into rugged, unfamiliar terrain under instrument flight condition (i.e., dark, nighttime or low visibility day-time) is an undertaking bordering on Kamikaze tactics.” Colonel Clapp described the procedures that had to be used:

The only equipment now available in the FMF for guiding helicopters from initial point to landing zone touchdown is the helicopter pilot’s eyeballs. One rather primitive visual aid has been provided to augment the eyeball, but that’s all. Therefore a night approach into rugged terrain goes something like this: The helicopter pilot studies a contour map of the landing point and determines the best avenue of approach and retirement.
based upon surrounding terrain and prevailing wind. He then predicts the altitude he must have at various checkpoints along his route in order to clear the terrain.

With this planning behind him, the pilot reaches the initial point... and commences an approach to the landing site. When (and if) he gains visual contact with the ground, and if the Pathfinders* have accurately set up the best equipment available to them, the pilot sees a light which is either red, amber, or green.

This approach light is a reasonably good aid for establishing a specific glide angle in flat terrain. As a life or death terrain clearance device, however, it is totally inadequate. And, of course, it is completely useless if clouds must be penetrated during the approach.60

Colonel Clapp came to the heart of the problem.

It is difficult to believe that this approach light is the best landing aid our advanced technology can produce. Rather than being technologically infeasible, it is more likely that we don’t have an adequate landing aid because of lack of familiarity with the problem.60

It was often difficult to explain to a non-helicopter pilot why old fixed-wing instruments were not entirely satisfactory, why it was difficult to obtain sufficient practice even on airways flight, and just what were the hazards of instrument flight in mountains.

He went on to call for an electronic device which would allow the helicopter to home in on it. It should be capable of establishing the direction to the zone, and a gradual rate of descent for:

The helicopter cannot fly directly over the landing site at cruising altitude, stop and descend like an elevator to the site. As absurd as it might sound, this was proposed by one of the more reputable electronic engineering firms.61

Ignorance of ground effect and power settling (another characteristic of helicopters) was not a limited commodity.

Four years later in 1965 this same primitive approach light system was still in use. It was all that Colonel Kleppsattel and the pilots of HMM–264 had in the Dominican Republic. The different colored lights appearing out of the rain and darkness of the polo field provided the only final guidance for landing. Fortunately, the area was relatively flat.

Two months before the publication of Colonel Clapp’s article, another proposal was made. The concept was different but could be complementary to his suggestion on terminal guidance. On 6 October 1961, the Landing Force Development Center at Quantico had sent a letter to CMC proposing a development characteristic for a “Self-Contained Navigation System for Helicopter” (SCNS).62

Colonel McCutcheon approved the proposal and on 4 December forwarded it to the CNO.63 The Development Characteristic, No. AO 12501–2, was “designed to provide an advanced navigation system for incorporation in the follow-on aircraft to the HUS and HR2S” either on the production line or in a later modification.64 The major features called for a capability to provide “sufficient information for enroute navigation of helicopters under all weather conditions, over any type of terrain or water, so that after a flight of one hour’s duration during which the helicopter has traveled a distance of at least 100 miles,” the airplane would be no more than one-fourth nautical mile from its intended position.65

Other features were the ability to operate in flight at a speed of 10 knots backwards to 175 forward. The terrain following was to be such that it must “permit the helicopter to operate with confidence over completely obscured unfamiliar terrain with a flight path” 200 feet above the hills and valleys.66 Though not required, it was desirable that the system be able to detect wires, cables, or antenna which might obstruct the flight path. The equipment would be required to allow large formations of helicopters to make assaults so a specification was included which could permit up to 32 aircraft “to proceed in company without visual reference to each other.” 67

Finally, the SCNS had to be ready for operational testing prior to 1 July 1964. It was not until 19 March 1964 that the CNO published the Specific Operational Requirements (SOR) No. W–14–09 which set out the details of an all-weather system for Marine helicopters.68 The concept still included all features of the SCNS, but had been refined and expanded. The new total package was to be called the Integrated Helicopter Avionics System (IHAS). It was to be a computer-controlled system which could present accurate displays to the pilot of his position, the terrain around him, and other aircraft in his formation, all of which could be fed into an automatic flight control system. Three contractors had conducted previous studies on the feasibility of IHAS. They were Texas Instruments, Nortronics, and Teledyne System Company.69

In March 1965 Teledyne was awarded a contract to produce four prototype IHAS sets, SCNS was to be a separate component included in the overall system. IHAS represented several firsts in the DOD and Navy development procedures. “The most significant was that this was the first time the Navy had given a single contractor responsibility for the entire avionics package of an aircraft.” 70

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*a Pathfinders are small teams which precede the first helicopters into the landing zone. They provide final guidance to the correct location for the aircraft.
The idea of such a system was so promising that the U.S. Army, in 1962, joined the program. In late 1964 DOD directed that the Navy and the Army would both share the cost on a 60/40 percent basis. Two of the completed experimental sets would be used in the Army development of the attack helicopter AH-56, “Cheyenne.” By 1967, however, the difference in requirements had become pronounced and the Army withdrew.

The IHAS was to be developed in three stages. The first would be the SCNS. The second increment would add short range station keeping to allow formation flight on instruments. The third level would be the entire IHAS package. Due to the increase in cost and weight of IHAS, in September 1965 Teledyne recommended only the first two parts be installed in the CH-46. Two sets were ordered for use by Vertol to develop details of the installation. As the equipment was undergoing final design and testing, the Navy ordered sufficient SCNS to equip 91 (later 126) CH-46s and 25 CH-53s. The first flight was to be in June 1968.

It appeared that at long last helicopters would have a full instrument capability in rough terrain. Then, in one of the more frustrating chains of events experienced by the Navy and Marine Corps, the entire concept began to run into difficulty. Testing fell 26 months behind schedule. Cost overruns were encountered which required delicate and lengthy negotiations between the Navy and Teledyne.

It was discovered that when the SCNS was installed in the CH-46, electronic interference blanked out all radio transmissions. In July 1969, after five months of reengineering in a shielded hangar at Vertol, the problem remained unsolved. The last months of 1969 and the spring of 1970 saw one contract after another cancelled due to cost and delays. By the middle of the year, IHAS and all its components were, for all practical purposes, no longer an active program.

The decade of the 60s ended with little progress in instrument equipment for helicopters. A flight into mountainous terrain remained somewhat of a “kamikaze” mission. In view of the difficulties, the fact that so many such flights were successfully completed is a truly memorable chapter in the history of Marine Corps aviation.
CHAPTER FIVE

HELICOPTERS SHOOT BACK

SHUFLY Ends

From 15 April 1962 to 8 March 1965 the brunt of Marine combat in Vietnam was born by Operation SHUFLY. The composition of the unit had remained essentially the same: a squadron of UH–34s augmented by three O–1s and a C–117. The MABS subunit and the small headquarters subsequently were reinforced by a security detachment from the 3d Marine Division on Okinawa.

SHUFLY was scheduled to move from Soc Trang to Da Nang in the summer of 1962. The switch was delayed several times by the strenuous objections of the senior advisor in the delta region, Colonel Daniel B. Porter, Jr., USA, and the Vietnamese commander of the area, Major General Le Van Nghiem. Colonel Porter was aware of the limitations of the Army H–21s which would replace the Marine helicopters. He wrote General Paul D. Harkins, ComUSMACV, that, among other things, “the Marines are better equipped. They have better navigational equipment. They have better maintenance capability. They have better pilots. They have high morale and a will to fly. They can and will fly night operations.”

In spite of the objections, on September 16 the first UH–34s arrived at Da Nang after a seven-hour flight from Soc Trang. The aircraft were from HMM–163, commanded by Lieutenant Colonel Robert L. Rathbun, which had relieved “Archie’s Angels” of HMM–362 a month earlier.

The climate and terrain which confronted the squadron’s “Ridge Runners” when they arrived in Da Nang was very different from the low flat land of the delta. In retrospect the geography of northern Vietnam was to have a major impact on the development of helicopters.

Were it not for the political and military turmoil, the area in which the Marines were to operate could be a paradise for sightseers. Long stretches of white beach border on the South China Sea. The sand is exceptionally fine and in some areas extends several miles behind the surf. Inland, for varying distances but seldom more than a dozen miles, are low-lying farm lands. Much of the area is devoted to the cultivation of rice in small paddies surrounded by clusters of thatched huts and bamboo hedgerows. All of the coastal plain is laced with rivers, streams, and canals which not only serve as irrigation for the rice and a source of fish, but also represent the complete transportation system. Roads are scarce and crude.

Arising abruptly from the low lands are the ramparts of the Annamite Cordillera, a chain of precipitous mountains which runs along the spine of most of Vietnam. Ranging up to 5000 feet high, the mountains have deep gorges cut through by rushing rivers. They are covered with a triple canopy jungle growth of teak and other tropic woods. A few openings exist which allow elephant grass to grow to heights of 10 to 12 feet. Just north of Da Nang, the mountains reach the sea at Hai Van Peninsula, effectively separating the population north and south of it.

Even the weather is different from that which prevails in the delta. From October through March the area is under the influence of the northeast monsoon. Rainfall increases in intensity until the end of January. During the monsoon, a phenomenon occurs which the French called the “crachin” with winds of up to 50 knots and fog and drizzle mixed with the rain. Cloud ceilings lower below 200 feet with visibility restricted to less than a half mile. The crachin may last for a few days early in the season to several weeks during the height of the monsoon. By April the weather begins to clear and the summer is hot, dry, with generally clear skies.

The effect of the weather and terrain was summed up by Lieutenant General McCutcheon:

The northeast monsoon had a direct impact on all military operations in the area and especially on air operations. Because they can operate with lower ceilings and visibility minimums than fixed-wing aircraft, the helicopters would often perform their mission when the fixed-wing could not, at least along the flat coastal region. Inland, however, the hills and mountains make even helicopter flying hazardous at best. The pilots all developed a healthy respect for the northeast monsoon.

Beginning in the fall of 1962, the pilots and crews would have additional time to gain that respect. The
tours in Vietnam were extended to six months at the request of Colonel Julius W. Ireland, who had replaced Colonel Carey as the task unit commander on 1 July.³

A year later, in 1963, it appeared that SHUFLY had accomplished its mission. More than 1000 Americans were to be withdrawn by the end of December, and the Marines at Da Nang were to be included.⁴

Within a month after the announcement, their departure had been delayed until sometime in the first half of 1964. The reason was that SHUFLY was about to add another mission to its combat role. It was to train Vietnamese pilots and crews in the UH–34. At the conclusion of the training the Marine helicopters were to be turned over to the Vietnamese Air Force (VNAF).

In September, CinCPacFleet, Admiral Thomas H. Moorer, established a schedule which called for the training to be complete and the aircraft turned over by 31 March 1964. Immediately, the Commander Seventh Fleet, Admiral Roy L. Johnson, registered an objection. When the Marine helicopter units were operating from an LPH they were a part of his force. The admiral long had thought there should be three helicopter transport squadrons available and only recently had won approval of his plan. If the UH-34s were turned over to the Vietnamese, he would have three squadrons, but aircraft enough for only two. He was assured that, if the transfer plan were adopted, replacement aircraft would be provided at the appropriate time by diverting helicopters from the Sikorsky production line to Far East-based MAG–16. In November, the JCS directed Admiral Ulysses S. G. Sharp, CinCPac, to comment on the proposed extension of SHUFLY beyond the originally contemplated December withdrawal date. A series of conferences and consultations resulted in a recommendation that Marines remain until 30 June 1964. This would provide ample time to complete the training and effect the transfer of the aircraft. On 22 January, the JCS approved.⁵

The task would fall first to HMM–362 commanded by Lieutenant Colonel John H. Lavoy. A pilot who had flown helicopters in combat during the Korean War, he had arrived with his squadron in Da Nang on 1 February as the relief for HMM–361. The first training flights with Vietnamese pilots came three weeks later.⁶

Sufficient progress had been made by late April that General Harkins reaffirmed the termination date as 30 June. The 24 UH–34s to replace those turned over to the VNAF had arrived in Okinawa during the first part of the month. It appeared that the Marine Corps commitment to Vietnam once again was going to be reduced to advisors (the numbers of which had expanded considerably since the inception of SHUFLY), staff officers, and specialized communications personnel. As the date of the turnover approached, Lieutenant General Victor H. Krulak, Commanding General, Fleet Marine Force, Pacific, recommended that the squadron be indefinitely retained in Vietnam. It was providing operating units valuable training and experience.⁷

Three weeks before the extended withdrawal date, on 10 June 1964, JCS approved the recommendation to continue Operation SHUFLY. Nine days later, the aircraft were delivered to the VNAF. On 23 June, HMM–162, under the command of Lieutenant Colonel Oliver W. Curtis relieved HMM–364. The training program was not completely terminated. In August, ComUSMACV directed that an additional 97 VNAF pilots and 45 helicopter mechanics receive instruction. The training, however, was not to take precedence over combat operations. By early 1965, combat commitments consumed almost all of the available helicopter flights and only a few more Vietnamese pilots completed the course.⁸

The training program conducted by the SHUFLY squadrons had mixed results. The Vietnamese often lacked the mechanical skills necessary to repair the aircraft. Progress in learning how to keep the helicopters flying was slow.

With one short exception, the SHUFLY squadron represented the only Marine Corps aircraft in Vietnam. In November, Typhoon “Kate” devastated the northern coast of the nation. Lieutenant Colonel (later Major General) Joseph Koler, Jr., in command of HMM–365 in Da Nang, was directed to rescue thousands of inhabitants who were marooned by the flooding rivers and paddies. The SLF squadron was on board the USS Princeton at Hong Kong, conducting a routine port visit. On 12 November the ship was ordered to proceed to the coast off Quang Ngai, south of Da Nang, so that HMM–162 could assist in the relief efforts. Lieutenant Colonel Curtis and his squadron arrived on 16 November and did not complete their mission until 23 November. During those few days for the first time, more than one Marine squadron operated within the country.

Land the Landing Force

The latter part of 1964 witnessed a growing escalation of the United States commitment to combat in Southeast Asia. Laos remained a thorny problem. A frustrating series of political coups in South Vietnam sapped the military energy of the nation. Then, on 4 August, North Vietnamese patrol boats attacked two U.S. destroyers on patrol in the Gulf of Tonkin. Re-

80 MARINES AND HELICOPTERS, 1962–1973
taliatory air raids were ordered but brought no lessen-
ing of North Vietnam’s support of the Viet Cong. The
security element of SHUFLY was exchanging fire with
snipers on an almost regular basis. The airbase at Da Nang became seriously threatened. On 7 March 1965 (6 March, Washington time), the JCS sent the long-
waited signal: land the Marines at Da Nang. 9 10

In a quick two-way switch, Lieutenant Colonel
Koler’s HMM–365, which was back on board the
Princeton, delivered its equipment and aircraft to Da Nang on the 9th. The officers and men from HMM–162 were flown from Futema to Vietnam the same day
and took over the helicopters. The personnel from
HMM–365 reembarked on the Princeton and sailed to
Futema to accept the equipment of HMM–162. On 3
May, VMO–2 arrived from Futema. Its complement of
aircraft included three additional 0–ls, and most im-
portant, six armed UH–1Es. 10

By April 1965, all elements of the Marine air-
ground team were finally reunited. It had been a
long, sometimes lonely, existence for the Marines of
SHUFLY. The three years of continuous combat since
Colonel Clapp and his “Angels” arrived at Soc Trang
had provided the Marine Corps with a wealth of ex-
perience. The lessons learned were to dominate the
development of helicopters for the next decade. One of
the first questions to which the Marine Corps tried to
apply its SHUFLY experience was that of arming and
arming helicopters.

Armoring

On introduction of Marine helicopter squadrons into
the Republic of Vietnam, only the UH–34 was involved.
At that time no armor plate was installed on the air-
craft. As the intensity of enemy resistance increased, it
became clear that some type of armor was needed for
protection of both aircraft and crew.

CGMFPac message to CMC. 11

In the Marine Corps, helicopter damage from hostile
fire was not a new experience. Over 12 years before
SHUFLY began, on 20 September 1950, an H03S–1
observation helicopter was struck while on a recon-
naissance mission in the vicinity of Inchon, Korea. 12
The pilot was able to land safely. The incident is the
initial one recorded of a Marine helicopter receiving
combat damage. Not so fortunate was First Lieutenant
Arthur R. Bancroft. Just nine days later, his helicopter
was hit and exploded. Lieutenant Bancroft was the
first Marine helicopter pilot killed in action. 18

In Vietnam, on 23 April 1962, the first SHUFLY
helicopter received combat damage. Again, as in
Korea, the pilot was able to land safely. It was not
until the first week in October that a Marine became a
casualty. A crew chief, Lance Corporal James I. Mans-
field, was wounded while on a flight to an outpost near
Da Nang. 14

In the time between the incidents involving Lieu-
tenant Bancroft and Corporal Mansfield, the Marine
Corps had made a number of studies of protective
armor for helicopters. One, in 1960, had concluded
that “passive protective measures in the form of armor
kits for aircraft and protective vests and helmets for
crews must be provided for presently operational heli-
copters.” 15 Subsequently it was suggested that the
concept be expanded to include “a means to protect
assault airlift pilots and embarked troops from small
arms fire and fragments.” 16

Any attempt to add armor plate to helicopters had
to resolve two problems immediately. First, it never
had been the intention of the Marine Corps to utilize
these aircraft to conduct assaults on heavily defended
positions. The vulnerability of helicopters had been
recognized and appreciated for a long time. The sec-
ond problem was that, at least until the introduction of
the HR2S and the UH–34, most Marine helicopters had
difficulty lifting any appreciable payload much less the
weight of armor platting. General Binney, Director of
Aviation at the time of the suggestion to provide pro-
tection for the embarked troops, responded “the weight
penalty of arming the entire troop cabin area will
prove to be prohibitive . . . and probably approach a
50 percent reduction in payload.” 17

In the first three and a half months of operation in
the Mekong delta, all but six of Colonel Clapp’s heli-
copters had been hit at least once by enemy fire. 18 A
study conducted by the Marine Corps Operational
Analysis Group pointed out that “four hits, involving
three helicopters, were taken in the oil system early in
the tour of HMM–362 and directed attention to the
vulnerability of this area.” 19 The report concluded,
“However, whether protection of this area alone is
worth an armor penalty of 200–300 lbs or whether
rather some lesser degree of protection should be pro-
vided to a wider area of the helicopter is an interest-
ing question in view of the hit experience.” 20

Because the helicopter was operating in close prox-
imity to the enemy, the shots did not seem to indicate
any particular pattern. They were peppered all over
the aircraft. Battle damage did not lend itself to sta-
tistical analysis. A solution to the difficulty continued
to be elusive for the rest of the war. One effort, much
later, was instituted by a team of systems analysts.

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6 For more information see: Jack Shulimson and Maj.
Charles M. Johnson, U.S. Marines in Vietnam, 1965: The
Landing and the Buildup (Washington: History and Museums
Division, Headquarters, U. S. Marine Corps, 1978.)
They “prescribed the criteria for describing the intensity of enemy fire thusly: 1–15 rounds per minute—light fire. 16–30 rounds per minute—moderate fire. 31 and over rounds per minute—intense fire.” Lieutenant Colonel Bertram W. McCauley described the results:

On after action reports we were required to use these terms to describe enemy fire we encountered on a mission. One of our pilots, after a particularly ‘airy’ fight, wrote the word ‘withering’ under the description of enemy fire. The next day he got a phone call from an indignant systems analyst asking just what constituted ‘withering fire’ to which our stalwart aviator replied: ‘One round through the cockpit!’"  

Regardless of the definition, in 1962 the Marine Corps took immediate steps to provide armor for the SHUFLY helicopters. General Anderson reported in October that “it has been determined that the UH–34 helicopter was extremely vulnerable to small arms fire in the area of the oil cooler system. A program to fabricate easily installed armor kits . . . was initiated in June.” Due to the time required to manufacture them, “it was decided to procure a limited number of interim kits made of aluminum and then follow-on kits of armor plate.”

The first sets, which consisted of a large protective shield bolted under the bottom of the oil cooler, were shipped to Da Nang in the late summer. They added 160 pounds to the weight of the UH–34 but were effective against .30 caliber gun fire. Eventually further modifications were incorporated and by 1965 the kit weight was approximately 200 pounds.

Protection for the pilots and crew chief was initially provided by standard Navy-issued flak suits. This armor, however, was designed for a person standing erect. When worn sitting down “gaps around the waist and pelvic region” were created and further modifications had to be made.

In 1964, in conjunction with the U.S. Army, the Marine Corps developed a “light-weight plastic . . . dual package outfit consisting of an ‘air crew protection’ component and a ‘vital parts protection’ component.”

The crew system consisted of a seat plate, a back plate, and side plates for each pilot. It weighed approximately 225 pounds. Similar kits were planned for the UH–1E, the CH–46, and CH–53. Further developments beyond these were stymied by the problem of loss of payload. In late 1965, DC/S (Air). General Robertshaw, concluded that “it appears improbable that complete armor protection for helicopters . . . can presently be provided for routine operations.” He continued:

For the present some helicopter crew protection can be provided, but transparent panels cannot be armored. The prohibitive weight penalty involved in arming the helicopter cabin compartment will require the embarked troops to rely on body armor for protection.

Until lighter material and body armor . . . can be developed, the Marine Corps will continue to provide armor protection only for aircraft crew members and vital aircraft components.

As limited as the armor protection was, the additional weight combined with the climate and geography of Vietnam significantly reduced the capability of the UH–34. General Krulak sent a message outlining the difficulties:

Squadrons in RVN (equipped with the UH–34) operate with reduced fuel loads of 1000 vice 1500 lbs leaving a residual lift capability of only 1300 lbs. If the particular mission requires a full fuel load of 1500 pounds, compensation has to be made by reducing the payload of either cargo or personnel to about 800 pounds.

He went on to plead for no more armor than absolutely necessary, though he did conclude that the UH–1E possibly could use more than it had.

Even armor was not enough. A method had to be devised which would allow an attack to be made on any enemy shooting at the helicopters. The problem was approached from several different angles.

**Helicopter Escorts**

Attack aircraft, naval gunfire, and artillery prepare the landing zones and approach and retirement lanes by destroying known enemy threats prior to the arrival of the first helicopter wave. Attack aircraft provide protection for helicopters traveling to and from the landing zones. They also provide close air support for the helicopter-borne force.

Classic Marine Corps doctrine was explicit. Protection of the helicopters was the mission of fixed-wing aircraft. Unfortunately, not until April 1965 were Marine Corps attack aircraft permitted in Vietnam. In the meantime, the SHUFLY squadrons had to rely on aircraft from the Vietnamese Air Force, some of which had American co-pilots. The escort consisted of propeller-driven T–28 two-seat trainers and large, single-engine, attack aircraft of the post-Korean War era, the Douglas-built AD series. Occasionally a twin-engine World War II bomber, the B–26, would be added to the protecting air cover. The results were not totally satisfactory. First, there were seldom enough escort aircraft available to neutralize the enemy effectively. Communication between the Marines and the Vietnamese pilots was often difficult. One study conducted
in 1962 regretfully concluded: “Preparatory strikes in the Landing Zone or objective area were not made regularly, although supporting air would make an exploratory pass.”

Part of the reluctance to provide full support was based on the complications of:

... the indistinguishability of the fleeing VC from frightened civilians; the lack of definition of front lines, and the resultant reluctance of ground commanders to call in ... strikes when the location of friendly forces was unknown.

The most serious difficulty was that the training of the Marine air-ground team in close cooperation was not being put to use. Marine attack pilots understood what was required to protect the helicopters, and Marine helicopter pilots knew how best to utilize the protection, but political considerations kept them from working together.

Jets were not the only solution. A requirement for a smaller, less expensive escort long had been recognized. The early reports coming out of the Mekong Delta stirred renewed interest in a Light Armed Reconnaissance Aircraft (LARA).

**Early Studies of the LARA**

On 25 July 1962, General Shoup asked the CNO to provide six T–28 aircraft to evaluate “reconnaissance, target-marking, escort and protection of helicopters ... and for limited close air support in lightly defended areas.” He further proposed that the aircraft be considered for a replacement of the fleet of aging 0–1 observation planes.

The T–28 was familiar to most Marine pilots. Since the middle 1950s it had been utilized as an intermediate trainer at Pensacola for all pilots. Equipped with a Wright 1820 engine, which was a very slight modification of the one installed in the UH–34, the two-seat trainer had performance roughly equal to the best combat aircraft at the end of World War II. There would be no problem finding pilots capable of flying the North American Aircraft product.

Though General Shoup had requested six of them, the number was subsequently reduced to only four. They were assigned to VMO–6 at Marine Corps Auxiliary Air Field (MCAAF), Camp Pendleton, California. Two of the aircraft were modified with two .50 caliber machine guns housed in pods, and all were to have six bomb racks installed on the wings. The first T–28s arrived at the squadron in February 1963.

Even as the evaluation was beginning, an urgent need developed for the assignment of the aircraft elsewhere. Reports from SHUFLY indicated increasing enemy resistance in the Da Nang area. The VNAF escort was too limited to ensure helicopter assaults without considerable battle damage. On 29 March 1963, General Shoup advised FMFPac that “in order to preclude further hazards of the UH–34D helicopters in fire suppression missions in Vietnam it is desired that a fixed-wing attack capability be provided to HMM–162 (the SHUFLY squadron) at the earliest possible time.” The introduction of Marine jets at the moment was still a political impossibility, so the Commandant went on to request that FMFPac “initiate action to provide support by suitably configured T–28 aircraft.”

FMFPac answered that the 0–1s were badly in need of replacement anyway and assigning T–28s “would place the helicopter squadron in a position to implement a fixed wing support/armed reconnaissance role from within our own resources.”

Considerable discussion of the proposal followed throughout the Pacific area commands. Finally, General Harkins cabled from Saigon that he did not concur with replacing the 0–1s with the T–28s. He had no objection, however, to testing the four aircraft in helicopter escort roles.

Three days later, on 5 May, Admiral Felt, CincPac, put the entire plan in abeyance. The withdrawal was scheduled the following month and SHUFLY would then be terminated. This revised schedule to withdraw the Marines cancelled the entire project. By the end of the year the evaluation at VMO–6 was complete and the aircraft reassigned. They never were shipped to Vietnam. Marine helicopter pilots still were without Marine escort aircraft and would be for another year and a half.

**Arming the Transports**

If the limited fixed-wing support available before 1965 could not suppress enemy fire, the transport helicopters were not completely defenseless. The crew could shoot back. One of the earliest examples of a
helicopter crewman firing at the enemy was recorded in 1953. Staff Sergeant Leo A. Masud in Korea had used a sniper rifle from a CH—19. The accuracy obtained from shooting out the door of that unstable, primitive helicopter, unfortunately, was not recorded. Vietnam was somewhat different.

When he arrived in Soc Trang, Colonel Clapp “decided not to install machine guns on the helicopters as the Army had done.” The principal reason was that such an installation would partially obstruct the door on the UH—34, and thus slow up the exit of the assault troops. Colonel Clapp “figured that our best defense was to hold our time on the ground in the landing zone to a bare minimum.” To accomplish this, the cabin door had to be clear of any machine guns. The crew chief and the co-pilot were armed with submachine guns. “They, of course, fired only when they could see a VC soldier firing at us.” The results were not all that could be desired. A study of operations in the delta concluded that “it can be stated that neither the presence of fixed wing air cover, nor chance of fire from the helicopters appear to deter the Viet Cong from firing.”

By the fall of 1962, the grease guns had been discarded in favor of a M—60 machine gun mounted in the door and fired by the crew chief. The objections of Colonel Clapp had fallen victim to the increasing boldness of the VC in shooting at helicopters. Two lightweight AR—15 automatic rifles also were carried in each aircraft. One was “available in the cabin and one operated by the co-pilot. The forward cabin window on the left side has been removed to permit firing from the left side of the cabin.”

In February 1963, the JCS temporarily authorized a change in the rules of defense for helicopter crews. The crews now could “engage clearly defined VC elements considered to be a threat to the safety of the helicopters and their passengers.” The authorization to shoot before being shot at, however, lasted less than a week. Another change in the rules again permitted return fire for “defensive purposes only.”

The definition of “defensive purposes only” seemed to lose something in the transmission from Washington to Marine helicopter pilots engaged in a deadly struggle in Vietnam. The SHUFLY squadron proudly announced that on 13 March 1963, three UH—34s for the first time had provided close air support from helicopters. Probably as no coincidence, less than two weeks later, General Shoup was striving to have Marine T-28s deployed to Vietnam for helicopter escort.

Even the AR—15 rifles were not enough. In May 1964 they were recalled and another M—60 machine gun—now one on each side of the cabin—substituted. The problems of close-in fire support for the helicopters was pointed out vividly in a widely read report submitted in December 1963 by Lieutenant Colonel (later Major General) William R. Quinn, the Marine Corps representative at the Military Research and Development Center in Thailand. This organization was assigned to assist the Thais in developing specialized capabilities in the field of counterinsurgency. Lieutenant Colonel Quinn, an experienced helicopter and jet pilot, visited SHUFLY the first part of October. He wrote of the frustrations being encountered:

Most Viet Cong targets are detected from the air by drawing and observing their fire. Under the present rules of engagement this is one of the few ways to identify and be permitted to fire at a VC target. Trying
to pinpoint the number and exact location of the individuals doing the firing is quite difficult. Many times you could only tell the general direction from which it was coming... the jungle looks so much the same if you look away for a moment, even after seeing a flash, the chances are you cannot return your gaze to the same point with any accuracy.”

The battles between helicopter crews and the Viet Cong refused to abate. The results often were disastrous for the Marines. In May 1964, the JCS reminded everyone of just what the relative roles were supposed to be. “Helicopters are for use as transports and their weapons are for the protection of the aircraft and passengers,” they cabled. “Armed helicopters will not be used as substitutes for Close Air Support.”

Just what was to be substituted for the scarce close air support was not specified, and as 1964 drew to a close, the Marine Corps faced a dilemma in Vietnam. Its fixed-wing aircraft were not permitted to escort its helicopters, and support from the VNAF was limited. The weight penalty from armoring the UH–34 was becoming a serious hindrance to operations, and yet aircraft still were being shot down. Above all, the increasing severity of the opposition was proving more than a match for the two M–60 machine guns installed in the UH–34s. One proposed solution was to design and equip a helicopter specifically to act as an attack aircraft: the gunship.

**Armed Helicopters**

The idea of converting a helicopter into an attack aircraft was neither new nor original. Within a year of the Marine Corps receiving its first helicopter, studies began on utilizing it in just such a role. By the spring of 1949 the concept had been expanded to include defense against enemy tanks:

> It is envisioned that the supporting tactics in the use of the helicopter for this purpose might include the use of covering artillery fire... to neutralize anti-aircraft weapons and the operation of such an anti-tank helicopter from an appropriate level smoke blanket laid by the helicopter itself.

At the time, research was being conducted “in connection with the test firing of rocket type projectiles in an effort to establish the effect... on the helicopter.” The first tests were disappointing, mainly due to the limited lift capability of the helicopters and their instability as a gun platform. The idea of an armed helicopter, however, was not abandoned. In 1957 it gained new impetus. Lieutenant Colonel Victor J. Croizat, an authority on French military matters and the first Marine Corps advisor to the Vietnamese armed forces, was dispatched to observe the use of helicopters during the war in Algeria. He was accompanied by Major David Riley. The two Marines returned to Washington on 27 June and submitted a lengthy report a week later.

> “[French] armed helicopter proponents,” they wrote, “have a twofold thought—protection of helicopter forces and provision for a highly flexible base of fire in support of ground elements until they are debarked and capable of self-support with organic weapons.” They had observed or had learned of French Army helicopters armed with machine guns, bazookas, rockets, missiles, and even recoilless cannon. The report concluded that, even though French operations were hampered by the limited number of obsolete helicopters which were utilized, further observations should be made to keep the Marine Corps abreast of the French experiences.

Simultaneously, the Division of Aviation exhibited renewed interest in the development of armed helicopters. Two years after Lieutenant Colonel Croizat returned from Algeria, General Munn wrote of the progress which had been made. Though a number of projects were under way or contemplated, “the basic problem [still remaining] is that of determining whether or not Marine Corps helicopters should be armed.” By March 1959 tests had been made on mounting a French-designed, SS–11 wire-guided, air-to-surface missile on an HOK. Also “preliminary information obtained... indicate no difficulty in adapting the Zuni air to ground rocket pod to the HUS.”

Smaller 2.75-inch rockets and 20 millimeter cannon were under consideration. Probably the most interesting evaluation was the firing of a “Bullpup” from a UH–34. This missile was 11 feet long, weighed approximately 600 pounds, and was mounted on the right hand side of the aircraft. Control was by radio, with the pilot able to steer it through the use of a device on his control stick. In the summer of 1960 the first one was successfully fired by Captain Samuel J. Fulton, a member of HMX–1 which was conducting the evaluation. From an altitude of 1,500 feet the missile traveled over 10,000 yards. Accuracy was rated excellent.

In the next 12 months, 10 more were successfully fired. On the one aircraft that had been especially adapted to the Bullpup, 20mm guns had been added. The total weight, including strengthening of the airplane, missile, and ammunition was 2,378 pounds—almost the maximum possible pay load for the UH–34. During these tests, the Marine Corps was “monitoring the progress being made by the U.S. Army in this field, through close contact with the Marine Corps Liaison Officer at Fort Rucker, Alabama.”

The Army had achieved impressive results in developing armed helicopters. In 1958 it successfully had
loaded a version of the H-34 with 40 2.75- and 2.5-inch rockets, 9 machine guns, and 2 20mm cannon.\textsuperscript{53} In the early 1960s it had conducted experiments with the same aircraft loaded with 20 4.5-inch rockets. In this case, the helicopter was not used for an airborne attack. It was landed and a track-roller dolly inserted under the tail wheel. Soldiers then could swing the entire machine and aim it just as if it were a cannon. As soon as the rockets were launched, everyone got back in, the aircraft took off, returned to home base, and reloaded for another mission.\textsuperscript{54}

The enthusiasm of the Army for armed helicopters was based on a very significant difference between its requirements and those of the Marine Corps. The Army was prohibited by law from operating fixed-wing attack aircraft. Thus, if it were to have airborne fire power, it was going to have to rely on armed helicopters.

**Gunships for the Marines?**

As General Greene later was to recount, many Marine aviators were "adamantly opposed"\textsuperscript{55} to adding helicopter gunships to the inventory of Marine Corps aircraft. This opposition, like a fine-grade golf ball, had many layers, each separate from the others and yet related to them.

Many fixed-wing aviators believed that helicopter pilots were inferior and unsuited to the dramatic and demanding tasks of dropping bombs and shooting rockets and guns. A more substantial reason for opposition was the fact that Marine Corps tactical doctrine, practice, and equipment were all geared to the protection of helicopter transports by fixed-wing aircraft. Incorporation of gunships would require a major change in concept—something not to be taken lightly.

Opponents of gunships continually pointed out that such a helicopter would be relatively slow compared to a fixed-wing aircraft and hence more vulnerable. In addition, even with advanced stability systems, helicopters were far from ideal gun platforms. Even the proponents of armed helicopters had to agree with these arguments, although they insisted that gunships had advantages which outweighed these disadvantages.

Perhaps of most concern to Marine opponents of gunships were the restrictions on the total number of Marine Corps aircraft. If gunships were to be provided, a similar number of fixed-wing aircraft would have to be deleted. Such a course of action was hardly likely to stir enthusiasm among jet pilots. More important, as Major General Norman J. Anderson later wrote:

> "... planners could foresee that at some point in sacrificing fixed-wing capabilities to helicopters, the Marine Corps would lose its main organizational distinction from the Army: its combination of ground and air combat power..."\textsuperscript{56}

For example, the procurement of armed helicopters could endanger the LARA program. The requirement for a small, fixed-wing aircraft of modest performance which could fill the gap between jets and helicopters had been validated by VMO–6 with the four T–28s at Camp Pendleton. Preliminary specifications had been published for a twin-engine, two-seat, turbo-prop aircraft which could perform light attack and reconnaissance roles.\textsuperscript{57} An armed helicopter might overlap into the LARA's mission and jeopardize OSD and Congressional support.

Most of the arguments for helicopter gunships came from Marines acquainted with the situation and problems in Vietnam. The war was being fought under peculiar circumstances familiar only to the handful of Marines who had served there. These Marines had difficulty convincing anyone that a helicopter war in Southeast Asia required new approaches to the problem of escort aircraft. Colonel (later Major General) Noah C. New wrote of this frustration:

> "The incompatibility of helicopter and jets was a lesson learned early during the Vietnam conflict, but there were so few Marines involved that it was difficult to accept the requirement for helicopter gunships as authentic and authoritative by those who did not have this recent experience. The advocates of helicopter gunships during the period 1962–1964 simply could not present a convincing argument that helicopters had a place in our arsenal of aviation weapons."

Many Marines without experience in SHUFLY could not understand why several fixed-wing jets fully loaded with bombs and napalm could not adequately secure a landing zone for helicopters. The reason, as proponents of gunships tried to explain, was that in the densely populated areas where the helicopterborn assaults were being made, firepower had to be applied with almost surgical precision. The most fundamental tenet in the Marine Corps prosecution of the war was protection of the civilian population from the inroads of the Viet Cong. A village might have but a small element of the enemy in it—often against the will of the citizens. If that small enemy element opened fire on approaching helicopters, a dozen 500-pound bombs in the middle of the village might indeed suppress the fire; but they hardly would "win the hearts and minds" of the frightened or uncommitted residents. It took a long time, however, for supporters of gunships to convince fellow Marines on this point.

\textsuperscript{58} Italics in Anderson Comments, p. 2.

\textsuperscript{59} The aircraft eventually procured was the North American-built OV–10.
Any attempt to resolve the armed helicopter controversy had to take account of two central and contradictory facts: the war in Vietnam was unique, but Vietnam was not the only area of responsibility of the Marine Corps. During the time SHUFLY was operating with a minimum of support and discussion of the value of armed helicopters was at its peak in the Marine Corps, at least seven major crises occurred in other parts of the world. Each of these could have led to a U.S. military commitment. Fighting continued in Laos, with the U.S. assisting the anti-Communist factions. There were riots and shooting confrontations in Panama over sovereignty of the canal. Haiti simmered; Cyprus exploded. Belgian withdrawal from the Congo left that new African nation in anarchy. Armed conflict with Russia over Berlin and Cuba was a constant possibility.

The Marine Corps had to maintain a readiness to fight in all of these areas and indeed anywhere in the world. Hard experience had taught Marines that they should not put themselves in a position where all of their equipment, doctrine, and tactics were tailored for only one specific theater of war or type of combat. Marines recalled that, 12 years before, they had been more prepared to repeat the beachhead and jungle operations of World War II than to fight in the bitterly cold mountains of North Korea. They had not forgotten the lessons so painfully learned.

General Greene, who had become Commandant on 1 January 1964, fully understood the problem and accurately perceived the dangers. To him fell the burden of maintaining a Marine Corps equipped for and capable of defending the nation in any “clime or place.”

On 6 February 1964, this quietly determined Vermonter sat down and personally wrote out his thoughts:

The highly successful and battle-tested doctrine and techniques of Marine close air support evolved over the years has not changed as a result of our experience in South Vietnam. Marine Corps doctrine calls for tactical fixed wing aircraft to perform offensive and defensive fire missions in support of ground troops and helicopter movement. In South Vietnam, Marine Corps helicopter units have been faced with a special situation in which Marine Corps tactical fixed wing aircraft have not been made available to perform their normal support missions. Consequently, Marine helicopter units have employed that support which has been made available to them. This support has consisted of United States Army armed helicopters used primarily as firing platforms for machine guns and rockets to provide escort for troop-carrying helicopters and to furnish suppressive fires in helicopter landing zones. Certain fixed wing aircraft furnished by the Republic of Vietnam Air Force have also been utilized to provide offensive and defensive close support fires for Marine Corps troop-carrying helicopters. In addition, the crews of Marine Corps helicopters have been armed with rifles and machine guns with which to defend themselves when fired upon. Corps

operation by the United States Army and the Republic of Vietnam Air Force has been excellent. As a result of its combat experiences in South Vietnam, the Marine Corps has found that its tactics and techniques of close air support have been reaffirmed. It, nevertheless, does not oppose continued experimentation and possible development of the armed helicopter as a stable firing platform for integrated weapons subsystems designed to provide both offensive and defensive fires against ground targets.54

A month later he sent a letter to all Marine Corps general officers “for the guidance of members of your staffs, or for other use as you may consider appropriate.” In it he outlined the efforts of the Army to develop an airborne helicopter attack capability and added further details to his position. “This is not to intimate,” he stated, “that helicopters so armed cannot be used effectively against limited opposition and in the environment of the politico-military artificialities which exist in the Republic of Vietnam.”55

Armed UH-34s

As the termination of SHUFLY kept being postponed, conditions in Vietnam prompted some development of armed helicopters. Since 13 April 1963, Marine helicopters had been escorted by Army UH–1B gunships. Six aircraft from the Utility Tactical Company permanently based in Da Nang and armed with four forward-firing 7.62mm M–60 machine guns and 16 2.75-inch aerial rockets (FEAR), escorted the UH–34s “on all troop carrying missions and on all missions into known V. C. infested areas.”56

By late summer 1964, even this escort was not sufficient protection. On 17 August, General Greene directed MCLFDC and HMX–1 to begin work on an armament kit for the UH–34.61 Less than two weeks later the first test firing had been completed.62 The kit, or TK–1 (Temporary Kit–1) as it was known, consisted of two pods for rockets and two M–60 machine guns. The weapons were mounted on a platform bolted just above the landing gear struts. One pod, containing 18 2.75-inch rockets, was installed on each side of the helicopter. The machine guns were on the right side above the rockets.

The entire installation, including 1,000 rounds of ammunition weighed just over 1,000 pounds. Generals Mangrum and Robertshaw, along with other representatives watched a demonstration of a flight firing on the TK–1 on 8 September. The conclusion was that the kit on a UH–34 “could adequately provide fire support similar to that presently available in Vietnam.”63 The TK–1 was a simple, readily installed modification that could be manufactured easily by

Italics by author.
most aircraft maintenance men. The Station Operations
and Engineering Squadron (SOES) at Quantico was
to fabricate sufficient numbers for shipment to SHU
FLY.

Two of the kits were sent to Okinawa for pilot
familiarization. General Krulak, then visiting Futema,
decided to test the gun-firing UH–34 himself in order
to “satisfy ourselves that they had a reasonable cap
ability.” “After the first one was mounted,” he later
wrote, “I took the opportunity to fire the system from
a helicopter in flight.” As a result of this experience,
Kruak had to agree with the pilots’ earlier conclusion
that the gun kit, “while better than nothing, was oper
able only at such short range as to make its overall
usefulness doubtful. Nevertheless, we were in favor of
its use until something better could be developed.”

In spite of the misgivings of General Krulak and
the pilots, the kits were manufactured and the first
ones arrived in Vietnam early in November. Testing by

HMM–365, however, had to be temporarily suspended
due to the squadron’s commitment to flood relief dur
ing Typhoon Kate. The squadron reported that the
limited evaluation accomplished before 17 November
indicated that there might be some unforeseen prob
lems. By mid-December, all the kits had been installed,
and, although more testing was required, “with proper
crew training and utilization, the aircraft [can] per
form the mission satisfactorily as armed escort and
for fire suppression.” Crew training was accelerated
by the forced transition program which brought into
the squadron pilots with previous experience in aerial
gunnery. They were pressed into service as a nucleus
of instructors.65

The next three months of experience verified that
the UH–34 had severe shortcomings as a gunship. Its
relatively low speed, the inherent vulnerability of cri
tical rotor systems, and the type of warfare being
waged, all made the UH–34 a lucrative target for the
Viet Cong. In addition, the helicopter was hardly an
ideal gun platform. To achieve the desired accuracy
from rockets and fixed machine guns, the aircraft had
to be flown in perfectly balanced flight. The instabil
ity of a helicopter made this difficult under the best
of circumstances, and during violent maneuvers in
turbulent air it was impossible.

By the end of April, MAG–16 reported that the
TK–1 kits “have not proved effective in combat oper
ations.” This evaluation was based on the “bitter ex
perience” that the UH–34 gunships accounted for only
15 percent of the flight time in Vietnam but were tak
ing 85 percent of the hits.66 A complicating factor was
that the TK–1 installations further reduced the al
ready limited payload of assault troops or cargo. The
recommendation that no further kits be procured was
adopted.

The Armed UH-1E

Even before the first UH–1E was delivered to the
Marine Corps, suggestions had been made to equip it
as an armed helicopter. The Army versions were being
manufactured with modifications suitable for a full
system of armament. “Bell Helicopter, rather than re
tool, found it cheaper and more advantageous to as
semble the Marine UH–1E with identical modifications
as those required on the armed version of [the UH–
1B/D] Army helicopters.”

In November 1963, DC/S (Air) reported that “the
Army is very enthused with the [UH–1B/D] as a light
weapons fire system,” and suggested that 12 aircraft
in each VMO should be converted into armed heli
copters.67 The idea, however, became enmeshed in

The TK–1 was designed to convert the UH–34 into an
armed helicopter. The round rocket pod is mounted
below the two machine guns.
controversy on the role of helicopters as attack aircraft and little progress was made at the time.

A year later, as SHUFLY continued to report difficulties in conducting assaults without conventional fixed-wing escort aircraft, another attempt to arm the UH–1E was made. The CNO sent a letter on 19 September 1964 to BuWeps stating:

... the Marine Corps has an urgent requirement for six Ground Fire Suppression Armament Kits to be installed on the Assault Support Helicopter [UH-1E] within the next 60 to 90 days.

Then, in very precise language which reflected the difference of opinion within the Marine Corps, he spelled out the reason for his request:

Tactical doctrine requires these helicopters to perform observation, reconnaissance, and rescue missions forward of friendly lines without armed escort. There is no present system of self defense against ground fire for these helicopters.46

The armament was to be used only for self-defense. No mention was made of escorting assault troop helicopters. The letter went on to request BuWeps to "select equipment, determine the technical feasibility of the complete system and install the selected equipment in six UH–1E helicopters."47

The actual design was to be the responsibility of HMX–1 at Quantico. It had just completed the fabrication of the TK–1 for the UH–34 and had gained experience in modifying guns to fire on helicopters.

On 13 October, CMC directed a high priority project to "develop, evaluate, and service test a readily installable weapons kit for the UH–1E helicopter to provide armed helicopter support for transport helicopters."48 The official concept now had been expanded to include escort missions.

Three different kits were tested. The first, and that which eventually was adopted, was very much like the TK–1. Among the armament features installed in the UH–1E as a result of Bell’s common manufacturing process with the Army versions were attaching points to which the Marines fastened a platform on each side of the aircraft. Two electrically fired M–60C machine guns were mounted on each platform, unlike the TK–1 which had guns only on one side. Two bomb racks were bolted on to the bottom of the platforms. Normally 2.75-inch rocket pods were suspended from the bomb racks, though other items could be carried.

A simple ring and post type of sight was provided which swung up to the top of the cockpit when not needed. To provide the forward point of the sight, a small piece of black tape was placed on the windshield. While the sight seemed crude, it was effective and simple. "Many more elaborate types of sights exist," HMX–1 reported, "but all require major modification of the UH–1E cockpit, introduce added maintenance requirements, or block the pilot’s vision."49

The kits, dubbed TK–2, were assembled by the Overhaul and Repair Activity, Jacksonville, Florida,
under the technical direction of HMX–1 and the Marine Corps Landing Force Development Center (MCLFDC). A total of 15 were made.

Test firing at NAS, Patuxent River revealed only minor problems. The most serious was that the expended cartridge links ejected from the left guns could endanger the tail rotor. (The same problem was one of the reasons the UH–34 had no guns on the left side.) The guns were slightly repositioned and later deflector plates were added.

This apparently solved the ejected link problem. However, on the last day of test firing, several additional nicks in the tail rotor were received. It was decided, in view of the time element, to go ahead with the fabrication of the other kits and continue efforts to solve the ejection problem after the kits were completed and delivered to Fleet Marine Force units. The alternative was to hold up delivery to a deploying squadron.72

On 15 January 1965 the completed armament sets were shipped to VMO–6 at Camp Pendleton. Once installed on the UH–1Es, they were an immediate success. So much so that on 31 March, CNO requested BuWeps to provide kits for 33 more aircraft. Delivery was promised in July.

Simultaneously with the development of this TK–2, HMX–1 was experimenting with other kits. Two General Electric .50 caliber SM–14 gun pods were evaluated “with excellent results, providing primarily greater effective range.”73 The added weight made the heavier machine guns suitable only for specialized missions. Also tested were two Stoner 63 machine gun pods on temporary loan from the U.S. Air Force. The installation proved unsatisfactory for the UH–1E.

In addition to the rockets and machine guns mounted on the sides of the helicopter, tests were conducted on a rotating turret mounted below the nose of the aircraft. The Emerson Electric TAT–101 turret contained two M–60 machine guns and could be aimed and controlled by the pilot.74 Beginning in April 1967, UH–1Es were modified to incorporate the turret. A total of 94 kits were purchased. By April 1972, other armament conversions were available which were more suited for the task, and the TAT–101 was removed from those aircraft in which they were installed.

While the TK–1 on the UH–34 was undergoing final testing at HMX–1 and efforts were under way to have approved a similar kit for the UH–1E, General Krulak at FMFPac sent CMC his estimate of the results which could be expected. “The proposed arming of the UH–34 will not provide equivalent protection to replace U.S. Army UH–1Bs.” The TK–1s, however, should be provided and “the assignment of Marine UH–1E helos to the 1st Marine Air Wing be expedited for employment in armed escort as required.”75

Marine Huey gunships with TAT–101 chin turrets land to pick up more 2.75-inch rockets at the MAG–39 LZ during Operation NANKING-SCOTLAND II in October 1968. The chin turret further improved the UH–1E’s firepower.
As soon as the pilots at Pendleton finished training, six of the armed UH–1Es were shipped in April to Futema. These six aircraft of Lieutenant Colonel George Bauman’s VMO–2 arrived at Da Nang on 3 May 1965. They immediately began to take over the role of escorting the Marine assault troop helicopters.

The introduction into Vietnam of Marine armed helicopters did nothing to still the proponents or opponents of the concept. The situation was not helped by a controversy, which during 1964 was becoming more and more public, between the Air Force and the Army over their respective roles. For airborne firepower, the Army placed almost total reliance on its armed helicopters. The Air Force held that only its fixed-wing aircraft were suitable for close air support and helicopter escort.

The Marine Corps occasionally got dragged into the controversy between the two other services. General Greene made a speech at the National Press Club in Washington, D.C. on 26 March 1964. In it, he once again stated his position on armed helicopters. Press accounts, unfortunately, were written stressing that the “Marines Join Air Force in Opposing Helicopters Ground Support.”

He had made no such statement. What General Greene told the reporters was the same thing he had been telling and would continue to tell the Marines:

This service [armed helicopters] in South Vietnam has been carried out under peculiar circumstances which has led many people to question the Marine Corps’ position—and has resulted in some misunderstanding of it. . . . The special situation in South Vietnam has not caused us to modify . . . our belief. . . . In South Vietnam, Marine Corps tactical fixed wing aircraft have not been available because of political considerations. He summed up: “We consider this capability [armed helicopters] must be complementary, rather than competitive with the primary fire support provided by fixed wing aircraft.”

Marine attack aircraft, after they were introduced into Vietnam, were used to protect and escort the assault helicopters. So were armed helicopters. Each in its way performed a vital mission. Throughout the conflict in Vietnam, the Marine Corps continued to maintain a balance of weapons which were capable of performing anywhere in the world under almost any conceivable circumstance. The armed helicopter and fixed-wing attack aircraft were just two of them. Much of the credit belongs to General Greene. He, at least, had not forgotten the lessons of previous wars.
CHAPTER SIX
MORE HELICOPTERS FOR AN EXPANDING WAR

The Buildup *

Helicopters. Here we could characterize our needs as almost a bottomless pit. . . . Our lift capability has doubled . . . but the hunger is still not satisfied.
And the valor and skill of the pilots has outrun the book. The stars on their air medals are matched only by the stars in their crowns.

Lieutenant General Victor H. Krulak
Commanding General, FMP Pacific
11 July 1967

1 At the time of the landing at Da Nang in March 1965, the Marine Corps had a total of 20 helicopter squadrons. Two, HMH–461 and HMH–462, continued to operate the “Deuce.” The three observation units had a mixture of old 0–ls and OH–43s and new UH–1Es. Of the 14 medium transport squadrons, 12 were flying the UH–34. One more was to be formed to complete the expansion previously planned by General Shoup. HMM–265 and HMM–164 were in the process of converting to the CH–46. HMX–1 remained at Quantico. A total of 433 helicopters were authorized but only 398 were on hand. The most critical shortage was of CH–46s, resulting from continued delays in production.

On 12 June, the two transport squadrons in Vietnam were joined by Lieutenant Colonel Gene W. Morrison’s HMM–161 from Kaneohe. The squadron was initially assigned to the Phu Bai area approximately 40 miles north of Da Nang near the old imperial city of Hue. The squadron in turn was followed by HMM–261, commanded by Lieutenant Colonel Mervin B. Porter, which arrived in Da Nang from New River on 21 June. Meanwhile, Lieutenant Colonel Lloyd F. Childers and his HMM–361 departed Santa Ana and were assigned to Futema on 8 June. There were now five transport squadrons in the western Pacific area: three in Vietnam, one on board the Iwo Jima as part of the Special Landing Force and one at Futema. VMO–2 had elements in both Da Nang and Okinawa.

Then, on 28 July, President Lyndon B. Johnson announced to the American people that the U.S. forces in Vietnam would be almost doubled to 125,000 men and that additional reinforcements would be sent if needed. Following the President’s speech, the Joint Chiefs of Staff ordered the deployment of MAG–36 from Santa Ana to Vietnam. The commanding officer of the group was Colonel (later Major General) William Gentry Johnson, a veteran of both World War II and Korea, in which he gained extensive experience with night fighter aircraft.

The USS Princeton (LPH 5) sailed from Long Beach, California the morning of 11 August. On board were HMMs–362, –363, and –364 commanded by Lieutenant Colonels James Aldworth, George D. Kew, and William R. Lucas. Each squadron was assigned 24 UH–34s. Also, there was VMO–6, commanded by Lieutenant Colonel Robert J. Zitnik. The squadron’s 27 UH–1Es would be more than welcome in Vietnam. The group’s heavy transport squadron, HMH–462, had been decommissioned two months earlier and the six remaining “Deuces” assigned to the Headquarters and Maintenance Squadron. These aircraft and their crews also were shipped to Da Nang. The Princeton arrived at Subic Bay in the Philippine Islands on 27 August. There, the aircraft crews began a three-day period of intensive final training in air-to-ground gunnery in preparation for their entry into combat. The ship departed on 30 August and arrived off Da Nang four days later. Back at Santa Ana, the remnants of the helicopter group were assigned to Marine Wing Service Group (MWSG) 37 with headquarters at the nearby MCAS El Toro.

Five months before the Princeton arrived, on 8 March, the headquarters of MAG–16 had moved from Futema to Da Nang. The overall commander of SHUFFLY at the time, Colonel John H. King, Jr., assumed command of the helicopter group. A small rear headquarters had remained behind, but even it proceeded to Vietnam on 11 September. Colonel King, a fighter pilot at Guadalcanal in 1942 and commanding officer of VMO–6 in the Korean War, was replaced on 9 August by Colonel Thomas J. O’Connor. Colonel

O'Connor was an unusual Marine aviator. Prior to reporting to flight training in May of 1943, he had been a member of the Marine Detachment on board the USS Savannah in the November 1942 landings in Africa—a campaign not often associated with a Marine. Before assuming command of MAG—16, he had been Chief of Staff of the 1st Marine Aircraft Wing at Da Nang. Both he and Colonel Johnson were about to have new homes for their men and aircraft, for the rapid buildup of helicopters and other aircraft had completely saturated the airbase. New helicopter airfields were urgently needed.

MAG—16 would be the first to move from the crowded conditions. A few miles east of Da Nang across the Song Han lay a long peninsula parallel to the ocean. The northern terminus was a mountain which created the south side of the entrance to Da Nang Bay. A few miles further south, the beach was broken by a series of red marble mountains that were almost devoid of vegetation and which rose precipitously from the coastland. As General McCutcheon was to write later, “For MAG—16, a site had been chosen . . . just north of this Marble Mountain. There was a beautiful stretch of sandy beach along the South China Sea and just inland was a fine expanse of land covered with coniferous trees ten to twenty feet high.”

The Marines did not count on the ability of the impoverished Vietnamese to utilize every scrap of material.

Unfortunately as soon as word got out that Marines were going to construct an air base there, the local Vietnamese came onto the land in droves and removed all the trees including the roots, instead of the few that had to be removed to build the runway and parking areas. Thus, the troops and other inhabitants lost the protection those trees would have afforded against sun, wind, and erosion.

The military construction units in Vietnam were straining to complete other projects so a civilian combine, Raymond, Morrison, Knudson-Brown, Root, and Jones (RMK—BRJ) received the contract to build the airfield. By the end of August the 2,000-foot runway and parking space made of Marston matting was complete. Colonel O'Connor and MAG—16 completed the move from Da Nang on 26 August. A week later MACV officially approved the name recommended for the new installation: Marble Mountain Air Facility (MMAF). When MAG—36 arrived, most of its aircraft and crews waited at Marble Mountain until their own base was ready at Chu Lai farther south.

It was hardly luxurious, but did offer some distinct advantages. Strongbacks, wooden platforms, and framing had been built on which tents were erected. By the end of the year a large wooden mess hall had been completed and in those few moments when not flying or working on the helicopters, the crews could enjoy a hot meal. The cooling breeze from the ocean did not compensate for the heat of the summer, but at least the wind kept away mosquitoes—which were the scourge of Da Nang and most of the rest of Vietnam.

The beach was the envy of all the other Marines in the area. Almost pure white sand bordered the clear crystal waters of the ocean. Sunbathing, surfing, and swimming were welcome breaks from the rigors of war, but the fine sand on which the entire base was built created a few problems. It was difficult to construct a road of any permanence, and the vehicles driving through the area often bogged down. Other than sand, the most significant handicap, initially, was that there were no hangars in which the mechanics could work on the aircraft. The heat of the summer and the cold downpours of the monsoon tested even the staunchest of the crew chiefs as they prepared their aircraft for the next combat mission.

Colonel Johnson faced different problems. On 7 May, the Marines had landed 55 miles south of Da Nang at Chu Lai. Construction of a runway for fixed-wing jets had begun two days later, and on 1 June the first aircraft had landed. General McCutcheon remembered that the “peninsula to the northeast of Chu Lai provided a likely site for a helo group.”

The construction of the Ky Ha helicopter base was begun by U.S. Navy construction battalions (Seabees). They leveled an area 600 by 900 feet which was to serve as parking ramp, landing zone, and takeoff runway. Metal matting was urgently needed for other projects, but by using several different types the Seabees were able to pave sufficient space for the helicopters. “But they had no time to do anything else in the way of preparing for MAG—36’s arrival.” The bulk of the effort fell to Major Jack A. Kennedy and his Marine Air Base Squadron 36. On 2 September it had left the Princeton and “began to dig in to stay at Ky Ha.” The unit was reinforced with every available Marine who could be spared from the other squadrons. “They unloaded, moved ashore and set about building the camp. At night they also established their own perimeter defense as there was no infantry to do it for them.”

In a classic brief understatement, Colonel Johnson reported that on 11 September “we also got our first monsoon rains.” The next day a damp Colonel Johnson welcomed the Assistant Commandant, Lieutenant General Richard C. Mangrum, to officially open Ky

* Also variously known as the Tourane River—from the French name of Da Nang—and the Da Nang River.

** Pronounced “key-hah” from the name of a nearby village.
Ha. The torrential rains continued and construction of the camp almost halted. It was not until 17 September that all the Marines could sleep under a tent. Still they were constantly drenched. Colonel Johnson described one solution:

> Our engineering department rigged up a drying tent by erecting a G. P. [General Purpose] tent close to a generator and ducting the hot air blown over the engine into the tent. This allows drying facilities for clothing, boots, etc., in wet weather, a very necessary commodity in this climate. 10

The Marines of MAG–36 and MAG–16 were learning what had been apparent to the members of the SHUFLY squadron since 1962. The monsoon season in Vietnam is a very wet time of life for everyone. Though the incident occurred some time later and in another area of the country, General Krulak recounted every Marine's opinion of the monsoon. "Not far from the Laos border, I saw this on a piece of a ration box in front of a boy's little hootch. It said, with apologies to G.B. Shaw, 'The rain in Laos falls mainly in the house.'" 11

There was another thing the Marines were discovering that had been previously noticed by the crews of SHUFLY. When Colonel Carey's staff avoided selecting an airfield in the delta which was paved with laterite, it was due to their knowledge of the characteristics of this red soil. Ky Ha was built in laterite. While the crews at Marble Mountain had to contend with sand in everything, "at Ky Ha it was pure, unadulterated mud." 12

Dry laterite and sand began to take a toll of helicopters on takeoff and landing. The clouds of dust stirred up by the rotor wash literally sandblasted the rotor blades, causing continued erosion of the metal and requiring frequent changes of the blades. The problem was aggravated by the heavy demands for helicopters. Parts for the machines had been procured on the assumption that each aircraft would fly 40 hours per month. By the end of the summer of 1965, even with the monsoon season starting, the average for the UH–34s was over 70 hours per month.

In August, CinCPacFlt reported a critical shortage of blades for the UH–34s. The problem was so serious that otherwise completely flyable aircraft were grounded because there were no blades for their tail rotors. The end of the month saw the same situation for the UH–1E. For that helicopter, the rotor blades were expected to last for 1,000 hours of flight. In the grit of laterite and sand they were being worn out after only 200 hours. Further aggravating the problem, ejected ammunition links from the guns were still nicking the tail rotor. The modification by HMX–1 had not totally resolved the difficulty. By 22 October, a new

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**The Viet Cong Worsen the Helicopter Shortage**

As October drew to a close, MAG–36 continued to improve the base at Ky Ha, in spite of the monsoon rains. Pilots and crews were heavily engaged in combat flights. At Marble Mountain, construction was continuing and though H&MS–16 now had a building for a hangar, most crew chiefs still had to work outside. All but a few of the structures were strongbacked tents. MAG–16 had three of its operating squadrons at Marble Mountain. HMM–263 had arrived on 12 October and replaced HMM–261. The new squadron was under the same commanding officer who had led it during the Dominican Republic crisis earlier in the
year, Lieutenant Colonel Truman Clark. Lieutenant Colonel Childers remained with HMM–361 as did Lieutenant Colonel Bauman with VMO–2. The six “Deuces,” which had arrived on the Princeton, had been assigned to Colonel O’Connor and operated as a subunit under Captain Gus H. Pennel, Jr. The two support squadrons, H&MS–16 and MABS–16 commanded by Lieutenant Colonels Jerome “Jerry” L. Goebel and Thomas E. Vernon were hard at work keeping the base operating and the aircraft flying.

To all of the Marines, 27 October had seemed much like any other day in the helicopter war. A group of VC had been spotted and eight UH–34s from HMM–361 escorted by armed UH–1Es of VMO–2 lifted 75 Vietnamese troops to engage the enemy. “Moderate to heavy small arms fire was received. The escort helicopters laid suppressive fire on these positions.” In addition, UH–1Es equipped with loudspeakers had flown over the area just north of MMAF conducting broadcasts to the natives of the area. The aircraft of HMM–263 were busy with routine resupply and administrative flights.

Long after night fell, many Marines were still working. Three of them, Corporal Eugene Mortimer, Lance Corporal Leonard O’Shannon, and Corporal Lawrence Brule were members of H&MS–16. By midnight they had completed their duties in the one hangar and were preparing to get a little sleep before starting again. A few minutes later “we heard three explosions—they sounded like mortars—and we grabbed our weapons and headed for a sandbagged hole.” They did not know that “a VC force estimated at 90, and possibly including some personnel from North Vietnam, had launched a well planned and well coordinated attack on the Marble Mountain Air Facility.”

Three and possibly four teams conducted the assault. One unit attempted to breach the defenses near the H&MS hangar. There they met Mortimer, O’Shannon, and Brule. “We’d been in the hole only about 20 seconds when we saw about eight people, all armed, running towards us,” said O’Shannon. “They were about 30 to 40 feet away. We saw they were Viet Cong. When they got within 15 feet of us, we opened fire with our rifles.” Marine Corps training paid off well. All three happened to be “Expert” riflemen and they annihilated the enemy squad, killing seven and wounding and capturing four others.

On the west side of the field, the VC attacked a bunker manned by Marines from MAG–16. Only after all the defending Marines were wounded was the enemy able to penetrate into the area occupied by the maintenance and administrative tents of HMM–361, HMM–263, and VMO–2. “Once in the parking area, they commenced a methodical attack on each helicopter.” Seven of the UH–1Es were lined up beside the hangar awaiting the arrival of parts. All were destroyed. Six more on the parking ramp met a similar fate. Two more received major damage and another pair suffered less severe damage. In a matter of moments, MAG–16’s UH–1Es had been reduced to four flyable aircraft.

The UH–34s did not escape. Six were destroyed, nine suffered major and 17 minor damage. Few were unscratched. Lieutenant Colonel Clark reported that one of his aircraft, which was considered lightly damaged, had “122 holes in the fuselage from shrapnel.” As the remnants of the VC retreated across the parking mat, they were confronted with the six giant “Deuces”. Apparently unfamiliar with such a large helicopter they could only push grenades through the machine gun ports in the nose doors. Fortunately all they had left were concussion grenades. The explosions blew off the escape windows from the helicopters, but caused little other damage.

At dawn the next morning, aircraft from the MAG–16 squadron at Phu Bai and from MAG–36 at Ky Ha arrived to bolster the Marble Mountain units. Even with 19 of the helicopters destroyed, 11 more heavily damaged, and most of the rest damaged in some manner, MAG–16, on the day after the attack, flew 333 individual sorties, carrying 312 passengers and 17 tons of supplies.

As initial reports of the attack were received at FMFPac headquarters in Honolulu, it was apparent that additional helicopters would have to be shipped immediately to Vietnam. Almost before the shooting ended, General Krulak requested replacement aircraft “with the highest priority given to the UH–1E.” At the time the Marine Corps had only 18 UH–1Es other than those in Vietnam. Two of even this small total were deployed to the Caribbean. Fortunately there were five available at San Diego which already were loaded on board a ship for transfer to the western Pacific area. FMFPac requested CMC to unload them and put them on cargo aircraft for immediate shipment to Vietnam. The next day CMC asked CNO to air-ship five more from HMX–1 at Quantico. By the middle of November, 12 UH–1Es had arrived in Vietnam. Two were from the ship at San Diego, five were from HMX, and five more which had just arrived in October from Santa Ana. Three of these aircraft incorporated a major improvement: The “540” rotor system which increased the speed and performance of the original UH–1E. In Vietnam, however, the Marines and Navy had no parts for the improved helicopter. BuWeps quickly arranged to procure the necessary supplies from the Army, which did have them. More critical was the fact that not only had aircraft been
destroyed in the attack but also the precious TK–2 armament kits which had been installed. An urgent program was begun and by 1 December the replacement kits had arrived at Santa Ana where they were assembled and shipped to Vietnam.26

The replacements for the destroyed UH–34s also began arriving inside large cargo aircraft.8 The combination of the attack on Marble Mountain, aircraft shot down by the enemy, and helicopters destroyed in crashes in the heat and mountains of Vietnam, however, resulted in a shortage of 69 UH–34s throughout the Pacific area by the first of December.27

**The “Deuce” Finds a Mission**

The insatiable demand for helicopter lift capability in Vietnam gave the powerful but idiosyncratic HR2S a last chance to prove its worth. The “Deuce” never had lived up to the vision of the early Marine helicopter planners of fleets of the huge machines carrying assault troops in massive vertical amphibious landings; but as the Vietnam war expanded, the HR2S found a role, first in filling in back in the United States for other helicopters committed to the war and then by service in combat.

During the late summer of 1965, the continued demands on MAG–26 at New River for aircraft and crews for Vietnam had left the east coast helicopter group short of aircraft to meet its usual required commitments. These included provision of a Caribbean ready force, such as had been on duty when the Cuban and Dominican crises had erupted. Major Richard L. Hawley, commanding officer of HMH–461, proposed a solution. Hawley, a former enlisted Marine who had been commissioned 21 December 1951, had been brought into helicopters by the forced transition program of 1963 and had been assigned to HMH–461 in various capacities since the completion of his training. He recommended that the next Caribbean ready force not use UH–34s, which were in limited supply, but be made up of a full squadron of “Deuces.”28

The prospect of 12 of these temperamental aircraft deployed together was not greeted with enthusiasm. In the past, a chronic shortage of spare parts had created maintenance problems with the “Deuce,” and it was believed that this difficulty would be aggravated if the aircraft were based on board a ship in the Caribbean. Major Hawley, however, was able to point out that the parts situation had improved greatly by mid-1965, as the result of a decision made in 1964 (when it had become apparent that the replacement for the “Deuce,” the CH–53, would be delayed in production) to procure a new supply of parts to keep the aging HR2S in operation.

Hawley convinced the Marine Corps that an all-“Deuce” ready force was not only feasible but desirable. On 15 September, HMH–461, with 12 aircraft, deployed on board the USS Guadalcanal as the aviation component of the Caribbean Ready Force.29 It was augmented by two UH–1Es (which were the two deployed when the search started for aircraft to replace the ones destroyed at Marble Mountain.)

By the time the squadron returned to New River on 15 December, it amply had demonstrated that the “Deuce,” old and cantankerous as it was, still could outperform any other helicopter then in service in Marine squadrons. On 26 January 1966, nevertheless, HMH–461 went into cadre status to prepare to receive the CH–53, but not until almost a year later on 15 December would the first of the new heavy lifters arrive. In contrast to the original Marine Corps conception of nine squadrons of 20 “Deuces” each, the September 1965 deployment of HMH–461 was the first—and only—time the HR2S deployed in a squadron-size force in the role for which it was designed.

In Vietnam, where the “Deuce” could not be used to conduct vertical amphibious assaults, Marines found many other useful tasks for it. Of increasing importance was the recovery of other helicopters which had been shot down or crashed. Less than two weeks after arriving from Santa Ana, on 12 September 1965, a “Deuce” performed what was claimed as “the first helo lift of a downed aircraft under tactical considerations” when it retrieved a Marine helicopter approximately 15 miles away from Chu Lai and carried it externally back to the airfield.”30

A typical, though not routine, recovery occurred three days after the attack on Marble Mountain. A UH–34 of HMM–263 flying an assault mission eight miles southwest of Da Nang had been damaged on landing. Recovery was attempted, but daylight ran out before it was accomplished.31 The Marines guarding the aircraft had to be returned to more secure positions before dark and the helicopter was left unattended during the night. The next morning six UH–34s of HMM–263 escorted by three armed UH–1Es of VMO–2 lifted a platoon of U.S. Marines to the site of the downed aircraft.32 Experts on the disarming of explosives were included as a Marine reconnaissance team in the area had reported that the Viet Cong had placed booby traps around the aircraft during the night. The recovery force landed in a nearby clearing and set up a defensive perimeter while the experts rendered the booby traps harmless. As the UH–34 would have to be lightened, maintenance personnel from the squadron

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* Most were shipped in Air Force C–124s. This four-engined propeller aircraft was one of the few large enough to allow the tall UH–34 to fit in.
The "Deuce" carries out its mission. A CH–37 of MAG–16 lifts out the stripped hulk of a UH–34 shot down near Da Nang in October 1965.

were landed and detached the main transmission and rotor, and the rotor blades. This action was necessary since the recovery aircraft would have to hover out of ground effect before reaching translational lift to allow the damaged aircraft to clear surrounding trees.

Two "Deuces" were dispatched. The first lifted the transmission and rotor head and returned to Marble Mountain. The second "Deuce," flown by First Lieutenant Anthony D. Costa, picked up the rest of the UH–34 and started back to Marble Mountain with the load riding steadily beneath the aircraft. Minutes later Costa's "Deuce" was hit by enemy ground fire which cut fuel lines in the left engine. Gasoline from the ruptured hose streamed from the engine and it appeared that there would be an explosion at any moment. Lieutenant Costa, ignoring the danger, kept full power on the engine until he once again could hover, lower the UH–34 to the ground, and then land. The security force, which had boarded other helicopters when the "Deuces" departed, was hastily diverted to the new area. Another "Deuce" was dispatched and once again the UH–34 was airborne under a helicopter and successfully returned to Marble Mountain. Lieutenant Costa's aircraft was repaired and he took off, only to be forced to make another emergency landing before arriving back at home base. The second time, the mechanical difficulty was quickly repaired and he and his crew finally completed the eight-mile trip from the site of the downed aircraft to Marble Mountain. The UH–34 which had caused it all gained the dubious distinction of being shot down twice without even having the engine started between the two incidents.

As Major Hawley's squadron was reduced to a cadre, additional "Deuces" and spare parts were sent to Vietnam. While the big helicopters could perform many missions that neither the UH–34 nor the UH–1E could accomplish, they still had limitations, as Lieutenant Costa's experience had illustrated. Therefore, on 25 January 1966, General Krulak at FMFPac headquarters requested that the "Deuce" be phased out of Vietnam by 1 September 1966. In April, he repeated the request and added that a detachment of three CH–53s should be deployed to Vietnam to replace the "Deuce" as soon as possible.

The rapid buildup of U.S. forces in Vietnam during 1965 had caught the Marine Corps at the beginning of its transition from the older generation of piston-engine helicopters to the new, more powerful generation of turbines. As a result, the reliable UH–34s, supplemented by turbine-powered UH–1Es and by a contingent of powerful but aging HR2Ss, had had to carry the burden of the Marines' first year of large-scale combat against the North Vietnamese and Viet Cong. The new year of 1966 would see jet-powered transport helicopters enter the war, bringing with them a great increase in operational capability but also some new and difficult problems.
CHAPTER SEVEN
THE CH-46 ON ACTIVE SERVICE

The CH-46 Enters Combat

A few months after the attack on Marble Mountain, the first of the new medium helicopters, the CH-46s, entered combat. Efforts to bring the CH-46 into the war had begun in mid-1965. By that time, the tempo of the war had increased, with the Marines no longer confined to defensive action but now actively pursuing the enemy. The demand for more helicopters seemed insatiable, and the UH-34s, reliable as they were, no longer could even begin to meet the requirements. More lift capability was needed immediately.

Only two CH-46 squadrons—HMM-164 and HMM-265—were close to being ready to deploy. On the east coast, HMM-265, now under Major Gregory A. (“Greg”) Corliss, had deployed to the Caribbean on board the USS Okinawa (LPH 3) in June, the first CH-46 squadron to make a shipboard deployment. On the west coast, HMM-164, which had been left behind and assigned to MWSG-37 when MAG-36 left for Vietnam, was still in training. The original schedule had called for HMM-164 to move to the western Pacific in October 1966, with HMM-265 to follow two months later.³

To meet the need for more lift capability, the Marine Corps sped up the deployment of these units by about seven months. HMM-164, under Lieutenant Colonel Warren C. Watson, who had taken command on 6 June 1965, sailed for Vietnam on the Princeton on 16 February 1966. Watson, who had been a naval aviator since May 1943 and had flown fighters, attack aircraft, and transports in addition to helicopters, had 27 CH-46s under his command, including three which were to be used as spares. On 4 March HMM-164 arrived at Subic Bay. It transferred there to the Valley Forge for the rest of the trip to Vietnam.²

On the morning of 8 March, the weary UH-34 and “Deuce” crews at Marble Mountain welcomed the sight of 27 CH-46s flying down the white sand of the beach, shuttling the squadron ashore. As one of the pilots watching, Captain Alvah J. (“Jerry”) Kettering, later recounted, “Those big airplanes sure were a sight for sore eyes to us ’34 crews.”³ The squadron pilots immediately began to familiarize themselves with the tactics and procedures being used by the other units. Initially, the UH-34s continued to fly normal missions, only instead of a second helicopter of the same type in the formation, a CH-46A would be attached. In a few days the indoctrination was over and Lieutenant Colonel Watson with his squadron took on the full burden of combat operations.

Lieutenant Colonel Watson and his crews lost no time in entering combat. In the first 35 days after their arrival in Vietnam, they flew almost 2,700 sorties.* In the same period, eight of the aircraft were hit by enemy fire and though the damage to the helicopters was small, two of the crew members were wounded. General Krulak summed up the first impressions of the new turbine helicopter after a month of operation. “It is emphasized,” he wrote, “that the limited period for evaluation of the CH-46 precludes any dogmatic conclusions as to performance and effectiveness of the helo in a combat environment. However, our initial impressions are all favorable.” He concluded that “The CH-46 is making a significant contribution to the helo assault capability of the Marine Corps air-ground team in South Vietnam.”⁴

Three months later in June 1966 Lieutenant Colonel Herbert E. Mendenhall led his HMM-265 with its 24 CH-46As ashore at Marble Mountain. The squadron had departed New River on 21 April on board the USS Boxer.

Problems and Improvements

The rapid introduction into combat of the CH-46 brought an immediate increase in lift capability, but from the start it also brought difficulties. Some of the problems had become apparent two years before, as the first of the aircraft were delivered to tactical squadrons.

In August 1966, Brigadier General Alan J. Armstrong, Assistant DC/S (Air), reviewed the history. The tests at Patuxent River “in early 1964 revealed

* A combat sortie is one requirement completed by one helicopter. Several sorties might be completed on a single flight.
that the CH—46A had excellent potential for the Marine Corps assault helicopter mission,” he wrote. “However, the mission capability of the CH—46A was seriously compromised by excessive vibration levels and susceptibility of the engines to severe damage in a sand environment.” Vertol’s engineers “undertook these problems and produced a useable vibration absorber. Engine susceptibility to sand erosion was reduced to [what was then considered] an acceptable level.” Like all aircraft in the Marine Corps, he added, the CH—46A “was constantly evaluated for possible improvement.”

Among the changes made before the deployment of HMM—265 and HMM—164, were a “four degree rotor trim in the forward transmission to improve the aircraft attitude during landing [the initial aircraft had to land with the nose high in the air, which, among other things, obstructed the view of the pilot at a critical time] and fuselage formation lights for night formation flying.” Another change was the direct result of Lieutenant Colonel Clapp’s experience in SHUFLY. In 1962 he had decided that the best protection from enemy fire was to spend the minimum amount of time on the ground unloading the assault troops. In a CH—46 the troops exited from the rear, over a lowered ramp. If the aircraft took off with the ramp still down, there was a good possibility of causing damage to the helicopter so “an acceleration in the rear ramp operating time” was included in the modifications.

Other lessons from SHUFLY were incorporated. Armor was added to critical areas of the engines. Armored seats, similar to those which were fitted in the UH—34, were designed and were “installed prior to the introduction of these aircraft into Vietnam.” The most important change, however, was that when the CH—46 arrived in combat it would be equipped with machine guns. Vertol designed a kit to be fitted in the aircraft which would allow the crew chief and a gunner to operate either a .50 caliber heavy machine gun or the familiar M—60. The company proposed that it manufacture and install the kits in the first 54 aircraft. The project would be completed in July at a cost of $2,995,000. The schedule was such that some of the modifications would have to be completed on board ship on the way to Vietnam and others would have to be finished after they arrived at Marble Mountain.

The Marine Corps was not satisfied with the offer. In view of the contractor [Vertol] time schedule and costs, the O&R Departments [overhaul and repair facilities operated by the Navy and Marine Corps] were requested to undertake a program to expedite installation. Following inspection of the . . . trial installation at Quantico . . . a decision was made to have the kits manufactured and installed by the Navy O&Rs.

At least 16 kits were to be ready in March. Total cost of all 54 was $905,000. “To equip HMM—164 aircraft prior to their WestPac deployment,” General Armstrong wrote, teams for the O&R facilities:

. . . from Cherry Point, North Island, and Jacksonville manufactured and working in two twelve hour shifts at MCAF Santa Ana, installed these kits in record time. This modification was called ‘Project Tough.’

Two gun mounts were installed. One was on the left side of the aircraft in an emergency exit door opening immediately behind the cockpit. The other was on the right side, in a window just to the rear of the side passenger door. To complete all of the modifications, including the gun mounts, required approximately 1,400 man hours of labor for each aircraft. The west coast helicopters were finished before HMM—164 departed on the Princeton. At New River, HMM—265 had all its aircraft ready by 28 March. Initially, the aircraft were furnished with .50 caliber machine guns. An additional 30 armament kits were built and installed by O&R North Island (San Diego, California) in the CH—46s delivered to HMM—165 in July 1966. From then on “new production helicopters will have the kit mounted by contractor personnel at the plant prior . . . to delivery” to the Marine squadrons.

The addition of the engine and seat armor and the machine guns was not universally applauded. A month after Lieutenant Colonel Watson and his squadron had arrived in Vietnam, General Krulak complained that “the .50 caliber machine gun and the weight of its ammunition constitute a significant reduction in the allowable pay load of the CH—46.” Not only was there a reduction of payload but, “the internal mounting of the .50 caliber machine gun restricts its field of fire, and the weapon is limited in elevation due to the dual rotor configuration.” “Finally,” he wrote, “the .50 caliber does not have the inherent capability of the M—60 to be removed from a downed aircraft and used in defense; it being too heavy for the purpose.” General Krulak concluded:

The weight of the engine armor and the pilot seat armor must also be given consideration in relation to the loss of payload versus the effectiveness of armor. Comments and recommendations with regard to help armor and arrangement will be addressed separately at a later date after further data are assembled.

Eight months later, in December, he summarized the results of the experience gained in Vietnam. “The addition of armor to this aircraft has reduced its lift capability 967 pounds, from 4850 to 3874 (80 degrees Fahrenheit, at 1500 altitude).” He continued:
The CH–46 which was initially advertised as capable of transporting 25 combat equipped troops, now carried only about 15 in combat. It was also intended to be the . . . helicopter capable of lifting the 105mm howitzer which task cannot now be performed without stripping the aircraft of all but essential equipment. With the CH–46, trade of fuel for increased lift is usually not acceptable except for extremely short range missions because of its already limited endurance. Reducing the fuel load to compensate for the current 967 pound armor weight would lower the usable fuel from a total of 2452 pounds to only 1485 pounds, or about 1.3 hours total operation; too little for acceptable combat flexibility.18

He agreed that “it is plain that we need protective armor on our helicopters.” But, he said:

... up to now . . . it appears that our armor installation efforts have been pursued without respect to the missions and tasks assigned, to the capabilities of the aircraft or in the nature of the combat environment in which the particular type is normally expected to operate.

He recommended that:

... an analytical review of present armor requirements be conducted, [and] the objective should be to hold armor weight to the lowest reasonable limit consistent with the mission for each type of helicopter.14

For the CH–46, he continued, it should consist of pilot and co-pilot seat armor and limited engine armor in vital areas only, the total weight of which should not exceed 450 pounds.

In spite of General Krulak’s advice, the guns and armor remained on the CH–46. On 3 August 1966, Krulak notified the squadrons in Vietnam that the helicopters would continue to be armed, but with the lighter, more portable M–60 machine gun. The .50 caliber guns could be retained and used as desired.15

By mid-1966, disturbing reports from the squadrons were citing difficulties with the aircraft. The much admired, beautiful, white sand of the Vietnamese lowlands was proving to be a deadly trap for the turbine engines. When David Richardson of Vertol had spoken to the 1961 meeting of the American Helicopter Society, he obviously did not have operation of the CH–46 in Vietnam in mind. But his fears of sand being sucked into the compressor and causing extensive damage were coming true for HMM–164. The sand was eroding the compressor blades to a point where they could not pump in sufficient air to the burning chambers. The resulting condition, called “compressor stall” caused the engine to lose power and to exceed the maximum temperature allowed. It was a dangerous situation. By the end of April, engines were being ruined and had to be replaced after every 200–300 landings.16

All the spare engines the squadron had brought with them had been used earlier in the month.17 Naval Air Systems Command in Washington, which was in charge of procuring more engines, estimated that, “Based on the programmed flight hours, the current usage rates will generate a need for approximately 32 engine assemblies a month.”18 A series of conferences with the manufacturer, the General Electric Corporation, resulted in the company arranging to have the engines repaired in Japan. This reduced the long time required to ship them from Vietnam to the United States.

In the first week in May, Vertol and General Electric sent a team to Marble Mountain to investigate the problem.19 The solution the team devised was a large filter, shaped somewhat like an oversized loaf of bread, and similar in function to that utilized in home air conditioners, which was installed on the front of the engines. One of these “100 percent barrier filter” systems was installed on a CH–46 at Marble Mountain. Another was sent to New River. The results of the initial tests were encouraging and by 31 May, MAG–16 could report that “360 landings had been made with no evidence of sand erosion.” A week later, MAG–26 confirmed that “753 landings had been completed. Some sand erosion had taken place on the No. 2 engine,” but this was the result of an easily corrected fault in the manufacture of the kit.20 The only difficulty reported was that “a 1% degradation of power is experienced with every 10 landings due to filter clogging,” but full power could be restored by cleaning the filter.21 Even before a contract could be signed, Vertol began constructing other kits. The first shipment of 15 filters was ready by 2 July and 64 more by 25 July.22

The sand was not damaging just the engines. The rotor blades were experiencing the same abrasive treatment. The solution was “main rotor blades with nickle plated leading edges” which were air shipped to Vietnam in May. The new blades were estimated “to be good for 1000 landings in sand laden atmosphere,” about five to ten times as long as the original stainless steel ones.23 Finally, the sand and dust were finding their way into the fuel system, causing erratic operation of the engines. The situation became so serious that on 21 July, all CH–46s were grounded and were “to be flown only for heavy lift capability and/or emergency situations.” It was a bitter blow for Lieutenant Colonels Watson and Mendenhall and their crews. Some of the pilots were temporarily assigned to the UH–34 squadrons “to supplement pilot strength.”24 Immediately, the Naval Air Systems Command and Vertol began “accelerating fabrication and shipping of . . . fuel filters.”25 By the end of August, all the aircraft in HMM–265 and over half of those
These CH-46s of HMM-161 transporting Marines of the 1st Marine Division in an assault southwest of Da Nang have their .50-caliber machine guns mounted in the doors and air filters fitted over the engine intakes. Both modifications proved necessary under Vietnam conditions.

A New Version

Four months before Lieutenant Colonel Watson and his squadron arrived in Vietnam, it had become apparent that the production of CH-46s would have to be accelerated to meet the expected demands of combat. In the 1965 budget, Congress had approved the purchase of 90 of the helicopters the next fiscal year. Late that fall, Roy L. Wilson, Naval Air Systems Command project coordinator for the CH-46, was called to a high-level conference. The question posed to him was, “How many additional CH-46s can be built by 1 July 1967?” Initially, Wilson and his staff thought that Vertol could increase production from the planned seven or eight aircraft per month to a peak of 17. That large an increase, however, would create manufacturing problems costly to the Navy, so the rate was finally established at 14 a month. On 22 September 1965, the Department of Defense notified Vertol to “accelerate the U.S. Marine Corps CH-46 Sea Knight helicopter production schedule by 100 per cent over the previously planned production rate.”

At the same time, the company was awarded a contract for $10.7 million to begin procurement of parts for additional helicopters. By January 1966, a total of 184 aircraft had been authorized. Some of these would be CH-46As already on the production line. Most of them would be an improved model: the CH-46D.

In the CH-46, as in most aircraft, the original design underwent a series of improvements. These resulted from development of new manufacturing techniques, experience in actually operating the aircraft, modifications to improve the aircraft’s ability to per-
form its intended mission, and redesign to accept equipment or engines not available when the machine was first built. Under the Department of Defense designation system, if these modifications were significant but did not alter the original purpose of the aircraft, these variations on the initial design were denoted by different letters following the basic model number. So it was for the CH–46. The first model which Boeing-Vertol built for the Marine Corps was designated the CH–46A, and the improved version now to be bought was to be the “D” model. In theory, there could have been a CH–46B and C, but, as was not uncommon, changes could be proposed and a designation assigned and then no aircraft of that designation, or possibly only a test aircraft, ever built. Some military purchasers might accept a modification while others did not. Hence, helicopters in the Marine Corps did not always have their letter designations in strict sequence, and the CH–46 jumped from an “A” version directly to the “D.”

The new CH–46D incorporated a number of design changes, many of them the results of rapidly accumulating experience in Vietnam, and it also had a different engine. An important consideration in the original selection of the Vertol entry in the competition with Sikorsky had been the fact that the CH–46A had transmissions and rotor drive components which could be adapted to more powerful engines if they became available. By 1964, such engines were being built, and on 24 January of that year, the CNO had published a new requirement, 14–12 Assault Transport Helicopter Medium, which called for an improved helicopter. Vertol won the contract for what was to be the CH–46D. The new model contained an improvement of the General Electric T58–8 turbine, the T–58–10 (or “Dash Ten” engine as it came to be called), each one of which produced 150 more horsepower than the earlier versions. This 12 percent increase of power resulted in much better performance in a hover and with only one engine operating.

Another significant change was that, unlike the CH–46A, on which only the tail rotor adjusted to give better visibility on landing, in the new machine both the tail and forward rotors automatically corrected for changes in speed. As a result, “The field of view during shipboard operations is significantly improved over the CH–46A helicopter.” New rotor blades had been designed which included a cambered—or curved—cross-section instead of the symmetrical design of the earlier ones. The new design “expanded altitude/airspeed capabilities . . . and enhances the service suitability of the CH–46D.” Although the new air-
The first CH–46Ds arrived at New River in October 1966 but were held temporarily in H&MS–26 until the transfer of HMM–161 from Vietnam on 19 December. Then the helicopters were turned over to this squadron. Simultaneously, CH–46Ds were being delivered to the squadrons at Santa Ana. With the immediate operating problems of the “A” model apparently solved and with the improved “D” version coming into service, it seemed at the end of 1966 that the Marine Corps’ difficulties with the CH–46 series were finally over.

**General McCutcheon Takes Charge**

In June 1966, as the first CH–46 squadrons were fully committed to the grinding struggle of combat in Southeast Asia, Major General Keith Barr McCutcheon was installed as Deputy Chief of Staff (Air) at Marine Corps headquarters. He would hold this position for the next three and a half critical years.

Among the thousands of Marines who had participated in helicopter development in the Corps since the mid-1940s, McCutcheon consistently had been in the forefront. While he contributed to many areas of the Marine air-ground team, he is best remembered for his work with helicopters. McCutcheon’s road to the office of DCS (Air) had been a long, tortuous one.
Lieutenant General McCutcheon dismounts from his UH–1E on a visit to the 7th Marines during his tour as Commanding General, III MAF in 1970. McCutcheon often piloted his own helicopter on such trips. Corporal Thomas F. Norman, the crew chief, holds the general's flack jacket, while Colonel Edmund G. Derning, Jr., the 7th Marines commander, greets McCutcheon.

McCutcheon was born on 10 August 1915 in East Liverpool, Ohio, a small, economically declining Ohio River industrial town on the edge of Appalachia. He grew up in East Liverpool and graduated from high school there in the grim depression year of 1933. In spite of the depression, McCutcheon's father, a physician, had enough money to pay for a college education for his son, and in the fall of 1933, Keith McCutcheon entered the Carnegie Institute of Technology in nearby Pittsburgh, Pennsylvania.

At Carnegie Tech, where he majored in management engineering, McCutcheon soon demonstrated the keenness of mind and capacity for work that would characterize him throughout his life. Besides ranking consistently in the upper one-tenth of his class in scholarship, he worked on the school newspaper, served on the YMCA cabinet, went out for varsity track and intramural athletics, joined a fraternity, and was elected to several journalistic and scholarly honor societies. He also joined his school's Army Reserve Officers' Training Corps (ROTC) unit and completed the four-year course. The course included, besides military tactics and engineering subjects, instruction in "Care of Animals and Stable Management"—an indication of the condition and sense of priorities of the Army at that time.

The continuing depression, with its resulting limited civilian job prospects, combined with a growing interest in aviation, led McCutcheon to seek a military career. Throughout his college years, he tried to get into Army aviation. In 1935, with the help of a Democratic party committeeman from East Liverpool, he obtained one of the few appointments then available to Army flight school, but he failed the entrance physical examination because of high blood pressure—the result, McCutcheon explained, "of finishing a final exam period and a slight sickness." 37

In January of 1937 (his graduation year), after job applications to several industrial firms, including Lockheed Aircraft, brought no attractive offers, McCutcheon again attempted to enter Army flight school. He obtained and passed a second physical examination,
and on 15 May 1937 received orders to report to Randolph Field, Texas, by 1 July to begin the prescribed one-year course of instruction. McCutcheon never reported. The Army informed him that, after his year of training, he would have no guarantee of a commission or of assignment to active duty due to a shortage of funds for aviation officers. McCutcheon therefore requested that his name be removed from the rolls of the July 1937 cadet class. He remained, however, on the eligible list for future classes. He also accepted a second lieutenancy in the Corps of Engineers Reserve.

McCutcheon by this time had a better alternative in sight; he had applied for a commission in the Marine Corps. The Marine Corps McCutcheon hoped to enter consisted of less than 20,000 officers and men in 1937, but it possessed a reputation for valor and an aura of glamor gained in World War I and in Caribbean and Asiatic interventions. Most attractive from McCutcheon's point of view, the Marine Corps had airplanes—in 1937, 102 of them, flown and maintained by an aviation establishment of 140 officers, 15 warrant officers, and 1,117 enlisted men. In these depres- sion years, the few openings for junior officers in the Marines usually were over-subscribed by applicants, many of them young men like McCutcheon of exceptional ability, who turned to the military for lack of other opportunities. This situation permitted the Marine Corps to pick and choose only the best, producing one of the most brilliant generations of officers in the Marines' history. One of those chosen was Keith McCutcheon.

On 7 June 1937, McCutcheon took his Marine Corps physical examination at the Philadelphia Navy Yard. He failed it. Again, high blood pressure—the result of a recent illness and of overwork preparing for examinations—threatened to end his military career before it began. But, as he had with the Army Air Corps, McCutcheon persisted. He appealed for, was granted, and passed a second examination. On 12 August, he was appointed a second lieutenant, USMC, "revocable for two years from the 1st of July 1937." He immediately resigned his Army reserve commission and, on 16 August, reported to the Marine Barracks in Philadelphia for duty and instruction at the officer's Basic School.

After graduation from The Basic School, McCutcheon, assigned as an infantry officer to the Marine detachment on the carrier USS Yorktown (CV 5), continued his effort to get into aviation. In September 1938, he applied for Marine Corps flight training and was turned down. He tried again in January 1939 and was informed that no vacancies in the training program existed but that his "preference for this assign-

ment has been recorded for future consideration." 40 In June of that same year, an unexpected vacancy occurred in the flight class scheduled to begin at Pensacola on 1 July, and McCutcheon at last obtained his desire. He was ordered to Pensacola to begin pilot training. On 3 July 1940, he was designated a naval aviator and assigned to Marine Observation Squadron 1 at Quantico.41

McCutcheon spent a year with the squadron, serving on board carriers and at Guantanamo and San Juan, Puerto Rico. Then he entered further aviation technical training. In September 1941, the Marine Corps sent him to the postgraduate aeronautical engineering school at the U.S. Naval Academy. McCutcheon graduated from this school—typically, number one in his class—in May 1943. He spent the summer touring military and civilian aircraft plants to learn production and design techniques, and in October he began graduate work at the Massachusetts Institute of Technology. Nine months later, he received his Master of Science degree.

In September 1944, McCutcheon, now a lieutenant colonel, became operations officer of Marine Aircraft Group 24, located on Bougainville in the Southwest Pacific. MAG—24 the following month was assigned to provide most of the close air support for the Army in the planned invasion of the Philippines. Lieutenant Colonel McCutcheon received the job of developing the procedures for coordinating Marine air and Army ground forces. This promised to be a difficult task. Marines long had experimented with close air support of ground troops, but no complete doctrine had yet been worked out. What systems the Marines had developed were oriented toward support of beachhead assaults involving large Marine forces in restricted areas rather than toward supporting units of a different service in mobile, wide-ranging land operations.

McCutcheon later recalled that he and his staff were "completely unprepared" for their mission. "Efforts were made immediately to assemble all the available literature on the subject," he continued, "but it became clearly apparent that the existing instructions were published piecemeal in many forms and much of the data was contradictory." 42

Using as much as they could of the existing doctrine and information and drawing on their own experience and ingenuity, McCutcheon and his group drew up a new, detailed doctrine. McCutcheon's system was based on the principle that "close air support is an additional weapon to be employed at the discretion of the ground commander." 43 Once the concept and instructions had been approved, McCutcheon

* Later redesignated Marine Observation Squadron 151.
supervised the training of both Marines and Army personnel in how to put them to use, and during the offensive in the Philippines he helped direct their implementation. The system proved successful in the campaigns for Luzon and Mindanao. For his part in developing it, McCutcheon was awarded the Legion of Merit by Admiral Thomas C. Kinkaid, Commander of the Seventh Fleet.\(^4\) McCutcheon’s plan for controlling close air support constituted a significant contribution to the development and refinement of air-ground cooperation.\(^5\) Had he accomplished nothing else in the Marine Corps, this achievement alone would have made him a major figure.

To the keen analytical mind which could produce an air support doctrine, McCutcheon added personal courage. In April 1945 he participated in an exploit that won him a Silver Star medal from the commander of the U.S. Army X Corps. Due to its nature, the feat remained classified and was not widely known at the time. The citation gives the details:

> For gallantry in action against the enemy in the vicinity of Malabang Field, Mindanao, Philippine Islands during the period 12 April 1945 to 17 April 1945. Prior to the landings on Mindanao information was received which indicated a possible change in the tactical plans. Lieutenant Colonel McCutcheon volunteered to fly to the Malabang Airfield that had just been reported seized by a small guerrilla force. He arrived at the Airfield five days prior to the landings of American forces. During the ensuing five days, from positions within close range of enemy machine gun and mortar fire and with utter disregard for his own safety, he reported the situation to the landing force aloft, briefed pilots and supervised the direction of air strikes. His accurate information transmitted to the task force commander aloft enabled the formulation of amended plans and resulted in an unopposed landing on Malabang Area. Lieutenant Colonel McCutcheon’s unselfish devotion to duty, disregard for his personal safety, and outstanding performance of hazardous duty in the face of the enemy contributed greatly to the successes attained.\(^6\)

By the end of the war, McCutcheon also had won a Distinguished Flying Cross and six Air Medals for his exploits. On his return to the United States in November 1945, he was assigned as an instructor in the Aviation Section of the Marine Corps Schools at Quantico and then, less than a year later, to the Bureau of Aeronautics at the Navy Department in Washington. At the Bureau of Aeronautics, where he remained until December 1949, McCutcheon became deeply involved with the guided missile and pilotless aircraft programs. During this assignment, from April to October 1947, he had the additional duty of Marine Corps aide to the White House. He also took on another title—that of husband. On 1 November 1947, the 32-year-old, highly decorated aviator was married to Marion P. Thompson from East Liverpool.

McCutcheon had been associated with the earliest development of helicopters as an aviation instructor in the Quantico schools, but not until July 1950 did he begin officially flying them. Ordered back to Quantico to take command of HMX–1, McCutcheon took transitional helicopter training with the Navy’s Helicopter Squadron 2 at Lakehurst, New Jersey. Always a superior student, he completed the course “in the shortest length of time the Navy had recorded up until then.” He assumed command of HMX–1 on 17 August 1950. With his new command, McCutcheon “inherited an experiment which had significant effect on . . . helicopter operations in Vietnam—firing a cockpit controlled 2.36-inch rocket from the side of the helicopter.” \(^*\) In addition, “bombing from the helo was also evaluated as the HRP–1 (early Piasecki transport helicopter) dropped externally carried bombs from 8,000 feet.” \(^6\) **

In December 1951, the now Colonel McCutcheon was ordered to Korea to take command of the recently deployed HMR–161. He continued to develop new tactics and techniques and to lead his squadron in combat assaults until 5 August 1952. For his service in Korea, he was awarded his second Legion of Merit and four more Air Medals. On his return to the United States he was almost immediately ordered to Frankfurt, Germany, where he served successively as Operations Officer; Assistant Chief; and later Chief, Operations Branch, J–3 Division at the headquarters of the United States European Command. May 1954 saw him back in the United States where he was assigned as Chief, Air Section, Marine Corps Equipment Board, at Quantico.

\(^6\) Not to be confused with later experiments with “Bullpup” missile firings from a UH–34.

\(^*\) For additional information on developments of the period, see Rawlins, Marines and Helicopters 1946–1962, passim.
Three years later, he reported to New River as the commanding officer of MAG–26, where he remained until June 1959. This was a particularly productive time for him in the development of helicopters, as he was constantly devising new techniques, developing tactics for the UH–34 and “Deuce,” and reorganizing the units and equipment of the helicopter group. A tour as a student at the National War College in Washington followed, and after graduation, in July 1960 he reported to HQMC first as Assistant Director of Aviation, and then—as a colonel—as the Director, in September of that year.

The next spring he was promoted to brigadier general and assumed command of the Hawaii-based 1st Marine Brigade. He and his family remained in Hawaii after this tour and he joined the staff of the Commander-in-Chief, Pacific, as Assistant Chief of Staff for Operations. During this assignment, he participated in the escalation of the war in Vietnam, and helped define clear-cut responsibilities for the conduct of combat air operations involving the Air Force, Navy, and Marine Corps. For exceptionally meritorious service from 1963 to 1965 he was awarded his third Legion of Merit.

Ordered to Vietnam in June 1965, McCutcheon commanded the 1st Marine Aircraft Wing and served as Deputy Commander, III Marine Amphibious Force, earning his first Distinguished Service Medal. He received his major general’s stars in January 1966 while still in Vietnam and six months later went to Washington, D.C., to begin work as Deputy Chief of Staff (Air). This, the longest assignment of his career, would tax to the full McCutcheon’s resources of character and aviation knowledge and experience.
CHAPTER EIGHT

TWO SEPARATE ROLES FOR THE UH-1E

Expansion and Shortages

When Colonel Reusser accepted the first UH-1E at the Bell plant on 21 February 1964, the Marine Corps planned to equip each of the three VMO squadrons in the active forces with 24 aircraft for observation and assault support roles. It had been hoped that the VMO squadron in the Organized Reserves could be similarly equipped, but approval had not been gained. Even as the first helicopters were arriving at New River and Santa Ana, a controversy was smoldering as to their proper employment. The roots went back to the disagreement between General Shoup and General Snedeker as to whether the combined observation and assault support roles required both a fixed-wing aircraft and a helicopter, or if the UH-1E could perform both missions. At the time of the disagreement, General Shoup had prevailed, and only the UH-1E was procured, but in 1965 he no longer was Commandant.

In July of that year, Major General Louis E. Robertshaw, DC/S(Air), presented a briefing to the annual general officers' symposium in which he outlined a different program. A new fixed-wing aircraft, much like that recommended by General Snedeker, was under study. The OV-10A, a “two-seat, twin engine, light armed reconnaissance aircraft,” he reported, “has been proposed for introduction into each of our observation squadrons, including the organized Marine Corps Reserves.” Though the Secretary of Defense so far had withheld approval of the OV-10A—which was a joint project of the Army, Air Force, and Navy/Marine Corps—the general remained optimistic. “We plan for the OV-10A to be operational commencing in FY-68. Each VMO squadron will be equipped with 18 OV-10As, and the number of UH-1Es cut in half to only 12.” The result would be that the three active duty and one reserve VMOs would be equipped with a total of 72 OV-10A fixed-wing aircraft and 48 UH-1E helicopters.1

Another factor influenced the enthusiasm for the OV-10A. SHUFLY had been operating over three years, and the buildup of Marines in Vietnam had occurred only four months before the general spoke. There was a rising clamor for armed helicopters and the opponents and proponents of the concept were busily defending their relative positions. General Robertshaw told the assembled generals, “We need this aircraft [the OV-10] to provide close-in escort capability to transport helicopters, especially during operations in rough terrain and conditions of reduced visibility.” Assuming that the Secretary of Defense approved the purchase, “we could expect to see the OV-10A in the Fleet Marine Force by the end of FY-68.” In the meantime, he concluded, “we will continue to rely on the A-4s and UH-1Es to do the job.”2

In early October of the same year, General Krulak urgently requested that another VMO squadron be activated for deployment to Vietnam no later than April 1966. General Greene answered reluctantly that the only way to meet the requirement in time was to mobilize the VMO from the reserves. The squadron was equipped with OH-43s which were hardly considered ideal. The only other possibility was to obtain the approval of the Secretary of Defense to commission a fourth squadron in the active forces, but such an effort would entail “a lead time which would be much greater.”3 Under normal circumstances, such an increase in the number of squadrons within the Marine Corps, without an offsetting decrease in fixed-wing units, would be a long and arduous process spanning several years. The war in Vietnam, however, was rapidly demonstrating that the fall of 1965 and the spring of 1966 were not normal times.

Major General William R. Collins had been overall commander of the Marines during the initial landings in 1965 at Da Nang and subsequently was assigned as Assistant Chief of Staff, G-3 at HQMC. In July 1966 he was able to announce that the Secretary of Defense indeed had approved the request of the Marine Corps to activate, not one, but two additional observation squadrons. He added a note of caution, for the units were only “Vietnam temporary add-ons” and not a part of the permanent peacetime Marine Corps.4 At the conclusion of the war, they probably would have to be disbanded. General McCutcheon, at the same
time, went on to say that under current plans "one of
the squadrons will form next month [August] and
deploy to WestPac in two 12-plane increments in De-
cember and March. The other will form in January
and remain on the west coast" at MCALF Camp
Pendleton to train additional pilots.⁵

Approval of the new units did not instantaneousl y
create more capability. Additional aircraft had to be
supplied and the Marine Corps already was short of
UH–1Es as the result of the attack on Marble Moun-
tain. In March 1966, although authorized a total of 76
UH–1Es in the operating units, it had only 58. To
alleviate the situation, the Marine Corps that month
attempted to borrow UH–1Bs from the Army.⁶ The
Army had none to spare, for it had found its UH–1
series to be well suited to combat as a light troop trans-
port and for its increasing numbers of gunships.
Though Bell was straining to meet the demands for
more helicopters, the shortage in the Marine Corps
continued. The addition of the two temporary squad-
rons compounded the problem. Colonel Alan J. Arm-
strong, who filled the two-month gap between the
departure of General Robertshaw as DC/S(Air) on 15
April and the arrival of General McCutcheon on 15
June, continued to press for the loan of Army UH–
1Bs. A week after General McCutcheon took over his
new duties, he was able to write that the Secretary of
the Army finally had agreed to transfer 20 helicopters.⁷
The Secretary of Defense approved the decision on 12
July.⁸

Since the Army version had no rotor brake, it was
only marginally suitable for shipboard operations. The
helicopter forces in Vietnam had first priority for am-
phibious vertical assaults, so it was necessary that they
be equipped with the Marine Corps design. All of the
Army aircraft were delivered to New River, releasing
UH–1Es for transfer to the Pacific area. While they
reduced the amphibious assault capability of the
FMFLant forces, the UH–1Bs without rotor brakes
were better than nothing. Ten of them arrived in
August and 10 more in January 1967.⁹

As the impact of the war became more apparent, it
was obvious that the Marine Corps would require addi-
tional UH–1Es to meet its needs. A supplemental bud-
get request for FY-66 included a total of 108 aircraft. To compensate for the combat losses, 28 were desired. An additional 45 were destined for the two new squadrons, and hopefully, 35 more could be procured to begin outfitting the organized reserve units. Only 59 were approved, with none for the reserves and only 31 for the add-on squadrons. These were not enough. By May, the Secretary of the Navy had approved switching funds from other programs so that the parts requiring long manufacturing processes for 27 more UH-1Es could be ordered. In July, Congress approved the actions and full procurement of the 27 helicopters was authorized. Simultaneously, VMO-3 was commissioned on schedule at MCALF Camp Pendleton on 1 August under the command of Major Francis R. (“Frank”) Murray. The first detachment of 12 UH-1Es departed California for Vietnam on 9 December. A week later, Major Kyle W. Townsend assumed command and on 17 December, he left with the rest of the squadron.

On the same day that Major Townsend took over VMO-3, 15 December, VMO-5, under the command of Lieutenant Colonel Donald K. Tooker, was formed out of the nucleus of a small training subunit which had been operating at Pendleton, nominally as a part of HMM-462. The new squadron continued to serve as a training unit for UH-1E pilots and crews until March 1968.

**Guns or Eyes?**

By the end of June 1967, the equivalent of the Marines’ entire peacetime helicopter observation forces were committed to combat in Vietnam. Three squadrons, VMOs—2, –3, and –6 had a total of 68 aircraft assigned. Even this many could not meet the requirements, for the versatile UH-1E was being subjected to two different, and often conflicting, demands for specific missions.

In July, General Krulak returned to Washington to report on the progress of the war. He brought with him some startling statistics. He displayed a chart which gave the type of missions being flown in Vietnam by the UH-1E from July 1966 through June 1967.

**UH-1E Task Performance**

*July ’66–June ’67*

<table>
<thead>
<tr>
<th>Mission Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin/liaison</td>
<td>5,579</td>
</tr>
<tr>
<td>Tactical Air Controller (Airborne)</td>
<td>1,086</td>
</tr>
<tr>
<td>Casualty Evacuation</td>
<td>1,109</td>
</tr>
<tr>
<td>Command and Control</td>
<td>1,099</td>
</tr>
<tr>
<td>Search and Rescue</td>
<td>116</td>
</tr>
<tr>
<td>Reconnaissance</td>
<td>1,756</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10,745</strong></td>
</tr>
</tbody>
</table>

He then announced some shocking information. In addition to the flights he had listed, another 19,597 missions—almost two-thirds of the grand total—had been flown as armed helicopters, a role for which the UH-1E had never been designed for the Marine Corps.

His analysis of the problem of the armed helicopter was a classic—and typical—example of his perception:

I believe our VMO has not been optimally used. Its function has been altered, in part from predominantly observation, command, control and liaison to the role of the attack aircraft; that is to say, 2.75-inch rocket and machine gun close air support.

You can see from the data [on his chart] that the commanders were largely denied the eyes which are so urgently needed over the jungle environment of much of Vietnam; denied the eyes that were provided them for the purpose, while the bulk of the sorties were in the armed role.

He then continued:

How did it come about? We all share some of the responsibility. We probably put too many rocket pods on the little aircraft and thus unconsciously encouraged their misuse. The close physical association of the VMO personnel and the personnel of the ground unit often generated ad hoc arrangements, which went around the existing tactical air request doctrine. There were some [commanders] reluctant to invest deeply over the jungle environment of much of Vietnam; denied the eyes that were provided them for the purpose, while the bulk of the sorties were in the armed role.

He went on to state his opinion that a helicopter—even large, heavily armed, and armored ones capable of speeds over 200 knots such as the experimental aircraft the Army was developing—“would not survive in a high resistance environment.” In case any of the assembled general officers had missed the point, General Krulak brought up another example of what he considered was the misuse of the UH-1E:

Akin to the observation problem is the forward air controller problem. Of our close and direct support attacks, which are delivered under a forward air controller (FAC), well over half are run by a U.S. Air Force forward air controller, airborne in a U.S. Air Force airplane. Why? Not because we do not have the FACs. We do have them and they are good ones. But
Another role for the UH-1E. Marines rappel from a Huey at Camp Pendleton in April 1970.

General McCutcheon echoed General Krulak's thoughts, but had some encouraging news. "The observation aircraft situation has improved somewhat in the past year," he reported at the same conference to which General Krulak had spoken. "We are almost in a position to return the 20 Army UH-1Bs we borrowed." Over 70 percent of all the Marine Corps UH-1s of either type were deployed to Vietnam where they "proved so useful in the utility, liaison, administrative and gunship escort roles that they were often pulled away from their observation mission." Assistance was on the way, however, as "we are counting on North American's OV-10A, recently named the 'Bronco,' to help us in the observation and helicopter escort missions." Unfortunately, "The airplane's schedule slipped in service test because of engine and control troubles." In spite of the difficulties in the twin-engine turbo-prop aircraft, he planned that "the first Marine OV-10s will go to Pendleton in November and will deploy in May 1968."

Until the OV-10s could be sent to Vietnam, other expedients would have to be found to support the observation requirements. Attempts were made to convert the ubiquitous UH-34 into an observation helicopter, but the attempts failed because the machine simply was not designed for the mission. A more promising alternative was to reactivate some old, small, fixed-wing, Cessna-built 0-1s—the same type of aircraft which had been assigned to the original SHUFLY. Ten machines, the entire inventory left in the Navy, were hurriedly pulled from storage in the fall of 1966 and shipped to Vietnam. Even though parts were scarce and the Commandant remained concerned over the supply problems, the aircraft made a valuable addition to the aviation forces in Vietnam. The 0-1s were so useful that General McCutcheon began negotiations with OSD "to borrow enough 0-1s to keep 1st MAW up to an operating level of 12 until the OV-10s deploy." He eventually was able to obtain the aircraft, which remained in service until the fall of 1969.

Reorganization

General Krulak and General McCutcheon had identified the problems created by the UH-1Es spending the majority of their flight time in the role of an armed escort. Finding a solution, however, proved a complex and lengthy task. General McCutcheon observed in July 1967 that as:

... a direct result of our experience in Vietnam ... we know that the VMOs, with 24 UH-1Es each, do not have enough helicopters to meet the demands for both observation and administrative-liaison-utility missions."

A year later, he was still lamenting that "Vietnam has proven that we do not have enough small helicopters for all of the tasks that Marine ingenuity can devise." Any major change in the makeup of the Marine Corps required a lengthy process of review in the Department of Defense and Congress, so in 1967 McCutcheon could only repeat that "If there is anything that we have learned in Vietnam, it is that we need light helicopters and many of them. One squadron per [division—wing team] is completely inadequate." With the introduction of the OV-10 into the VMO squadrons, which was scheduled for the summer of 1968, "The VMOs will drop to 12 UH-1E each and the shortage will be compounded," he wrote.
An OV–1OA flies over the countryside near Da Nang in 1970. This long-awaited aircraft took over some of the reconnaissance and tactical air control missions previously performed by the UH–1E.

The ever-resourceful General McCutcheon had evolved two plans to strengthen the UH–1E program. First he proposed that the 12 aircraft deleted from each of the squadrons when the OV–10A became operational, and the aircraft approved for the two temporary “add-on” squadrons, be combined “to form a light helicopter squadron for each wing.” Second, he wanted to procure helicopters which were specifically designed as armed escorts and assign 12 of them to each of the VMOs, replacing the rest of the UH–1Es.

The VMO would then have gunships... and OV–10A and the pure observation, Tactical Air Controller (Airborne) (TACA), and helicopter escort mission. The HMLs (Helicopter Marine, Light) would have 24 straight UH–1Es each and would pick up the utility, administrative tasks.

The general was optimistic about the program “Because it uses the UH–1E already on hand and requires such modest procurement we think this proposal stands a good chance of approval.” The Secretary of Defense agreed with the arguments “but only on a temporary basis.” When the Marine Corps requested that he reconsider the decision and include the three squadrons as part of the permanent peacetime force the Secretary of Defense refused. The units were to remain only as temporary ones, General McCutcheon reported in July 1968, and the Office of the Secretary of Defense had stated that “we do not need HMLs” at all when the war in Vietnam was over.

Though the issue was not resolved at the time, General McCutcheon lost no time organizing the three temporary squadrons. On 15 March 1968, HML–267 was formed at Pendleton under the command of Lieutenant Colonel Phillip P. Upschulte, followed a week later by HML–367 at Phu Bai in Vietnam under Lieutenant Colonel Glenn R. Hunter. The final commissioning was that of HML–167 at Marble Mountain with Major Robert C. Finn taking command on 1 April.

As part of the reorganization, the two wartime “add-on” observation squadrons, VMOs -3 and -5, disappeared from the rolls of Marine Corps units. Their personnel were absorbed by the new HMLs. The Marine Corps continued to press for inclusion of the new units in the permanent forces, and subsequently succeeded in this effort.
A New Role for the Sea Stallion

The CH–53 had been designed as an amphibious vertical assault helicopter, but by early 1966, as it entered final testing, a new and urgent role was being considered for it: that of a flying crane. Helicopter designers long had dreamed of constructing a “flying crane,” a machine which could lift more than its own weight. Igor Sikorsky had envisioned such an aircraft in 1948 when he had predicted that helicopters with a gross weight of 50,000 pounds and a lifting capacity of half that figure could be designed in the near future.1

Until the advent of the turbine-powered helicopter, however, the building of a true flying crane had been impossible.

While a single large aircraft seemed beyond the range of possibility during the 1950s, many experiments had been made with hooking together two, three, or even more helicopters to lift single heavy loads. The Marine Corps pioneered the “multiple lift” concept in 1954 by using two HRS helicopters attached to the load by long cables. To counteract the weight being carried between them, both aircraft had to fly in a steep bank to avoid being pulled together. Although heavy loads could be lifted, the flying proved extremely hazardous and the project was dropped.2

Vertol had made early studies of the same type of multiple helicopter lifts, and by the mid-1950s had concluded that a satisfactory procedure could be worked out using light-weight but rigid beams between the aircraft. In 1957, the company received a contract from the Army Transportation Research and Engineering Command to study further possible designs and techniques. In the final recommendation of this study, Vertol proposed a “multilift system composed of equal sized beams . . . with a single beam for two helicopters, three for three helicopters, four for four, and so on.” 3

This study led to another contract in 1958 to construct the beams and flight test two-, three-, and four-plane hitches. Tests of this system with two aircraft revealed that as the aircraft entered ground effect on takeoff or landing, their rotor wash intermingled, creating an unstable condition similar to hovering in a gusty wind. More serious, if the load began to sway for any reason, it set up a similar motion in the helicopter. This difficulty could not be overcome, and the contract was cancelled on 12 February 1959. Vertol continued its experiments and tried without success to interest the Marine Corps in using the system with the YHC–1A (which became the CH–46).

The war in Vietnam revived interest in a multiple-lift system, and indeed in flying cranes in general, for use in retrieving aircraft shot down in enemy territory. During the Korean War, in 1951, Marines on several occasions used helicopters to retrieve other helicopters downed close to Communist lines. These lifts involved almost total dismantling of the damaged aircraft and the carrying of different portions by different helicopters.4 During the years after Korea, the use of helicopters as cranes to retrieve other helicopters continued to be limited by the small lift capability of the available machines. With the “Deuce,” more retrievals were possible, but for most aircraft, unless conditions were absolutely perfect, extensive stripping had to be accomplished before they could be lifted. For the UH–34, for instance, either a combination, or all, of the main rotors, the main transmission and rotor head, the engine, or the tail pylon had to be removed before the aircraft could be retrieved with any degree of certainty by the “Deuce.”

The war in Vietnam offered no time for this lengthy process. In Korea, where there had been a fixed front line, most damaged helicopters managed to land in American-held territory; but in Vietnam most came down in areas easily reachable by the Viet Cong, who found downed aircraft lucrative targets. Even if security forces—made up of troops urgently needed elsewhere—could guard the aircraft as it was being stripped, the VC would make every effort to stop the recovery, as Lieutenant Costa had found out in his attempts to retrieve a UH–34 with a “Deuce.” It was natural, therefore, for the Marines to explore the possibility of using their new heavy helicopter, the CH–53, as a flying crane.
A Helicopter Retriever

On 7 January 1966, Colonel Alan J. Armstrong, then assigned as Assistant DC/S(Air), wrote a letter to the CNO recounting the conditions existing and those that could be anticipated in the future. "A need exists," he said, "in the Republic of Vietnam for a helicopter capable of retrieving helicopters or light aircraft downed as the result of enemy action or aircraft malfunctions." He pointed out that in combat "Retrieving downed aircraft in a minimum elapsed time is an operational necessity; failure to do so may result in loss of downed aircraft." Even though the planned deployment of the CH-46A would provide "an enhanced retrieval capability as well as an improved heavy external lift" to assist the over-worked "Deuces," "specific information as to procedures, performance data and preparation of the downed aircraft has not been generated to date."

Armstrong requested that testing be completed in three phases. The first, to be completed by 1 April, was to determine the methods for the CH-46A to lift the UH-34 and UH-1E. The second step was to evaluate the CH-53 to lift the CH-46 plus the two smaller aircraft. He asked that this project be completed within the next five months. Finally, tests were to be run on retrieving a CH-53 with another CH-53. The dates were "based on firm CH-46A deployment dates and," in one of the first inklings of future plans for the CH-53, "possible early deployment of the [heavy helicopter] to provide a retriever capability for the CH-46A." 5

As Colonel Armstrong was writing, the CH-53 was still undergoing testing at Patuxent River prior to introduction of the helicopter into the Marine Corps squadrons. The evaluation as a retriever was incorporated into the normal testing routine. On 16 May, a CH-53 was assigned to begin the project. 6 The next week a UH-1E was successfully lifted into a hover. The day after, on 24 May, a "dud CH-46A... weighing 11217 pounds" was lifted with the retriever carrying a full fuel load. 7 Two more tests were completed in the next two days. One carried the UH-1E in forward flight at a speed of 100 knots, by utilizing two drogue parachutes to stabilize the load. The same demonstration, only with a CH-46, was completed on 26 May. At the conclusion of the initial tests, the "Preliminary performance data ... indicates the CH-53A with its present engine, the T-64-GE-6, to be an acceptable retriever of the UH-34D and UH-1E aircraft, but only marginally acceptable as a CH-46A retriever." 8

Additional lifting capability was needed. While an improved engine, the T-64-GE-12 (Dash-12), was scheduled to be installed in the CH-53, it would not be available until Fiscal Year 1968, too late for the first planned deployment. In March, as preparations were underway to begin the retrieval demonstrations at Patuxent River, Major General Robertshaw, DC/S (Air), had decided that an "emergency helicopter recovery capability was to be deployed as early as air crews and maintenance training can be accomplished subsequent to the August 1966 CH-53 deliveries." 9 A detachment of three or four aircraft from HMH-463 at Santa Ana was to be sent to Vietnam. Target date was 1 November. There was no possibility of having the Dash-12 engines ready by then.

There was, however, another alternative. The rated 2,850 horsepower of each of the engines installed was a guarantee that all engines would produce that much as a minimum. Slight variances in the manufacturing process created a situation in which some engines could produce more. The exact power of each individual engine being delivered from the production line could be established only by operating the engine in a test stand. On 3 June, as soon as the preliminary results of the retriever evaluation were known, General Greene approved a letter to the Naval Air Systems Command "requesting utilization of increased shaft horsepower (3080 maximum . . . vice current 2850)" for the CH-53A's engines. 10

Initially it appeared that speedy approval would be obtained. General McCutcheon, who had returned to the position of DC/S(Air) on 16 June, reported the first week in August:

To improve lift capability of four CH-53As deploying to Southeast Asia . . . selected T-64 GE-6 engines will be installed. These selected production engines average 200 horsepower each greater than the minimum specification engines. 11

In addition, NavAirSysCom was to provide these selected engines on a continuing basis to bridge the gap between the T-64-GE-6 and the improved engine, the T-64-GE-12. His optimism was short lived, for Rear Admiral Allen M. Shinn, Commander of NavAirSysCom, refused approval of the request. His basis was that minor modifications were to be incorporated in the Dash-6 the summer of next year and that the Dash-12 engines should be ready in early 1968. Neither date came close to meeting the requirements of the Marine Corps.

General Greene and General McCutcheon were not to be thwarted. "On 27 October 1966, a letter was sent to CNO strongly repeating the increased power requirement for the CH-53A and advocating that an emergency, time-limited, higher horsepower rating be provided by 1 December 1966." 12 Rear Admiral Robert L. Townsend, who had replaced Admiral Shinner in September, was overruled. "The Naval Air Sys-
tems Command authorized the Marine Corps to designate and operate eight CH–53As for helicopter retrieval missions," General McCutcheon could report on 12 December. He continued that the General Electric engines “have been hand picked to provide in excess of 3000 shaft horsepower,” and, “moreover, these selected engines have been granted an emergency time-limited, higher horsepower envelope in which they may be operated.” He went on to write that the CH–53As:

Will initially complement and eventually replace the obsolescent CH-37 ‘Deuce.’

These CH-53As, which will be used primarily as aircraft retriever vehicles, have been provided additional engine horsepower so that the ambient conditions of RVN will not hinder retriever missions. This 3800 pounds of increased lift performance will enable recovery of the CH–46 and lighter helicopters intact on a 100 degree day at sea level or an 86 day at 2000 feet.

The improvements allowed the CH–53A to “recover all USMC helicopters in RVN except itself, without the requirement of prior stripping.” By December the retrieval testing at Patuxent River had been completed and “the results, and necessary hardware to accomplish retriever missions have been issued to the fleet for both rotary and fixed-wing recovery.” General McCutcheon could conclude, on 22 December, that “The current helicopter retriever requirement has been solved by the introduction of the CH–53A with increased power into RVN.” It was a welcome Christmas present for all Marines involved.

**Other Modifications**

The specifically selected engines were not the only changes in the CH–53 which were being made during the busy summer and fall of 1966. Three additional ones were the direct result of the experience in Vietnam. Armor was to be added to critical areas of the engines and controls. The installation had been programmed in 1965 and would “be installed prior to introduction of these aircraft into Vietnam.” As General Krulak had pointed out in the case of the UH–34 and CH–46 armoring, there was a significant loss of lift. He wrote in December 1966 that the CH–53s would be “tasked primarily for transport of supplies and equipment and they are not regarded as primarily an assault, reconnaissance, evacuation, or observation aircraft. It is noted, however, that the lift capability . . . will be reduced at least 610 pounds

* At higher horsepower the turbines create higher temperatures in the burning chambers and on the turbine. To prevent damage, the amount of time the engine could be operated at the increased temperature was limited.

* The “Deuce” was so large it was never considered as being retrievable intact by helicopter.

USMC Photo A422527

Before being sent to Vietnam, the CH–53s had large filters installed on the air intake of the engines.
swirl sand separator system similar to that used on the Army's CH-54A crane" helicopter. The first design was less than satisfactory and Sikorsky reported that after 300 landings in a sand pit, the engines had lost from three to five percent of their rated power due to erosion. Further modifications were made and the resulting engine air particle separator (EAPS) was first installed and flown on a CH-53 by the middle of November at the Sikorsky plant. The new kits "proved very satisfactory and flight tests show it to be airworthy and that performance difference is negligible." Installation on the four aircraft to be deployed to Vietnam was made by Sikorsky personnel and completed 8 December before the aircraft departed.

Retrievers to Vietnam

The object of all this attention and intense activity was Major William R. ("Bill") Beeler, the commanding officer of HMH-463 at Santa Ana. Beeler's squadron, which had been commissioned 1 March 1966, had been expecting to receive the first CH-53s in late summer. The difficulties in the production line had prevented the original schedule from being met and it was not until 20 September that Beeler landed in California with the first new helicopter. While he and his crews were at the Sikorsky plant in Connecticut, accepting the aircraft, General Krulak sent a warning order to Vietnam, alerting 1st MAW to expect the arrival of a detachment of CH-53s with a retriever capability. The general set a date of 25 October for the unit to be ready to leave Santa Ana. A week before the expected deployment day, General Krulak "postponed HMH-463's readiness date for embarkment of a four aircraft detachment for 25 October 1966 to 1 December 1966. This delay will allow adequate testing of the engine air inlet sand filter," and the incorporation of all other modifications into the aircraft.

On 16 December newly promoted Lieutenant Colonel Beeler assumed the duties of officer in charge of Detachment "A" of the squadron (which had been commanded by Lieutenant Colonel Samuel G. Beal since 21 September). Two days before Christmas, he and the maintenance officer for the detachment, Major James L. Shelton, arrived at Marble Mountain. Most of the remainder of the other 11 officers and 36 Marines joined them in time to mark New Year's Eve in Vietnam. The four precious aircraft had been preserved for the long ocean voyage at O&R North Island and arrived on 8 January on board the USS Croatan (TAKV 43). The next few days were spent getting the aircraft ready for combat operations, including final installation of the armor and armament kits. On 13 January the detachment completed its first cargo hop. Only four days later, the Viet Cong introduced the crews to small arms fire. Two aircraft were hit but not seriously damaged. Lieutenant Colonel Beeler's crews and aircraft had their first chance to demonstrate the mission for which they had been sent to Vietnam on 25 January, when a UH-34 had mechanical difficulties on the landing platform of a hospital ship. The CH-53 pilot retrieved the stricken aircraft and closed the official report with a terse "No problems encountered."

During their first weeks of activity, the CH-53s were grounded temporarily after an accident at Santa Ana,
where one helicopter was seriously damaged when the tail pylon broke in a practice landing in the hills east of the airfield. Initial fears were allayed when an investigation revealed that the failure had most probably occurred when the helicopter had made a landing which imposed stresses beyond the designed limit. Nevertheless, NavAirSysCom “recognized that during combat and in operations from unprepared areas it may be difficult to assure that pilots will stay with specified landing limits.” To prevent any recurrence of the accident, NavAirSysCom “developed a structural change to provide an overall improvement in aircraft strength of approximately 30 percent.” The changes were quickly incorporated. Even before the kits had arrived in Vietnam, Lieutenant Colonel Beeler and his crews went back to unrestricted flight on 29 January.

From its arrival in January to 22 May, this small detachment of four CH-53s retrieved 103 aircraft, many of which would have been lost if it had not been for Lieutenant Colonel Beeler and his crews. The total included 72 UH-34s, which, General McCutcheon was quick to point out, were enough aircraft to equip three medium transport squadrons. In addition, the unit had recovered 13 CH-46s, 16 UH-1Es, and two Air Force aircraft.

Meanwhile at Santa Ana, the rest of HMH-463 was undergoing intensive pre-deployment training. On 1 May it sailed on board the USS Tripoli with 22 CH-53s and arrived at Marble Mountain three weeks later. As Lieutenant Colonel Beal and his crews began flying to their new home, they were greeted by Major General Robertshaw, McCutcheon’s predecessor as DC/S (Air), who had overseen much of the development of the CH-53 and now was finishing a tour as Commanding General, 1st Marine Aircraft Wing. The same day, Detachment “A” was reunited with its parent squadron and Lieutenant Colonel Beeler became the executive officer. By the middle of the summer of 1967, Lieutenant Colonel Beal could report that “the squadron is moving over 100 tons of cargo daily, and
dier General Armstrong, Assistant DC/S (Air), on 22 January 1968—only a few days past the anniversary of the first CH–53 operational commitment in Vietnam—could state confidently:

The immediate requirement for a helicopter retriever has been satisfied by the CH–53. Retriever techniques and equipment have proven themselves in Southeast Asia. All CH–53s have been provided uprated engines from 2850 shaft horsepower to 3080 shaft horsepower. Further engine improvement is programmed for CY 69 CH–53 deliveries when the new T–64.12 engine (3400 SHP) is to be incorporated.

The exploits of these large helicopters became widely appreciated by not only the combat Marines and their commanders, but the pilots and crews as well. Gradually, in recognition of its capabilities, it acquired a new nickname which remains to this time. The CH–53 is known as “The Super-Bird” among those Marines who have seen it perform at its maximum lift and speed capability.

**Requiem for a Heavyweight—
the End for the “Deuce”**

As the CH–53 proved its worth as a heavy lifter, the machine upon which the entire Marine Corps helicopter doctrine had been based finally was leaving active service. On 1 January 1967, Major Richard L. Hawley, who had commanded the only HR2S squadron ever operationally deployed as a unit, took over as officer in charge of the detachment of “Deuces” at Marble Mountain. He was replaced on 12 April by Captain Steven E. Field. A little over a month later, on 14 May, a “Deuce” made the last operational flight of a HR2S in Vietnam, carrying 20 troops and 3,000 pounds. An era had ended. Since the aircraft had arrived on the Princeton in September 1965, this small subunit had flown over 5,300 hours, carried almost 32,000 passengers, and transported 12.5 million pounds of cargo. Though hardly designed for the mission, the “Deuces” also had executed over 600 medical evacuation flights.

When the HR2Ss left Vietnam, the commanding officer of MAG–16, Colonel Samuel F. Martin, summed up the feelings of most Marines:

The Deuces carried a big share of the logistics cargo lifted by MAG–16. Though their lift capability is replaced many times over by the CH–53s, the belching roar of the “Deuces” will be missed as they pass from the scene.

The crews who had flown them and maintained them would miss them even more. One reporter wrote of their feelings:

The sentiments—and that’s just what it was, sentiment—from tough-talking Marines, were echoed by
Gunnery Sergeant Donald D. Stoltz. "It's a damn shame to see them go. That's all—a damn shame."

In June 1967, for the first time since HMH–461 accepted the initial "Deuce" to be delivered to a Marine Corps tactical squadron in March 1957, the official reports did not list any of these giant helicopters in the active inventory. NavAirSysCom, on 30 July 1968, directed that all the stored "Deuces" be stricken from the records and disposed of at the least expense to the government. Even then the "Deuce" continued to serve the Marine Corps. Three years later, MAG–56 requested use of one last hulk which had been rotting in San Diego, to train a new generation of helicopter pilots in the techniques of aircraft recovery. The Naval Air Systems Command approved the transfer on 25 February 1971. It was the last known reference to the "Deuce" in official records.

To new generations of Marines, it is difficult to remember that this helicopter was the first—and for almost 10 years, the only—aircraft which could conduct a vertical amphibious assault in the manner conceived in 1948 by the early planners. The "Deuce" dominated development of the helicopter for two decades. All machines prior to it were but interim designs awaiting the introduction of it into the Marine squadrons. The lessons learned from this aircraft proved to be the basis for most subsequent development. The "Deuce" established that a power blade fold mechanism could be designed which would permit large helicopters to operate from the confined flight decks of the LPHs.

The lifting capability of the "Deuce" was the limiting factor in what equipment was carried by all assault Marines, and it was the "Deuce" which demonstrated that the Marine Corps had a unique capability in the nation's military forces.

While the idiosyncracies of the "Deuce" were legendary, it was, and remains, the most significant helicopter ever introduced into the Marine Corps. A search of available records indicates that all of the Marine versions have been broken up and sold for scrap. The mighty "Deuce" deserved a better fate.
The CH–46 in Trouble

In the summer of 1967, the Marine Corps had 10 squadrons of CH–46 helicopters. Half were equipped, or being equipped, with the improved “D” model. The rest still had the earlier “A” version. Three of the squadrons were in Vietnam and one was on board the assault ships of a Special Landing Force operating in the South China Sea. The deployed aircraft represented 107 of the 211 CH–46s possessed by the Marine Corps. The remainder of the Marine Corps medium vertical assault capability consisted of five squadrons flying UH–34s, three of which were in Vietnam and one as another SLF squadron. In addition to these 15 transport squadrons which were now available as the result of General Shoup’s expansion program, two additional ones had been authorized as part of a temporary wartime fourth helicopter group, MAG–56, based at Santa Ana. “The shortage of helicopter pilots,” General McCutcheon lamented in July 1967, “has prevented our manning MAG–56 as an active group.” At the time he spoke, only one of the extra transport squadrons, HMM–561, had been formed but it remained in a cadre status with no aircraft assigned. Later it received UH–34s as they became available. The second approved squadron was never activated.

Even with the loss of lift capability in the CH–46As due to the installation of the guns and armor, and in spite of the difficulties with sand the previous May, the CH–46 units had compiled an enviable record. From the time Lieutenant Colonel Watson flew into Marble Mountain until 1 May the next year, they had flown a combined 32,774 hours. Prior to 1 May 1967, General McCutcheon later was to write:

... there had been only isolated incidents/accidents involving the H–46. Statistics gathered by the Naval Aviation Safety Center revealed that the H–46 had an accident trend comparable to other fleet helicopters at a similar time in their development cycle.

Then on 3 May, a CH–46D at Santa Ana crashed, killing all four members of the crew. Within three days the investigators of the accident had determined that the mounting brackets of the main transmission had failed, allowing the front and rear overlapping rotors to intermesh. The result was catastrophic. The solution required a detailed inspection and the addition of steel reinforcements to those transmission mounts which were found faulty. All CH–46 helicopters were temporarily grounded. In Vietnam, “immediate corrective action of a temporary nature enabled the aircraft to fly combat missions while at the same time a detailed inspection program . . . was instituted.” Of the 115 transmissions available, including spares, in the Western Pacific, inspection revealed that 46 would have to be repaired. All the aircraft in the United States remained grounded until 13 May, when the Naval Air Systems Command released for flight any CH–46s which had successfully passed inspection.

Unknown to the Navy at the time, a few hours before the message ungrounding the aircraft was sent, another CH–46—this time an “A” model—crashed off the coast of Vietnam when the tail pylon containing the engines, main transmission and aft rotors broke off in flight. All four crew members were killed. General McCutcheon ordered “a comprehensive study of CH–46 material problems,” and Vertol “initiated extensive investigation with instrumented flight tests” to determine the exact cause. In June, General Krulak reported “another problem area was highlighted when a CH–46 crashed . . . due to a still undetermined cause. However,” he added, “the malfunction under strong suspicion is failure” in the main transmission. Later the same month, on 20 June, another CH–46 A crashed, though two of the four-man crew survived. Once again, even though the aircraft was not recovered from the water, failure of some sort in the rear pylon was suspected.

Ten days later, a CH–46D at Santa Ana crashed when a rotor blade separated from the aircraft. Miraculously, all three of the crew survived. As a result of this latest accident, all CH–46Ds were immediately grounded. Other models of the CH–46 were not affected, which meant that all the “A” model aircraft in Vietnam and on the SLFs could continue flying. Sophisticated X-ray inspection equipment was ordered and double checking of all blades directed. Three days later, on 3 July, still another CH–46 crashed in Viet-
A CH–46A of HMM–262 prepares to land on the U.S.S. Guadalcanal (LPH 7) in July 1966. By 1967, the CH–46 had become the backbone of the Marines' medium helicopter transport capability.

Nam, killing all four Marines of its crew. The aircraft was one of the ungrounded “A” models, and the cause of the crash again was traced to failure of the main transmission. General McCutcheon had had enough. He demanded, and got, a “CH–46 Reliability Review Conference,” scheduled to convene the first week in August.13

At the end of July, General Krulak became sufficiently concerned about the CH–46 to send a message to Vice Admiral Allen M. Shinn, Commander, Naval Air Forces, Pacific, stating that he “wholeheartedly support the effort to obtain an expedited review of the basic reliability of the aircraft.” He continued that:

The problems with the aft transmission and the rotor blades appear likely to be solved with the programs now in effect. Although hard to equate with the Vietnam record, there remains the possibility that there may be some basic design weakness in the aircraft with respect to transmission mounting and distribution of transmission stresses in the airframe. I hope that the review which [has been] requested clarifies this.14

Krilak called attention to two additional effects of the protracted groundings of the CH–46 on the West Coast. HMM–364, equipped with CH–46Ds, was scheduled to deploy to Vietnam in October. The continued difficulties with its helicopters, according to Krulak, “is affecting adversely the replacement pilot and crew training program” for the squadron. In addition, “while I am sure there has been some loss of confidence in the CH–46... I have no evidence that it has yet reached significant proportions.” Krulak concluded that, until the results of the reliability conference were known, “we are obligated to keep the CH–46 at work as best we can, since, as you know, it is the backbone of our vertical assault capability in Vietnam.” 15

The conference began on 1 August at the Vertol plant in Morton, Pennsylvania. Members of the DC/S (Air) staff, Naval Air Systems Command, the fleet operators, Vertol, and technical personnel all attended. Among other conclusions, the conferees decided that in the CH–46, “There were no safety or flight discrepancies remaining uncorrected on the aircraft provided recommended inspection procedures were accomplished.” These inspection requirements “created an unacceptable maintenance workload [but] the aircraft fixes being installed and test equipment under procurement would reduce the required maintenance workload to an acceptable level.” The Vertol represen-
tatives suggested that the massive buildup in Vietnam had helped produce the difficulties by reducing the quality of Marine maintenance crews. “The rapid turnover rate of maintenance personnel, their level of technical training and their CH–46 maintenance experience are critical contributing factors in this area.”

The Marines denied that this was a significant cause of the trouble. 16

Other members of the conference blamed the crashes on “rotor blades, drive shaft bearings, and excessive vibration of the aft pylon.” 17 The conference ended with a report that since “The vibration level and flight stress loads in the CH–46 were an area of concern,” the Naval Air Safety Center should task the Naval Air Test Center at Patuxent River, Maryland, to conduct an expedited CH–46 flight test program to evaluate structural changes to the aft pylon considered necessary as a result of an instrumented flight test program conducted by Boeing Vertol.” 18

It appeared that the difficulties of the CH–46 could be brought under control. Then, on 31 August, a CH–46A from HMM–262 on the SLF “Yawed at 3000 feet and lost the tail pylon.” All five crew members died in the flaming crash. The next day in Vietnam, an aircraft was landing, when the “tail pylon separated from aircraft.” 19 The crew escaped with minor injuries. This latest incident “precipitated an exhaustive investigation by the accident board and various technical advisors including Vertol engineers.” The team of experts “failed to determine the exact cause of the accident.” Reluctantly, Major General Norman J. Anderson, who had left DC/S (Air) in November of 1963 and who now commanded the 1st Marine Aircraft Wing in Vietnam, ordered that all CH–46s be “restricted to emergency combat requirements which could not be met by other aircraft.” 20

The first of September saw technicians from Vertol, Naval Air Systems Command, and other agencies converging on Vietnam in an attempt to pinpoint the cause of the failures. The President of Boeing/Vertol, Robert W. C. Thrarrington, accompanied by a Marine helicopter maintenance expert, Major Wyman U. Blakeman, arrived the 17th of the month. 21 They were met by a growing team of experts. Their investigations indicated that “although the specific causes of the CH–46 accidents were varied, the ultimate structural failures occurred in the area of the after pylon.” 22

Back in Washington, General McCutcheon, DC/S (Air), agreed with the recommendation “that interim structural and system modifications be incorporated in the CH–46.” The modifications included:

- A strengthening of structural members in the aft pylon and along the ramp closure area. These modifications will improve areas of known weakness... and will provide additional strength and durability. Several hydraulic and electrical systems modifications will be effected which will minimize the possibility of damage... will prevent malfunction of the yaw stability augmentation system with resultant structural damage... and will reduce overall maintenance effort... power transmission modification will provide a reduction in engine mount... wear and structural cracks in the aft transmission... area.”

Improvements, already underway, to reduce the high frequency vibration in the shafts connecting the engines to the transmissions—an area of concern since the first tests of the helicopter at Patuxent River—were to be expedited. The entire modification program “which will require about 1,000 man-hours per helicopter will be performed by personnel of the Boeing/Vertol Company. Marines will disassemble and reassemble the aircraft.” 24

In the western Pacific area, rather than complete the required work at the airfields in Vietnam which were receiving sporadic attack from the enemy, General McCutcheon approved a plan which would “establish maximum CH–46A repair positions at MCAF Futema, Okinawa.” 25 Repairs began on 11 October when 40 helicopters were unloaded from the LPH Tripoli. Initially only eight aircraft could be handled at a time, but by early November 16 more work stations were added. 26

The Marines of Lieutenant Colonel Gregory A. “Greg” Corliss’s HMM–262 were selected to move from the SLF to Futema to prepare all of the aircraft. On the squadron’s arrival Lieutenant Colonel Corliss turned over command to Major David L. Althoff, who in turn was relieved on 23 November by Major John W. Alber. The modification program on Okinawa was officially completed at Futema on 20 December. 80 CH–46s had been completed and returned operationally ready to the forces in Vietnam as scheduled.” 27 An additional 25 aircraft which had been undergoing normal overhaul in Japan would be completed in February 1968. An additional 111 CH–46Ds were modified at New River, 32 at Santa Ana, and 34 more at overhaul and repair facilities. A total of 325 CH–46As and “Ds” underwent the extensive overhaul.

A year earlier, DC/S (Air), Brigadier General Alan J. Armstrong, had written “The Marine Corps has

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* Major General Norman J. Anderson, who had succeeded Robertshaw in command of the 1st MAW in June 1967, later recalled that: “The pinnacle was Vertol’s proposal that they provide maintenance crews to the Marine Corps in [South] Vietnam because our Marines were too thin in talent to do justice to the machine. . . . General Krulak upheld my view that the basic contention of ineptitude was nonsense and that we had no desire to introduce more civilians into the combat domain.” (Anderson Comments)
always been proud of its 'crisis control' capability.” The major modification of so many helicopters in such a short time was a tribute to that capability. Every Marine mechanic who worked on the aircraft, the personnel from Vertol, and the officers and men of the units involved, as well as the leaders and staff in all the major commands contributed to the rapid restoration of the CH–46 as a full-fledged member of the amphibious vertical assault team of the Marine Corps.

The temporary loss of the CH–46 had been especially critical in Vietnam, where the CH–46s assigned to MAG–16, MAG–36, and the SLF represented 48 percent of the cargo lift and 47 percent of the personnel lift capability of III MAF. Until the CH–46s could be returned to duty, additional helicopters had to be found. As soon as the seriousness of the problems in the tail pylon became evident, 23 UH–34s were sent in cargo aircraft from Norfolk, Virginia and MCAS Cherry Point, North Carolina. These old reliable work horses arrived on 15 October and immediately were thrown into battle, often flown by CH–46 pilots from the squadrons which were having their aircraft modified. It was during this time, in the fall of 1967, that the “interim” UH–34 (or HUS under the old system) had the unique distinction of having its official designation adopted into the slang of all Marines. “Give me a ‘Huss,’” had become indelibly identified as asking for something good.

An additional 10 CH–53s were sent from California to further augment the lift capability in Vietnam. Finally, on 28 September, 31 U.S. Army UH–1s were assigned to General Anderson’s forces until the CH–46s could be returned to flight status.

The exact causes of the problems with the CH–46 never were pinpointed with accuracy and complete assurance. There is no doubt that at least a partial reason for the crashes was the extensive modifications made on the aircraft Vertol had sold in 1961—the YHC–1A—to produce the aircraft being flown by the Marine Corps in 1967. The provision of a blade folding mechanism introduced new loads on the transmission and fuselage. The widening of the ramp door and the resulting smaller support on the sides of the fuselage for the “shelf” on which the main components were attached would have weakened the structure of the aircraft, and more powerful engines would add still more strain. The persistent high-frequency vibrations, if uncontrolled, could impose stresses far beyond what the airplanes could withstand. Even the modifications, such as the installation of gun mounts and armor, made on the CH–46As before their deployment to Vietnam and not considered significant enough to warrant full-scale testing, might have been contributing causes. Regardless of what the exact cause was, the modifications installed in the final month of 1967 corrected the problem.

The CH–46D Arrives in Vietnam

The need for drastic structural modification of the CH–46 delayed the introduction of the improved “D” model to Vietnam. Lieutenant Colonel Louis A. Gulling’s “Purple Foxes” of HMM–364 at Santa Ana had been scheduled to be the first squadron to deploy to Vietnam with CH–46Ds, but their movement was held back so that each of their 32 helicopters could have the new modifications installed. Work on the CH–46Ds began on 5 October 1967. On the 28th, most of the unit’s pilots and crews flew to Vietnam where they began operating UH–34s to help relieve the medium lift shortage while waiting for their own aircraft to be completed back in California.

On 10 November, the aircraft were ready. They left the United States on board the Valley Forge that same day, and 19 days later arrived at Phu Bai, north of Da Nang. The 1st MAW now had 115 CH–46s in the combat area, 83 of them the older, less powerful “A” model. In all, the Marine Corps possessed 222 CH–46s, with 132 of them the improved version.

The difference between the two models was immediately appreciated in Vietnam. Lieutenant General Robert E. Cushman, Jr., then commanding III MAF and a future Commandant, reported in the summer of 1968 that “the advantage of the CH–46 ‘D’s over the ‘A’s becomes more apparent each day as the temperature rises.”

A CH–46D arrives in Vietnam. This aircraft of newly-arrived HMM–263 is being stripped of its “Spray-Lat” protective coating at Marble Mountain in January 1969.
With the arrival in Vietnam of the first “D”s and with the correction of its structural problems, the CH-46 at last was ready to take its place as the heart of the Marines’ vertical lift capability, not only in Vietnam but throughout the world. Uncounted Marines since 1967 have conducted assaults from them, depended for food, water, and ammunition upon them, and have returned to their home bases in them. Countless Marines owe their lives to the CH-46, which picked up the wounded—often in the face of enemy fire—and sped them to waiting hospitals. The CH-46 became, and remains, a valuable and respected member of the Marine amphibious assault air/ground team.

A Premature Funeral for the UH-34

With the return of the CH-46 to full operational status, the replacement of the “Deuce” with the CH-53, and the expansion of the UH-1E program, it appeared by 1967 that the Marine Corps would soon be equipped with nothing but turbine-powered helicopters. Such was not the case. The ever-versatile UH-34 simply refused to leave the scene. No one, in 1955 when General Shepherd had first requested that 90 HUS helicopters be procured, could have foreseen how this aircraft would become such a seemingly permanent fixture of Marine Corps aviation. It was, after all, only an expedient interim model to augment the capability for vertical assault until the “Deuce” could be produced in large numbers. The peak number of UH-34s in the Marine Corps was reached in January 1964 with more than 350 assigned. At that time, Lieutenant Colonel Walter Sienko, commanding officer of HMX-1, accepted the last Marine Corps UH-34 from Mr. Leete P. Doy, vice president of Sikorsky. With Captain Bruce A. Colbert as co-pilot and Staff Sergeant Donald Sabattus as crew chief, the aircraft represented the last of over 500 delivered to the Marine Corps since January 1957. In the intervening years since the first and last delivery, these sturdy aircraft had already amassed a total of 580,000 hours in the air. One single helicopter had already flown 3,745 hours, a phenomenal amount.

Originally, the Marine Corps had planned to introduce the UH-34s into the organized reserve as soon as the CH-46s could replace them in the active forces. This plan had been frustrated by the delays in delivering the CH-46s and by the initial attempts to slow down their purchase to save money. In April 1964, General Robertshaw pointed to “the critical shortage of reserve helicopters available,” and complained that “there are currently only 10 UH-34s available to meet a . . . mobilization requirement of 120 helicopters.”

Three years later, in the summer of 1967, it appeared that there soon would be enough UH-34s available to provide the reserve squadrons with the total of 73 aircraft which had been approved. Continued losses in Vietnam, the urgent need to augment the combat lift capability during the fall of that year when the CH-46s were having the tail pylons modified, and the ever-expanding war frustrated the plans. Helicopters would be assigned to the reserve units, only to be withdrawn and shipped back to the active forces. By 1968 only 38 were available. Not until 1970 could the expanded authorization of 105 UH-34s be diverted from the active forces and assigned to the reserves.

The reserves were not the only source of UH-34s to meet the needs of the helicopter program. In the fall of 1965 when it was obvious that the war in Vietnam would make it necessary to find more helicopters for the Marines, the Navy proposed that the ancient CH-19 be brought out of storage in Arizona and substituted for the UH-34s utilized in the training command at Pensacola. It was quickly pointed out that it would cost over $3 million to restore 53 of the CH-19s to flyable condition. In addition, there were few mechanics and pilots left who knew how to fly and maintain the CH-19, and new ones would have to be retrained. Such an effort would delay the progress of students completing the syllabus in a training program that was already beginning to show signs of strain at the increased pace caused by the war. Most of all, the CH-19 was “not configured for instrument flight.” If the CH-19 were used instead of the UH-34, “The Navy, Marine Corps and Coast Guard would receive helicopter pilots with no helicopter instrument time.” Had it been a lengthy struggle to procure aircraft which were capable of flying on instruments for the training command, and any step backward now would be disastrous. When the potential results of the plan were presented, it—fortunately—was dropped. Had it been adopted, a whole new generation of Marine Corps helicopter pilots would have become personally acquainted with the “can’t let go to scratch my nose” technique which had so bedeviled Colonel Dyer 15 years earlier.

A similar proposal was made the following spring and it was “tentatively planned to replace UH-34 helos at 24 specific sites with CH-19E types. This shift will create a source of UH-34s needed to replace losses in Southeast Asia.” Most of the UH-34s to be replaced were assigned to Navy and Marine Corps air stations for search and rescue duties. Once again, it was pointed out that the CH-19 had neither the stability systems nor the instruments to provide for flight in clouds or at night except in dire emergencies. This program was also abandoned. Even then, the Marine Corps con-
continued to operate three CH–19s at MCAS El Toro until the fall of 1967.

The UH–34s in the training command remained until 1969 when their replacement began. The new advanced trainer was the TH–1L, basically a standard UH–1E painted bright red and white for improved visibility in the crowded air at Pensacola. Initially, UH–1Ds had to be borrowed from the Army until production of the Navy models could begin in the fall, when 45 TH–1L trainers were procured from Bell.11

In the meantime, the UH–34 continued to serve around the world. Its days, however, were seemingly soon to come to an end, and preparations began to assure its rightful place in history.

**Last Flights of the “Huss”**

In early 1968, the Marine Corps began a search for the oldest UH–34 still on active duty. The helicopter was to be displayed in the Marine Corps Aviation Museum in Quantico, Virginia. The search led to Vietnam, and the proper aircraft was located. Being a UH–34, the “Huss” was little impressed by the distinction and impending place of honor. It kept on flying missions in support of the combat Marines, and in May “before the oldest of the choppers could be brought in, she was downed by enemy mortar fire near the Demilitarized Zone and destroyed.”12

A renewed check of the records indicated that the oldest UH–34 now remaining was also in Vietnam and was assigned to H&MS–36 at Phu Bai. On August 17, with Lieutenant Colonel Duwayne W. Hoffert at the controls, First Lieutenant Peter A. Cacciola as co-pilot, Gunnery Sergeant Leland R. Lindley as crew chief, and Staff Sergeant Richard J. Purtell as gunner, the aircraft, Bureau Number 143971, was flown to Da Nang for shipment back to the United States.13 The trip to Da Nang was not the last flight of “971” for there had been a change of plans and the aircraft eventually was assigned to the Marine Corps reserve unit at NAS Glenview, Illinois. There, like all UH–34s, it continued to be a work horse. Three years later, in August 1972, “971” once again made headlines as the aircraft “now the last one, has been retired from active duty in the Marine Corps.”14

The UH–34’s last combat flight in Vietnam occurred, appropriately, in HMM–362, the first Marine helicopter squadron to enter the country (with UH–34s) in April 1962 at Soc Trang. Over seven years later, the squadron was still flying UH–34s in the war. On 18 August 1969, at Phu Bai, ceremonies were held marking the end of the combat role of the UH–34s. Two days later, the squadron, now under the command of Lieutenant Colonel Jack E. Schlarp, flew the final six aircraft to Da Nang for shipment back to the United States.15 The squadron’s title was transferred to New River where a new HMH–362 was formed equipped with CH–53s.

At the time of last combat flight, General Leonard F. Chapman, Jr., who had been appointed Commandant on 1 January 1968, sent a message to the Sikorsky plant in Connecticut. In it he said:

> As the last UH–34 is phased out of Marine Corps forces in Vietnam, it is appropriate to express our appreciation for the outstanding record compiled by this aircraft. Over 500 of these helicopters have flown one and a half million flight hours in 15 years. They have proven their dependability in an amazing variety of roles. They have accomplished every task from space capsule recovery to disaster relief in peacetime, and

**Marines of HMM–326 salute after folding the blades of a squadron UH–34D at the squadron’s decommissioning ceremony on 18 August 1969 at Phu Bai. With the decommissioning of this squadron, the UH–34 at last retired from combat service.**

USMC Photo A422466
assault troop lifts to medical evacuations in war. In the rigorous combat environment in Vietnam, they have proven the Marine Corps concept of helicopter assault. Many hundred of Marines owe their lives to this aircraft. As we look to the future with more modern aircraft, the UH–34 takes its place in our memories along with such aircraft as the F-4F, SBD, and F4U as one of the giants of Marine Aviation.

By the end of September 1969 there were no more Marine UH–34s operating in Vietnam. Even though these aircraft were no longer engaged in combat, they were not yet quite ready to disappear from the scene.

Of the two temporary transport squadrons authorized for the duration of the war, one had never been formed for lack of aircraft and personnel available for assignment. The other unit, HMM–561, remained at Santa Ana with a complement of 12 UH–34s. On 14 October 1969, all 12 aircraft flew in formation over the airfield. The occasion was in honor of the decommissioning of the last UH–34 squadron left in the active Marine Corps. On 27 October, Lieutenant Colonel William C. Anderson, in the presence of Major General Robert G. Owens, Commanding General, 3d Marine Aircraft Wing, carried out his orders and the squadron was disbanded. Now the Marine Corps was down to the original 15 medium transport squadrons authorized in the permanent force.

The next “last flight” did not occur for almost another two years. In March of 1972, it was announced that “The last active Marine Corps UH–34D helicopter flew its final mission on March 22 when it arrived at Marine Corps Air Station, Quantico.” The aircraft, Bureau Number 147161, was piloted by Lieutenant Colonel Daniel P. Prudhomme, commanding officer of the Headquarters Squadron of FMFLant at Norfolk. It was to be put on display at the Marine Corps Aviation Museum, instead of the originally selected “971.”

The report of the final flight gained widespread publicity in professional journals and newspapers. The response from the readers was a shock. Not so, wrote Captain James E. Henshaw, to the Naval Aviation News which had reprinted the story. While “161” had indeed gone to the museum, the aircraft at FMFLant had been replaced by another UH–34, Bureau Number 147191. This aircraft, he wrote, “served previously with the Headquarters Squadron, FMFPacific, and now doubtless holds the distinction of being the only UH–34 still on active duty.” He continued that he wanted “to take this opportunity to clarify the status of an old and honored aircraft and to let you know that there’s still at least one alive and kicking.”

Captain Henshaw, as did many other Marines, underestimated the durability of these old helicopters. Even more indignant over the announcement was Colonel Kenneth M. Scott, commanding officer of the Marine Corps Air Reserve Training Detachment at Glenview, Illinois. In another letter to the hapless editors of the magazine, he wrote that HMM–776 still had UH–34s. “Not only is the squadron still flying the UH–34, but continues to use it in a tactical environment.” Though the unit was making the transition to UH–1Es, as Colonel Scott was writing in late June, it still had six UH–34s assigned. Just to make sure there was no doubt, he included a copy of the 17 June flight schedule in which the UH–34s had flown a total of 18.9 hours in the one day. By the end of July, however, UH–1Es had replaced all the UH–34s in the squadron and no additional flights were made.

As the “last flight” claims were being disputed, three more UH–34s took to the air. On 21 May 1972, Bureau Numbers 149317, 145787, and 145729 arrived at Davis-Monthan Air Force Base in Tucson, Arizona to be put in storage. For as dependable an aircraft as the “Huss”, the 1000-mile trip from Dallas was routine. They are the last recorded arrivals at the vast desert aircraft preservation facility.

A few more flights were made during the late summer of 1972, all by aircraft belonging to headquarters units, but one by one each aircraft had a “last” flight. It now seemed certain that the UH–34 had finally left the Marine Corps service.

Nevertheless, the morning of 3 October 1973, the Marines at New River were jolted to hear a strange sound in the air. Unmistakably it was the distinctive noise of a UH–34. Bureau Number 147191 had remained at Norfolk after “161” had been transferred to the museum at Quantico. Colonel Grover C. Doster, commanding officer of the air station at New River, knew of “191” and at the first opportunity requested that it be delivered to New River to be installed as a permanent memorial display at the front gate. Approval was granted. The only remaining problem was how to transport the aircraft to its new home. Once again, the Marines who knew the UH–34 were confident that the easiest way was the same as the UH–34 had always arrived—flying. So Colonel Doster went to Norfolk, climbed in the aircraft and casually flew the ancient veteran to New River. His co-pilot, ironically enough, was Lieutenant Colonel Prudhomme who had flown “161” the year before on the previous “final flight” to Quantico. When Colonel Doster arrived at New River, Bureau Number 147191 was stricken from the records of active UH–34s in the Marine Corps. It was the last “last one” left.

The F–4F, SBD, and F4U were all famous World War II aircraft.
In honored retirement, UH–34 Number 147191 stands at the main gate of MCAS(H) New River in November 1977.

It is difficult to determine accurately the position of the UH–34 in the development of helicopters in the Marine Corps. It was, after all, only a very slight modification from the Navy anti-submarine aircraft. In addition, it was initially procured as a temporary measure and was never intended to become the backbone of the vertical assault capability—much less for the length of time its position was preeminent. It was one of the first helicopters in the Marine Corps which could be flown with some degree of confidence on instruments. It was the first armored helicopter; the first armed one; and, in spite of the unimpressive performance of the TK–1 kit, the first gunship which belonged to the Marine Corps. For five years it had made up the bulk of the lift capability in Vietnam. Many Marines learned to fly it in the training command, flew it in war, and then flew it in the reserves when they left the active forces. It also was the last piston-engined helicopter in the Marine Corps.

Probably one of the better evaluations of its service was given by an experienced helicopter pilot who had flown the “Deuces,” the UH–34, and the CH–53. Major Dwight L. (“Ike”) Bledsoe summed up his feelings as: “Well, if we ever get into a scrape where we need lots of helicopters in a hurry, I won’t be surprised a bit to see someone find some UH–34s and have me flying them again.” 53 It is unlikely that Major Bledsoe’s fears will ever come to pass. At the same time, no one who knew the helicopter will ever say conclusively that the last Marine UH–34 has had its final “last flight.”
CHAP ER ELEVEN

A GENERAL AND HIS PILOTS

Conscience and Will Power

I particularly pride myself in the fact that I can carefully and meticulously plan and organize my work in a most efficient manner; and not only to plan the work, but to execute it with rapidity and accuracy. The ability to do these things lies in my will-power and conscience. Anything I have been made responsible for, or anything I have undertaken, I have always endeavored to complete.

It also seems that my capacity increases with the pressure, that is, the more work there is for me to do, the more efficiently I perform it.

Keith B. McCutcheon
26 February 1937

In these words, written as a young man applying for a job with an insurance company, General McCutcheon expressed the quiet determination and self-confidence which, with experience and expertise in his field, made him one of the most effective promoters and defenders of Marine Corps aviation. During 1967, these inner resources helped sustain General McCutcheon in a long, complicated struggle with the Office of the Secretary of Defense. At issue was the perennial problem of Marine aviation—a shortage of pilots.

"There Is No Shortage"

My next topic has held the number one spot in DC/S (Air) this spring—pilots. Surely everyone knows that there is no pilot shortage; it is merely that requirements exceed resources.

Major General Keith B. McCutcheon
Speech to General Officers’ Symposium.
July 1967

The first days of 1967 brought no lessening of the war in Vietnam. Marines were fighting major battles against the Viet Cong and the North Vietnamese Army. In Washington, a serious battle of a different kind was shaping up—one which would test the capabilities of General Greene, General McCutcheon, and most of the rest of the staff at HQMC. It also was one of the most vivid examples of why a Marine is proud of his Corps.

The root cause of the disagreement was the fact that the military services of the United States were involved in a major war in Southeast Asia without the backing of an all-out mobilization of the nation's men and material. The problem affected all the services, but none so seriously as the Marine Corps which had almost half of its Fleet Marine Forces engaged in combat. Within the Marine Corps, there were few areas which were not affected, but no difficulty was more serious, or eluded solution longer, than the provision of trained pilots for the war. The situation was particularly critical for helicopter pilots.*

From 1957 to 1964 total pilot requirements for the Marine Corps had remained at approximately 4,000. Slightly over half were assigned to tactical squadrons. The rest were divided about equally among staff positions requiring aviation experience, students and instructors at schools, and an assortment of other miscellaneous duties. Included in the latter portion were those pilots who were in transit from one duty station to another, a status usually referred to as the "pipeline."

In five of those years, the Marine Corps actually had a surplus of pilots, though the number was extremely small. The only significant shortage occurred in 1963, when 226 retired, leaving an identical number of unfilled billets. The rest of the pilot attrition that year was made up of 191 reserves who chose not to remain in the Marine Corps beyond their initial obligation, and 22 who were killed. Only three pilots resigned. To compensate for these losses, 490 new pilots graduated from the training command. The Marine Corps ended FY–63 in June, with 3,927 pilots against an authorized strength of 4,201. The next year there was again a small surplus of 11 aviators.

While the total numbers were encouraging, the imbalance between fixed wing and helicopters continued.

* Unless otherwise noted, all information on pilots is for lieutenant colonels and below.
The forced transition program had been quite successful and the shift in training goals at Pensacola was beginning to show results. Still, the number of helicopter crews never quite caught up to the demand for them.

Even after the Marines made the initial landings at Da Nang and Chu Lai, it seemed possible that the formation of the three new helicopter transport squadrons instituted by General Shoup, and the transition into turbine helicopters, could be completed smoothly. After more than a year in combat, the Marine Corps was short only 45 pilots out of an authorized total of 4,284.³

Many Marines, however, harbored no illusions as to what the future held. Marines had, historically, been stationed in the Orient and knew well that Occidental solutions do not apply to Asian problems. The Marines in Vietnam were engaged in a brutal “nose to nose, toes to toes” war with a determined enemy who sought the conquest of South Vietnam as his only goal. General Greene was particularly aware of what was happening. A plan for prosecuting the war to a swift and successful conclusion had been developed by the Marine Corps in 1965 and had served as a basis for much of the initial effort. Unfortunately, only parts of it were adopted, and without all of

How many Marine helicopters arrived in Vietnam. These CH-53s, cocooned in canvas for protection, are being towed from the docks at Da Nang to Marble Mountain in 1968.
them, the plan was doomed to failure. The plan was termed “Echo,” not for any secrecy, but simply an alphabetical listing of the alternatives. Plan “Echo” included an increase of 441 pilots. Brigadier General Alan J. Armstrong, DC/S (Air) in 1966, could report that by “12 October 1965—the increased pilot training rate associated with Plan “E” (Echo) was absorbed by the Naval Air Training Command.” 4 A further development was needed.

In July 1966, Lieutenant General Leonard F. Chapman, Chief of Staff of the Marine Corps, told the generals assembled at the annual symposium: “Many of you will remember that at last year’s symposium we at Headquarters were heavily engaged in preparing Plans A, B, C, D, and E.” 5 It was the last of these which was adopted, “giving us an increase of 30,000” Marines. “Then, in October,” he continued, “the Headquarters Staff produced in 4½ days, from a standing start, including 8 hours of printing time, Plans 1A, 1B, 2A, and 2B. 1A provided another 55,000 Marines.” 6

Plan 1A was submitted to the Secretary of the Navy on 21 October 1965 and approved by him on 1 December the same year. Simultaneously, General Armstrong was developing a program for 447 additional pilots to carry out the provisions of the plan. When the Navy was preparing the requirements for the new effort, “Plan 1A had not [yet] been approved by OSD, and consequently [the Navy] did not deem it appropriate to include a pilot requirement in the proposals.” The day after CMC submitted Plan 1A, on 22 October, General Armstrong requested an increase in the training rates at Pensacola from the FY 65 goal of 450. He estimated that a total of 502 new aviators would be necessary in FY 66; 588, in FY 67; 683 in FY 69. “The . . . training rates were tailored to provide an orderly build-up which could be realistically absorbed by the Training Command,” and, he wrote, “at the same time satisfy the activation and augmentation schedules required by Plans E and 1A.”

The lack of the requirements for additional aviators being stated when the Navy sent its plans to OSD was to come back and haunt the Marine Corps. For when the plans were approved, “the Marine pilot training rate for FY 67 [was only] 525.” 8 When the news of the low training levels was received DC/S (Air) submitted a letter to the CNO pointing out that the 525 new pilots a year “did not provide an adequate pilot training rate for the Marine Corps and it was in conflict [with the decision] which has approved 1A increases.” The letter “also reiterated requirements and recommended that CNO initiate action to insure that OSD documents reflect the Marine Corps requirement.”

The Marine Corps was in for a shock, for on 21 December, it was informed that “no further action could be taken until the completion of the study of pilot production and aviator inventory problems, required . . . to be submitted to OSD by 1 April 1966.” As a basis for the study, the Marine Corps was directed to make all its plans on the assumption that the war would end at midnight 30 June 1968—the end of the fiscal year for the U.S. Government. It was an order which, with a change in the year, would be repeated more than once in the years that followed.

General Armstrong and his staff rolled up their sleeves and went to work. On 23 March, the approved plan was sent to the Secretary of the Navy, via the CNO. Although the plan recognized that fewer pilots would be needed after 1968, if called for even higher training goals than had been requested the previous October.

Required Training Rates


There could be no delay in increasing the number of Marines reporting to Pensacola for flight training because “predicated on a fifteen month training cycle, the student input to the Training Command commencing April 1966 will [not] be reflected [until] the FY–68 output.” 9 The report concluded “that slippage of input increases beyond April 1966 will directly affect augmentation and activation schedules connected with Southeast Asia commitments.” During this brief time between July 1965 and July 1966 the Marine Corps pilot requirement had climbed from 4,307 to 5,292. 10 Most of the increase was related to more helicopter units needed for Vietnam. The two “add-on” transport squadrons had been authorized. Two new VMOs were to be commissioned.

Equally important, all aviation units in the combat area had been operating under a “peacetime” manning level and the tempo of war was beginning to have serious effects on the thinly stretched pilots and crews. The squadrons were to be brought up to full wartime strength. Additionally, and this was often misunderstood at the time, with the increase of pilots and crews traveling across the Pacific back and forth from the war, and with the casualties being suffered—particularly in helicopters—additional pilots would be necessary to compensate for the larger “pipeline.” A final new need was to staff with flight instructors combat training squadrons, both for helicopters and for fixed wing. These units would complete the train-
ing of pilots just graduated from the Training Command.

The prospects were summarized at the July 1966 General Officers' Symposium by Major General Richard G. Weede, Director of Personnel. General Weede was intimately familiar with the war in Vietnam, for from February 1962 until May 1964 he had served in Saigon as the Chief of Staff of the newly-created U.S. Military Assistance Command, Vietnam (USMACV). He reported "Our Marine aviators face accelerated assignments to unaccompanied overseas tours." He continued:

Helicopter pilots present a special problem. Over one-half of the WestPac aviator requirements are for helicopter pilots and losses in this skill are unusually heavy. . . . We can anticipate a shortage of helicopter pilots.11

The late summer and early fall of 1966 was a frustrating time for the Marine Corps. After a series of conferences, letters, messages, memos, and meetings, in August the Navy settled on a pilot training rate (PTR) which was a compromise among all the services which had their pilots trained at NATC. The share for the Marine Corps was 725 a year. At that rate, the Marine Corps would not catch up with its approved needs for some years into the future. On 26 September it reiterated that a higher rate was required for "as long as SEA commitments continue, and assuming we receive the 725 pilot training rate by FY 69, the pilot shortage will continue until FY 74." A month later, on 19 October, the Secretary of the Navy went ahead and approved the original plan and forwarded it to OSD. It called for the Navy to produce 1,700 pilots each year; the Coast Guard and foreign military services were to get another 100, but the Marine Corps remained at 725.

Once again the Marine Corps received a jolt. Even after having compromised on its requirements, "OSD Systems Analysis recomputed both the Navy and Marine Corps attrition factors as submitted . . . to arrive at a revised Navy/Marine Corps distribution of the 2,525" total graduates.12 According to OSD the proper balance for the Navy was 1,902 pilots and the Marine Corps only 523.

All during the month of December 1966, there were intense negotiations between General McCutcheon, who had returned in June as DC/S (Air), and his staff and their counterparts in the Navy "in an effort to resolve the problem . . . to arrive at a fair distribution." Finally, on 17 December, "the Navy concluded that an 1800/625 compromise was in order and it was recommended." Five days later "The joint Navy/Marine Corps memorandum to SecNav requested an 1800 Navy and 625 Marine Corps PTR for FY 69 and stated that additional actions have been taken and others are to be initiated to increase the pilot resources." This time, to avoid any doubt, the "memorandum was signed jointly, the Marine Corps on 22 December 1966 and the Navy on 27 December 1966."

It was a significant document—but not in the usual sense of the word. In the intense negotiations to achieve the compromise, the request had concentrated on only one aspect of the problem and had neglected to cover other important factors. As General McCutcheon informed the Commandant, the memorandum "was deficient in that it did not state what the Marine Corps originally requested (725) and it did not address specific training rates for FY 67 and 68." He added, "to preclude restaffing the joint . . . letter, a CMC memorandum was initiated to CNO to reiterate CMC stipulations in connection with the 625 compromise."13 Thus the Marine Corps found itself in a position where it needed up to 838 new pilots in a single year, had worked out a compromise with the Navy of 725, which had been rejected by OSD who ordered it to receive no more than 525, and now was jointly, with the Navy, requesting a further compromise of 625.

The situation was becoming grave. It was further aggravated by the fact that many pilots, faced with repeated tours in Vietnam, and deployments away from their home bases during the short time they were back in the United States, were finding Marine Corps careers less attractive. Though the final results would not be known until 30 June, FY 67 was rapidly shaping up as a near disaster for retention of pilots. By the end of the year 288 of the reserve pilots had been released from the service, and another 107 had asked for retirement. More ominous, 125 pilots had been killed or taken prisoner and 257 voluntarily resigned their commissions. The Marine Corps in the end gained slightly more than its allotted 525, a total of 573; but it lost 777 pilots.14 It ended the year with a shortage of 706; and the situation promised to get worse.

General Greene and General McCutcheon found the Marine Corps in a three-way squeeze. They needed more pilots to fill the new units authorized by plans Echo and 1–A; they could not obtain approval for an increased training rate which, even though the results would not have much effect for nearly 18 months after the additional students reported to Pensacola, was one of the best long-range solutions; and now they were having difficulty keeping the pilots they already had.

As the magnitude of the expected shortage became apparent in the last months of 1966, all of the Marine Corps knew that the question of additional pilots—
particularly those for helicopters—was becoming extremely critical. Starting in July 1967, pilots who had been back in the United States 22 months were scheduled to start returning for a second year in combat. By the end of 1968, it was estimated, almost 300 who had left since 1 March 1965, would have to be ordered back to Vietnam. The situation for fixed-wing pilots was only a little better. At the same time the Marine Corps was becoming alarmed at the continued drain on its pilots, the situation became a matter of concern to the Congress.

Congress Investigates

Senator John Stennis (D.-Mississippi) was a respected and powerful figure. On 19 January 1967, as Chairman of the Preparedness Investigating Subcommittee of the Senate Committee on Armed Services, he announced that “the Subcommittee will hold formal hearings in the near future on the aircraft pilot programs of the Army, Navy, Air Force, and Marine Corps.” Senator Stennis said “that the Subcommittee has had a continuing interest in this matter for several months and the hearings will follow staff investigations and inquiries which commenced last fall.” The subcommittee, he continued, would:

... address themselves to all aspects of the programs, and all problems which they present with particular attention being given to the adequacy of the present and proposed pilot production programs to meet existing and anticipated demands.

Simultaneously, in the House of Representatives, the Chairman of the Committee on Armed Services, L. Mendel Rivers (D.-South Carolina) wrote to Secretary of Defense Robert S. McNamara. Congressman Rivers said that “I am very much concerned about a serious situation which exists in the Department of Defense. I am referring to the fact that we have been losing pilots at a faster rate than we are replacing them.” He continued that “This problem seems to have received little attention in the Department of Defense, insofar as the expansion of pilot training is concerned, until recently. I am sure the situation could have been anticipated some time ago.” Never noted as a fond admirer of Secretary McNamara’s style of management of the Department of Defense, he kept pointing out in the letter that some action had to be taken!

Pilots who have completed their obligated service and wish to retire or resign are not permitted to do so.* This, of course, cannot help but have an adverse effect upon our ability to attract young men into our pilot training program.

Perhaps the Defense Department has expressed no concern about the shortage of pilots...

We have got to come up with an answer.

But it seems to me that we need more pilots now, and the faster the better. Half measures will not be sufficient. A gradual buildup will not solve the problem. He concluded that “I intend to go into this matter fully at the first opportunity,” and that “this situation needs immediate attention.”

In the hearings that followed in February and March, General Greene was among those called to testify before Senator Stennis’ and Representative Rivers’ committees. In each case the Commandant reviewed the needs of the Marine Corps, the number of new pilots being produced by the Training Command, and the losses being experienced. He also explained that “management actions” had reduced the number of pilots required to 5,002; but even with that, there remained a shortage of 851 aviators, 416 of them for helicopters. He estimated that by July 1968, the shortage would increase to 1,021.

The Congress was not the only place where General Greene was describing the situation. On 15 February, he spoke briefly to the Marine Officers’ Wives Club. He explained some of the impact of the shortage. “Now about rotation policy. If your husband comes back from South Vietnam, how long are we going to let him stay here before he has to go out again?” The answer was not reassuring:

Well, our policy is two years. That’s our optimum time, but I’m finding that in certain specialties and helicopter pilots... I don’t have enough... to let the individual remain at home for two years... and that’s the kind of sacrifice you ladies are going to make, and you’re going to have to look forward to... And I’m asking you to do it.

Though less a matter of debate at the time, the shortage was not confined just to helicopter pilots. The crew chiefs, mechanics, and their wives faced nearly the same conditions. To most people concerned with the problem, the existence of a serious shortage was evident, but a few key men in DOD were not convinced.

The crux of the controversy lay in the statements General Greene had made before committees in both houses of Congress. The Commandant repeatedly had told the legislators that the Marine Corps was experiencing a severe shortage of pilots and the situation would get worse if steps were not taken immediately to cure it. With full-scale hearings on military pilot training, requirements, and inventories scheduled in April before Senator Stennis’ Preparedness Investigating Subcommittee, OSD became concerned about the testimony which might be given by the witnesses.

* One of the “management actions” taken to maintain pilots, though it was applied on a selective, almost case-by-case basis by the four services.
On 21 March, General McCutcheon was called to
the Pentagon to meet with Mr. Russell Murray from
the office of Dr. Alain C. Enthoven, Assistant Secretary
of Defense (Systems Analysis). “Mr. Murray stated
that Mr. McNamara simply could not have programs
where resources and requirements were out of bal-
ance,” General McCutcheon reported. The general
responded by recounting the reasons for the increased
requirement, including all the steps the Marine Corps
had taken to make more pilots available, but concluded
that the only long-term solution was an increase
in the pilot training rate. “Mr. Murray then showed
us a chart which depicted a new projection of re-
sources vs. requirements.” After going over the new
OSD calculations, General McCutcheon told him:

I would be glad to take the chart and study it and
come up with some suggested dialogue to reconcile the
Department of Defense view of ‘no shortage’ vs. the
Marine Corps statement, which is now a matter of rec-
cord in the Congress, that we will be short 851 on 30
June 1967.

The next day, in response to a telephone call from
Dr. Enthoven to General Greene, General Chapman
(Chief of Staff) and General McCutcheon returned to
the Pentagon for another meeting. There, General
Chapman explained to Dr. Enthoven that he thought
the Department of Defense “was taking a rather nar-
row definition of ‘requirement’.” Dr. Enthoven, for
instance, had suggested that if the Marine Corps
would just restrict pilots’ leave to 20, rather than the
more customary 30 days, prior to leaving for Vietnam
and on returning from combat, additional aviators
would be available at any one time. While General
Chapman agreed that such a program might be neces-
sary, instituting it did not eliminate the need for
sufficient pilots so that the pipeline could accommodate
30 days’ leave. He repeated that “The Marine Corps
had not complained about not having assets equal to
total requirements. . . . What we [do] not have [is]
an adequate approved pilot training rate to get us
well.” The meeting broke up with Dr. Enthoven
“stating he was in hopes we could draft a paper that
would show a balanced program and thus come to a
meeting of the minds.” Neither of the two generals
had much doubt what was meant by a “meeting of
the minds.”

On 29 March, the chief of staff approved a memo-
randum for the Secretary of the Navy in which he
stated: The Secretary of Defense “intends to have all
programs in balance, i.e., resources to match require-
ments. He proposes to accomplish this by reducing
requirements in FY 1968 and 1969.” Apparently
OSD had underestimated the courage and determi-
nation of the generals, for, as General Chapman stated
in the memo, “The Marine Corps has refused to ac-
quiesce in this method of eliminating the ‘shortages’.”
The increases required by plans Echo and 1–A were
valid; the statements by General Greene as to the
shortage were valid; and regardless of what actions
the Marine Corps took to temporarily relieve the
problem, a long-term solution had to be found. As it
was, the memo pointed out, “The situation as seen
by the pilots is one of repetitive tours to WestPac,
two years or less in [the United States] between
tours,” and “reduced chances for professional school-
ing, reduced leave to and from WestPac, family sep-
aration even in [the United States] due to other de-
ployments, exercises,” and squadrons on the east and
west coast woefully undermanned.
The “effect on the pilots,” he wrote “runs counter to those [actions] taken to increase pilot retention. The situation looks better on the outside and the pay is higher.” Worst of all, “The Marine Corps prediction of wartime pilot retention has proved to be too optimistic, thereby contributing to the ‘shortage.’ The pilot retention rate can get worse.” Under the circumstances, he continued, the Marine Corps could only consider that, “the present pilot situation is tolerable only for a short, interim period. There must be a ‘get well’ program we can publish” to our aviators and reassure them that the sacrifices they are making are not to become a continuing way of life. “To summarize the essence of the matter,” he concluded, “The Marine Corps refuses to agree to exorcize the ‘shortage’ because no ‘cure we can rely on’ had been approved and started by OSD."

On 30 March, there was another meeting between Mr. Murray, Dr. Enthoven, and General McCutcheon. It was quickly apparent that little progress had been made toward a “meeting of the minds,” for “the primary concern of [OSD] was the forthcoming testimony before the Stennis Committee.” Dr. Enthoven “objected to the Marine Corps showing what it considered to be its full requirements.” One of his ideas was that since deliveries of some aircraft were slightly behind schedule, “the requirement [for pilots for them] was not valid for that year, but should be shown in some future year.” A particularly deep point of disagreement concerned the squadrons in combat. OSD had previously agreed that they should have a full wartime complement of pilots instead of the peacetime level with which they were fighting the war. Dr. Enthoven stated that OSD “would issue a paper negating” the decision, and the units would remain at a peacetime allocation of pilots. General McCutcheon said, “that we carried this as a requirement since we had received it in writing and if he wanted to cancel the requirement, he would have to do so in writing.”

“The end result of the conversation . . . was that [Dr. Enthoven] was still adamant that our true requirements should not be shown and that he questioned the validity of many of them.” As the meeting broke up, Dr. Enthoven stated “he regretted that we couldn’t get together and agree, and that it might be necessary to ‘air our dirty linen’ in public before Congress.” He also warned that OSD “found it necessary to attack and that they would have to point out that the Marine Corps requirements were fictitious and that they had resources necessary to carry out their assigned missions.” General McCutcheon was not cowed, for “I told Dr. Enthoven I understood his position but we would be happy to accept the challenge.”

That night, Dr. Enthoven’s secretary called General McCutcheon’s home and left word with his son to get in touch. It was past midnight when the general arrived from work, but early the next morning he returned the call. Dr. Enthoven told the general “that he was taking personal charge of the Marine Corps pilot requirement problem,” and that he wanted to meet with General McCutcheon “and go over all [the] requirements line by line.” A few hours later, he arrived at HQMC and they went to work immediately.

It is not often that a single room contains two more intelligent, analytical—and determined—men as when the experienced, perceptive Marine general sat down at the same table as the brilliant economist. It is also seldom that each and every Marine aviator and his billet receive as careful scrutiny from such high ranking officials. At the end of the first day, General McCutcheon could report that as a result of their efforts, “He certainly will know a whale of a lot more about Marine Corps aviation, and I will have a fuller appreciation of his systems analysis procedures.”

After another full day of effort, the Marine general and the systems analyst had finished their review and come close to agreement. McCutcheon had started out with the initial need for 5,002 aviators, had pressed for 5,222 but “wherever my new figure was above the previous . . . requirements, I told him I would drop to the lower number.” Dr. Enthoven had accepted 4,705. The difference was the manning at wartime levels of the squadrons engaged in combat. General McCutcheon held out for a full strength of pilots; Dr. Enthoven remained convinced that they could operate at peacetime levels. At the conclusion of the line-by-line justification, the general reported, “we then turned to a discussion of ways and means to improve our situation. He took notes . . . and I’m sure we will get some action.”

After it was all over, General McCutcheon concluded that “it was a most interesting and worthwhile session. Dr. Enthoven learned a great deal about the Marine Corps and I believe we have established a good harmonious, close rapport with him.” He concluded “I believe that anytime we have a good hard case to present that he will hear us out and decide the issue fairly and squarely.”

On 3 April, in a telephone conversation with General Greene, Enthoven further clarified both the areas of agreement and the remaining issues between himself and the Marine Corps. Enthoven declared that after his working session with McCutcheon, he was
“satisfied that you definitely need more pilots than you’ve got” and that he was “quite sure that we are going to be able to figure out one way or another . . . to improve your training rate.”

At the same time, Enthoven again tried to persuade Greene not to use the word “shortage” in relation to the pilot problem. The OSD analyst urged the Marine Commandant to concentrate in all public statements on three points: First, that “We do have enough pilots to fly our planes today;” second, that DOD, the Navy Department, and the Marine Corps all agreed that over the long run more aviators were needed; and, third, that all agencies and services concerned were examining ways to “increase our pilot inventory.” Enthoven made it clear that he was concerned about the effect on public opinion of any official statement that the Marines (or anyone else) did not have enough pilots. Such statements, he said, would be used by antiwar elements in the U.S. and by enemies abroad to claim that the nation no longer could carry on the war, thereby undermining the overall political effort of the Johnson administration to defend its Vietnam policy. Greene acknowledged the importance of the political problem but made no commitments on what Marines would tell the Congress.3

In spite of these lingering differences, it appeared that enough agreement had been reached that steps could be taken to begin a program to produce sufficient pilots for plans Echo and 1-A. The Marine Corps, however, had not taken into account fully the fears of OSD over the rapidly approaching Stennis committee hearings. The results were spelled out in a memorandum written by General McCutcheon:

General Chapman received a call from Dr. Enthoven late Wednesday afternoon, 19 April and agreed to meet with the Doctor in his office at 0830 the following day. We prepared a modification of the current tables [of pilot requirements] which had been under discussion. . . .

Lieutenant General Chapman, Colonel [Mervin B.] Porter [who had commanded HMM-261 in Vietnam and now was an assistant to General McCutcheon] and I arrived at Dr. Enthoven’s office at 0830, Thursday, 20 April.

The session lasted until about 1315. Several times it got rather heated and I thought that we would conclude the meeting with no agreement between us.

The main point at issue remained the one that has been prominent since the beginning, i.e., “shortage.” The Department of Defense cannot accept the fact that requirements can in fact be in excess of capabilities without the corresponding shortfall being publicized as a shortage. Dr. Enthoven made it clear that if we did not accept his chart and cooperate in front of the Stennis Committee by saying that we are not short that he would have no alternative but to analyze Marine Corps aviation in depth and he assured us that he would cut us apart. He emphasized that he had lots of experience in this line of work, i.e., [the Air Force’s hoped-for new bomber] the B-70, and that he had the organization to do it. He said he did not want to but if we didn’t cooperate he would have to. I got the impression that he was on the defensive and that they were afraid of what we might say in front of Stennis and more important what the aftermath might be.

In spite of this blackmail threat we continued to negotiate and General Chapman was very successful in extracting nearly everything we asked for.

Several hours after we had left Dr. Enthoven’s office Mr. Sullivan [an assistant of Dr. Enthoven] called Colonel Porter and requested a lot of data on our pilots going back to 1961. He wanted the information by 1000 the following morning. I tried to get in touch with Sullivan but could not; but I did call Dr. Enthoven and told him we could not provide it in that short of notice but would get it as soon as possible. Most of it was provided late the following day.3

If the Marine Corps had miscalculated the sensitivity of OSD to the Stennis committee hearings, then OSD miscalculated the integrity and determination of the Marines who were called to testify. Friday, 5 May 1967, General McCutcheon was the witness. Within minutes of the afternoon session’s beginning, James T. Kendall, chief counsel for the committee, asked, “General McCutcheon . . . I trust that you will not be offended if I am so bold as to use the word ‘shortage’ in my questioning. Is that word in your vocabulary, sir?”

The general shot back a brisk “Yes sir; it is.”32

Three and a half hours later, there was no doubt in the minds of the Senators. The Marine Corps had a serious shortage of pilots.
CHAPTER TWELVE
MORE PILOTS FOR THE WAR

Busy Helicopter Crews

The Stennis Committee hearings established as common knowledge that the Marine Corps had a shortage of pilots. Recognition of the problem, however, was not equivalent to a solution. Even if the pilot training rate could be increased immediately—and it could not—there would be no noticeable effect for almost two years. In the meantime the situation continued to worsen. Among fixed-wing pilots it was serious. Among helicopter pilots it was critical.

No Marine will ever detract from the heroic efforts of the fixed-wing crews. Flying under seemingly impossible weather conditions, the jets performed miracles to protect the helicopters as well as the combat riflemen on the ground. They encountered a thicket of surface-to-air missiles while attacking targets in North Vietnam. They operated from expeditionary airfields and aircraft carriers. Always they fought with the highest degree of skill and dedication and, whenever possible, as a member of the Marine air-ground team.

If the speed and altitude of a jet made the war a slightly impersonal experience to the pilots, the same was not true of the helicopter crews. Theirs was a very personal war. They were seldom out of range of enemy fire from the moment of takeoff until the final landing. With rocket and mortar attacks against forward bases, even when they completed a flight, they were subjected to continuing enemy fire.

The continued combat at close quarters between the helicopter crews and enemy gunners brought a new dimension into the pilot shortage. Attrition, either as a direct or an indirect result of this new factor, was climbing beyond all previous estimates. Prior to the Stennis Committee hearings, General McCutcheon had prepared an analysis of the conditions.

Since Archie’s Angels had first landed at Soc Trang—and they had never suffered a combat casualty—up to 23 April 1967, 719 pilots and crew members had become casualties in Vietnam. After the landings in 1965 both fixed-wing and helicopter crews were exposed to enemy fire in approximately equal numbers. The results were revealing. Of the total casualties, 638 had been in helicopters. Among pilots, 37 helicopter and 21 fixed-wing had been killed. For crew members, the ratio was 52 against 16. Most indicative, 311 helicopter crew members and 229 pilots had been wounded or injured. The equivalent numbers for fixed-wing were 19 and 10.

Two months earlier, a similar study on a different facet of the problem had been completed. It was a part of General Chapman’s and General McCutcheon’s strenuous efforts to have sufficient pilots approved by OSD to bring the squadrons in combat up to wartime allowance of pilots. The report had made a detailed and comprehensive analysis of the duties of pilots in Vietnam. The conclusion was that as a routine average, fixed-wing pilots were on duty 86 hours per week, and for the helicopter crews, the normal was 14 hours a day, the equivalent of 100 hours a week. The study added that:

...not portrayed in the above data are the following considerations: irregular hours and interrupted sleep, heat and humidity preventing recuperative daytime rest, continuous seven-day week duty period up to six months with little respite, and almost continual exposure to enemy fire on the part of helicopter pilots and frequent periods of being downed in the midst of a fire fight as evidenced by two CH–46 crews who were recently downed and joined in with other friendly troops in repelling an attacking force.

If a large assault operation was underway, the hours for fixed-wing per day increased from 12.3 to 12.5. For helicopters, every single pilot assigned would have to average “15.5 hours crew time... per day,” and “these increased rates continue for periods of 5 to 10 days.” General McCutcheon also calculated that a helicopter pilot on a 13-month tour in combat would complete more than 1,100 individual sorties. Jet pilots averaged about 250, though those flying the Grumman-built, all-weather A–6 attack aircraft would spend half of them flying into North Vietnam, rather than supporting the Marines in the south.
Though no equivalent studies were made for crew chiefs, they worked even harder, flying in their aircraft on missions and manning the guns, maintaining the helicopters, and trying to catch a few moments of rest before again taking off on another mission. Their exploits provide one of the proudest moments in the history of the Marine Corps. More than anyone else, the flying mechanics and crew chiefs of the helicopter units made the prosecution of vertical assault warfare possible.

Even when the crews returned to the United States, there was little let-up in the pace. General Greene had hoped that no Marine would be sent back to Vietnam without at least two years between tours. This meant that for every pilot in the Western Pacific area, at least two were needed elsewhere to provide a "rotation base requirement." General Chapman calculated that by the summer of 1967, 881 helicopter pilots would be needed for the overseas units if they were to be brought up to full wartime strength. This meant that there should be 2,643 elsewhere. There were only 1,966, almost 700 individuals and 25 percent short of the number needed. In jets and transports, there was a tiny surplus of 80 pilots.

At the General Officers' Symposium in July 1967, there were few bright spots in the outlook. General McCutcheon could report that the change from the UH–34s to the CH–46s was progressing and that the last squadron was due to make the transition to the new helicopter by the end of 1970. "More than one half of our medium helicopter squadrons are deployed," he said. "Rotation of the CH–46s to WestPac to replace the UH–34s has nearly doubled the Marines' lift capability without"—and it was a vital point—"increasing the demand for helicopter pilots." The impending difficulty with the tail pylon still was unknown at the time.

He continued that "of the (medium) squadrons deployed, two are assigned to the Special Landing Forces; the other seven are with MAG–16 in Vietnam." Remaining in the United States, "we have six squadrons of the permanent force structure plus two temporary add-on squadrons of MAG–56 which have been activated in a cadre status on the West Coast." The shortage of pilots and crew members, however, "has prevented our manning MAG–56 as an active group." For the "heavy" transports, production of the CH–53 was beginning to catch up with the schedule, and "all three squadrons will be fully outfitted this fiscal year." HMH–463 had arrived in Vietnam two months previously and had joined the four-plane detachment which had retrieved so many downed aircraft. In observation units, "at present, three of our five VMO squadrons, with 70 percent of our UH–ls, are in" Vietnam.

He concluded his presentation by reviewing the pilot situation. "Retention of aviators on active duty fell far below our earlier projections," and "the attrition is forecast to stay higher than in the past. This includes losses due to death, disability, retirement, resignation ... and all other causes." Not for another two years could any improvement be foreseen. In the meantime, a series of steps had been "taken and [are] to be taken to ease the pressure on our pilots." 

Management Actions

Even as General McCutcheon was talking, the results of the FY 67 pilot program were being added up. The news, while not quite as bad as expected, was grim. New pilots numbered 573. Attrition from all causes was 777. Now the Marine Corps was short 706 from a requirement of 4,705. Although the steps taken to remedy the shortage were, at the time, called "management actions," there was really only one meaning to them: scrape up every available pilot in the Marine Corps for assignment to the operating units, until sufficient new ones could be recruited and trained.

Some of these efforts had begun in the fall of 1965 when it first became readily apparent that Vietnam could expand into a major conflict. Unless there was a personal hardship involved, all regular officers who had requested retirement or resignation beyond 31 August 1965, were to be retained in the Marine Corps for an expected additional 12 months. For the regular enlisted Marines, much the same program went into effect and, in addition, there were some involuntary extensions of enlistment for up to four months. The
message announcing the freeze on Marines getting out went on to say:

Reserve officers and enlisted personnel are not affected by involuntary extensions, not because their numbers are not needed, but because of legal considerations. The large number of reserve officers and enlisted personnel whose terms of active service... expire each month represent a tremendously important source of skill and experience which is vitally needed for the leadership of our Corps during this time of expansion.

When the restrictions on leaving the Marine Corps were lifted the next year, a surge of resignations and retirements contributed to the ever-widening gap between requirements and resources. Once again, involuntary extensions were ordered. In a message to all Marines, the Commandant explained the necessity of such a move:

During the past year, every effort has been made to obtain sufficient officers with necessary qualifications to meet all requirements. Despite these efforts, some deficiencies exist. Therefore, in order to provide the needed officer strength to maintain an adequate rotation policy, the Secretary of the Navy has approved the reinstatement of a program of selective deferrals of acceptance of resignations and requests for retirement or termination of temporary appointments.

The Commandant is fully aware of the many inconveniences, personal hardships, and sacrifices caused by similar action in 1965, and therefore takes this present action with the greatest reluctance. However, there is no alternative if the Marine Corps is to continue to meet its expanding contribution to our nation's defense effort. Assurance is given that case-by-case attention will be given each request to ensure full consideration of personal problems resulting from this policy.

Acceptance of resignations, requests for retirement, or termination of temporary appointments of regular officers of the grades Lieutenant Colonel or below will be selectively deferred [and] will be based on critical needs for officers with particular skills... including naval aviators.10

The deferrals would "remain in effect indefinitely," the message concluded.

Even though there was no way to retain reservists without Congressional legislation, at least the regular pilots would remain in the Marine Corps. The policy was effective, and resignations and retirement of aviators dropped off sharply during FY 68.

There was another source for more pilots. Borrowing the systems analyst's technique of carefully scrutinizing each billet requiring an aviator might be a way to reduce the number of pilots needed. The biggest savings was also the most difficult for the Marine Corps. Reluctantly, Generals Greene, Chapman, and McCutcheon agreed that there was no way possible to fill the units in combat at a full wartime complement of pilots without jeopardizing any semblance of a rotation policy back to the United States.11 They ordered the squadrons to remain at peacetime levels. This reduced the needs of the WestPac squadrons by a total of 166 pilots. It meant that the deployed Marines were going to continue to be fully committed, but it also meant that they could have a somewhat longer period back home before returning to Vietnam.

Another bitter pill was the loss of MAG-56, the long-fought-for and finally approved "add-on" helicopter group formed at Santa Ana after MAG-36 departed for Chu Lai. It was left in a cadre status and staffed with ground officers who carried aviation specialties designations, thus eliminating the need for another 124 helicopter pilots. The Marine Corps finally had to accept OSD's proposal for only 20-day leaves for pilots when departing to or returning from Vietnam, an action which produced the equivalent of 102 more pilots. Aviator students at the Amphibious Warfare School at Quantico, normally considered a vital part of the training of a Marine officer, were cut by 50. Bit by bit, the Marine Corps whittled away at any place where a pilot could be spared. Nothing was overlooked. Two were replaced by civilians at air stations, and even one was subtracted from the staff at FMFPac. When it was all over, 709 billets had been identified as being able to be reduced.

One more approach was substituting ground officers for pilots. Though not as productive as eliminating billets, the effort still netted 245 more pilots. Generals no longer could have aviators as aides, and squadron staffs were carefully screened from top to bottom for billets which could be filled by a ground officer. HQMC gave up 20, including 10 from DC/S (Air).

Finally, the Marine Corps had to curtail commitments in areas other than Southeast Asia. Nowhere was there a greater impact than on the helicopter pilots of MAG-26 at New River. Lieutenant General Richard G. Weede had been promoted and assigned as the Commanding General, Fleet Marine Force, Atlantic after his tour as Director of Personnel at HQMC. He also spoke at the 1967 symposium.

Up to June 1965, he pointed out, the Marine landing force of the Sixth Fleet in the Mediterranean Sea had included a small detachment of eight UH-34s. A lack of LPHs, which were then still being built, had prevented the assignment of any larger vertical assault capability. Since then, General Weede continued, "we have been forced to withhold even this [limited UH-34] support due to our critical shortage of helicopter pilots."12 He went on that "We consider it essential to provide full helicopter support for this unit—by that I mean an LPH embarked squadron." In the Caribbean the helicopter unit of the ready force, which
normally was a full squadron of transports reinforced with two UH–1s, was down to “six UH–34s and two ‘Hueys’ due to nonavailability of LPHs.” We were actually a bit thankful for this,” he continued, “since it gave us a breather and temporarily alleviated our pilot shortage somewhat.”

Even with the units in Vietnam being held to peacetime pilot strengths, with the elimination and substitution of billets, involuntary extensions of active duty, and cutbacks of Atlantic fleet commitments, there were still not enough helicopter pilots to go around. General Weede displayed two charts. One showed that the 2d Marine Aircraft Wing, which made up the aviation member of the FMFLant air-ground team, had only enough pilots to satisfy 71 percent of the wartime, and 88 percent of the peacetime requirements. Discussing the shortage, he said, “I won’t harp on this. We are all aware of it.” Then he displayed where the bulk of the shortages lay. MAG–26 had 58 percent of the pilots it would need in wartime. “Many of our problems or situations we can work with, on, and around,” the general concluded, “But only a long lead time pilot can fill that cockpit seat and 42 percent of MAG–26’s helo seats are empty, with no significant relief in sight.”

Not only was no relief in sight, the shortage continued to get worse. In 1966, the obligated service of pilots graduating from the training command had been increased from three to three and a half years after earning their wings. In 1968, approval was gained for another increase to four and a half years starting with those officers beginning flight training after 1 January 1970. A new program of warrant officer pilots was suggested, but not approved. The disadvantages of pilots who were restricted in their assignment still remained a major issue. In addition, it would take just as long to train a warrant officer as a commissioned officer, and the plan offered no real benefit.

Fixed-wing pilots again were ordered to transition into helicopters. On completion of training, they were sent to Vietnam. The reaction of most was similar to that expressed by the Marines in the forced transition program in the early 1960s. One of the first to be sent to helicopter training was Major Jerry D. Boulton. He wrote HQMC pointing out his long experience in jets and requesting that he be assigned to a fixed-wing squadron in Vietnam. The answer was not reassuring, for DC/S (Air) said that while “taking fixed wing pilots, transitioning them into helicopters and sending them to SEA was undesirable . . . the bottom of helicopter assets had been reached.” Each case would be reviewed individually, but the Marine Corps desperately had to find some way to obtain more helicopter pilots. By 1 July 1968 it needed almost 1,000 more aviators than it had. The worse shortage remained with helicopters. For a total requirement of 5,010, there were only 4,045 available.

The “management actions” had not solved the problem, only softened its blows. The only cure for the
shortage was more pilots from the Training Command.

A New Source of Helicopter Pilots

Any increase in the pilot training rate did not automatically produce more pilots. If additional students were to be taught how to fly, more aircraft, classrooms, and instructors were required. Like everything in aviation, a major change could not be produced overnight. In the spring of 1967, plans were being made for a total production of 2,525 pilots in FY 69. Vice Admiral Alexander S. Heyward, Jr., Commander, Naval Air Training Command stated “That in view of the expected phase in of assets which lag real requirements, a 2,525 pilot production capability in FY 69 is in some doubt.” Such an objective, he added, “in any event represents the absolute maximum attainable goal short of mobilization or similar measures.” If aircraft, instructors and maintenance personnel, and construction programs were all provided on schedule—and he had misgivings that they would be—the Naval Air Training Command might be able to reach a rate of 2,700 students per year by FY 70 and to sustain it through “over utilization of assets.”

When representatives from CNO discussed the matter with the admiral they reported that “It is not a simple matter to address a specific phase without analyzing the overall effect.” At Ellyson Field, where helicopter training was given, the problem was serious. “Increasing the number of helicopters would enable us to increase that phase of the program providing the instructors were available,” but “the whole training syllabus is a series of interacting phases, the effects on other phases would have to be analyzed to see if a total increase could be achieved, just by adding to the helo phase.” Such an action as adding more aircraft and instructors to Ellyson, “could create bottlenecks in other areas and students would be delayed.” The admiral pointed out that “it is impossible to project an increase in production merely by addressing one specific part of the overall syllabus. The entire program must be examined.”

At the time, a syllabus for a Marine Corps helicopter pilot consisted of 11 weeks of preflight academic training, two weeks of learning how to survive if forced to land in uninhabited areas, and other scholastic instruction. Flight in aircraft was normally eight weeks and 26 hours in a very light Cessna-built, fixed-wing T-34, followed by 21 weeks and 100 flight hours in the T-28—the same aircraft utilized to evaluate the LARA concept. This stage was followed by three weeks of intensive practice, and finally, landings on board an aircraft carrier.

At the conclusion of carrier qualification, the student was assigned to advanced training, and if ordered to helicopters, reported to Ellyson. There he received an additional 11 weeks of instruction, divided between classroom work, 20 hours of flight in the H-13 (HTLs), followed by 50 hours in an H-34.

In 1967 the helicopter pilot syllabus was shortened and the carrier qualifications phase and some of the basic flight training were eliminated. This allowed 48 more pilots to be trained per year, still nowhere near the number needed by the Marine Corps. Ellyson could produce no more, at least for the immediate future. Another source for training had to be found.

The idea of one military service conducting aviation training for another was not new. In World War I there had been the “training of 23 seaplane pilots for the Army by the Navy.” In return, the Army had trained “61 naval pilots in the operation of aeroplanes for use on board ship.” Though it was often difficult to explain to anyone unknowledgeable in military matters, the arrangement existing for many years at Pensacola was not that of one service training the pilots of another. Both the Navy and Marine Corps were—and are—members of the same naval service, tied closely together by history, custom, and missions. The Training Command was staffed jointly by both Marines and Navy personnel. But the training of pilots by the Army or the Air Force definitely involved another service.

In April of 1967 a peculiar set of circumstances set the stage for a change. The U.S. Air Force had been training many of the fixed-wing pilots of the Federal Republic of (West) Germany, and it also was attempting to increase its own pilot training rate for the buildup of the war in Vietnam. To do this Air Force pilot training had been “programmed to maximum capacity.” Training bases had a policy “to fly every day that the weather permits, including weekends and holidays to maintain student schedules.” Then the German government announced to the Air Force that “beginning in FY 68, they [would] be unable to fill their contracted agreement” up to the full allotment of students. As a result, Germany “proffered 108 of these spaces for Air Force students.” Originally the Air Force planned “to utilize these spaces to relieve the somewhat saturated conditions on other” bases.

The Marine Corps learned of these events and quickly requested that the spaces left unfilled by Germany be utilized to train Marines, since any fixed-wing aviator who received his instruction from the Air Force would free a space for a helicopter pilot to
be trained at Pensacola. The proposal was agreed to by OSD, and the first of a total of 507 pilots over the next four years began flight training with the Air Force in the summer of 1967.

The speedy acceptance of this program opened up new avenues to General McCutcheon. Though there was no way to prevent the 1,000-pilot shortage forecast for 30 June 1968, if a program similar to that with the Air Force for fixed-wing pilots could be worked out with the Army for helicopter pilots, the training rate could be increased above that which was possible just at Pensacola.

Army aviation consisted almost exclusively of helicopters, with only a few light fixed-wing aircraft assigned, and during the years since its commitment to combat in Vietnam, the Army had established a large complex for the training of its helicopter pilots. In November, Secretary McNamara had approved a pilot training rate of "7,320 Army pilots plus 180 foreign" students for the fiscal year beginning 1 July 1968. The Army, however, estimated that it could train up to 8,100 pilots in FY 69. The Marine Corps jumped at the chance and on 9 November 1967, Secretary McNamara directed the Army to "please develop plans for training Marine pilots with the Secretary of the Navy and provide my Systems Analysis office [Dr. Enthoven] with a schedule as soon as possible." The goal was 150 graduates in FY 69. The first nine were to report in July 1968.

Within three weeks of Secretary McNamara's approval, General McCutcheon was exploring ways to expand even further the training of Marine helicopter pilots by the Army. On 30 November, he wrote the Army, requesting that it not wait until the start of the new fiscal year, but begin accepting Marine students as soon as possible. The Army tentatively agreed to add 67 more between February and 30 June. The Deputy Secretary of Defense Paul H. Nitze, who previously had been the Secretary of the Navy, wrote on 2 February, "I would like the Army to start training helicopter pilots for the Marine Corps as soon as possible." He added, that though the original program was not to begin until July "I understand your staff has proposed entering the first Marines into training in February 1968. That schedule appears satisfactory providing the build up is fast enough to produce 150 Marine pilots during FY 69." The approval of the accelerated schedule should have brought some relief to the hard-pressed Marine Corps. The increase, while small compared to the overall requirements, was at least a step in the right direction. As so many other times in the development of helicopters, however, what seemed like a solution to a problem still required refinement.

Colonel Edwin L. Powell, Jr., Director of Army Aviation, wrote on 29 January, "that the FY 68 training of USMC pilots was contingent on training being conducted on a reimbursable basis, and also requested action to reimburse the Department of the Army with $179,719 to cover the cost of the FY 68 training." In addition, as there were no suitable government quarters available at the Army training bases, the Marine Corps would have to provide each of the students an extra allowance of pay. The entire cost for the FY 68 classes, Major General William K. Jones, Deputy Director of Personnel at HMQC, wrote, amounted to "approximately $241,000, none of which . . . is available." A search by the Fiscal Director of the Marine Corps, Mr. Joseph F. Wright, indicated that "this office does not know of any slippage elsewhere that can fund this deficiency." A plea to the Navy brought no relief. The Army responded on 29 January that "since no indication has been received that FY 68 funds will be provided, the training previously discussed for FY 68 cannot be accomplished." The first classes were scheduled to begin in two weeks, and sufficient funds had been found for only five Marine students. The level of frustration within DC/S (Air) was definitely on the rise as January ended. Deputy Secretary Nitze was briefed on the problem, and on 2 February, directed that the "FY 68 costs should be financed within the funds available in the Army's FY 68 budget." It had been a close call, but the Marine Corps was back in the accelerated program and students began reporting to the Army for training as helicopter pilots.

Army Helicopter Training

There were some differences between the flight training a Marine would get at Pensacola and what he would receive under the Army system. Most were minor. There was, however, one great difference. Under Army training, all flights would be in helicopters. There would be no fixed-wing time as there was at Pensacola.

The first students reported to Fort Wolters at Mineral Wells, Texas, where the Marines joined a class of "120 officers from the Army, the National Guard, and various Allied nations." There were two main phases to the training. The first one consisted of 18 weeks of primary training at Fort Wolters. Instructor pilots were civilians under contract by Southern Airways. The fledgling aviator received a total of 50 hours of flight, 20 of which were solo, along with extensive classroom work. One of the small trainer helicopters used was the OH–23D "Raven," a much-improved version of the HTL which had proved so
underpowered in the early days of Ellyson. After successfully completing this part of the syllabus, and still at Fort Wolters, the Marine flew an additional 60 hours “performing a countless number of confined and pinnacle operations. These involve a high and low reconnaissance of each area, planning an approach into the area, and selecting the type of takeoff.”

Lieutenant Colonel Warren G. Cretney, a former commanding officer of HML–367 in Vietnam and Marine liaison to the Army Aviation Center in 1971, described the results. “Since the terrain in Texas offers an infinite number of confined areas and pinnacles, and the wind conditions vary from day to day, the officer student is constantly presented with new problems to tax his planning ability and judgment.” At the completion of the training at Fort Wolters, the Marines were transferred to either Fort Rucker in Alabama, Hunter Army Airfield at Savannah, Georgia or Fort Stewart, South Carolina, for advanced maneuvers.

A total of 50 hours of instruction on flight under instrument conditions followed. The aircraft was the TH–13, essentially the same aircraft being flown at Ellyson. Since this was the only phase of the entire syllabus which was flown in that particular aircraft, to save time, the Army did not teach the student how to start it or take off and land in it. The instructor accomplished all of those maneuvers, and the student flew the aircraft only during the required exercise. This practice, while unusual, is not uncommon.

In a final phase of the training, the student learned to fly and conduct operations in the familiar UH–1 series. As Lieutenant Colonel Cretney recounted, during the last two weeks “of the Army Flight Program, the entire unit (made up of several classes) actually lives and functions in the field, under simulated Vietnam conditions.” While there, “students have the opportunity to plan and execute complete operations involving live troop lifts at Eglin (Florida) Air Force Base, and Fort Benning, Georgia.”

The first six Army-trained Marines graduated in September 1968 at Hunter Army Airfield. All were second lieutenants: Robert L. Barnes, George W. Hauffler, Jr., Jeffery D. Monaghan, Stanley W. Taylor, Edward L. Watson, and Joseph E. Sturtevant, Jr. The Deputy Director of Army Aviation, Colonel Jack W. Hemingway, was the speaker at the graduation ceremonies. Also on hand was General McCutcheon. The first Marine to complete the course was Second Lieutenant Watson.

By the end of FY 69, 142 Marines had graduated from Army helicopter training. As a result of this program and the similar one with the Air Force, for the first time since July 1965, the shortage of Marine Corps pilots decreased. The situation continued to improve. Pensacola had gained additional facilities, and both the Marine Corps and the Navy became anxious to have all pilot training returned to the Naval Air Training Command. The Army was requested on 22 February 1971 that “the remaining Marine quotas for FY 71 be cancelled and that no quotas be allocated for Marine Corps use in FY 72 and FY 73.” The Air Force program also was dropped.

Five months later, the last of the Army-trained helicopter pilots graduated. The Commandant, General Chapman, wrote a personal letter to the Chief of Staff of the Army, General William C. Westmoreland. The letter stated that “the training was accomplished in a timely and professional manner and contributed greatly to the accomplishment of the Marine Corps mission during an extremely turbulent and trying period.” General Chapman concluded, “please accept my sincere thanks for a job well done.”

There were several attempts to continue the association of the Army and Marine helicopter pilots. In June 1970 the Army made a proposal “to allow Marine and Navy company grade helicopter pilots to
volunteer to serve for one year with Army aviation units in Vietnam." While the shortage of helicopter pilots had eased somewhat, it certainly had not eased that much! Lieutenant General Louis B. Robertshaw, Deputy Chief of Staff for Personnel at HQMC, answered the request, in an almost classic understatement, "The Marine Corps has enjoyed sufficient commitment in Southeast Asia to provide combat experiences for all Marine helicopter pilots." In addition, "our commitment during the fiscal year 1971 will still provide adequate opportunity for combat service of all new pilots. Accordingly," he added dryly, "the Marine Corps does not anticipate a requirement for additional combat opportunity for its helicopter pilots."

A few months later, a more serious proposal was made. For some time Congress had been looking into the reason for separate helicopter training programs. In early 1971, OSD agreed that it might be possible to have the Army take over the training of all service helicopter pilots, including those of the Navy, Air Force, Coast Guard, and Marine Corps. The Army was happy to oblige. The Air Force, which had few helicopters other than for Search and Rescue missions, was indifferent. The Navy and Marine Corps were violently opposed. They objected on a number of grounds. One minor, but often mentioned fact was that the Army-trained helicopter pilots had most of their instructors instruction based on what was termed, "tactical instrument flight." Prior to being certified to fly on the FAA-controlled airways in the United States, additional training had to be given. This normally was accomplished in a short syllabus which consisted of classroom work and about 12 hours of flight.

OSD calculated that the Army could train the pilots at less expense than the Training Command. The costs were subjected to repeated analyses. In the end, the difference, if there was one at all, was based more on accounting procedures than any real savings. The Marine Corps was particularly concerned about the fact that Army-trained helicopter pilots would lack fixed-wing qualifications. The problem was the same as with the warrant officer programs. Marine Corps aviation was too small to have any segment of its pilots restricted to a single type of aircraft. In an emergency, as had been proven repeatedly, the Marine Corps could order pilots to make the transition from fixed-wing aircraft to helicopters with a minimum amount of time needed. The opposite also was true. A helicopter pilot who had fixed-wing experience would take less time to train in jets than one who had flown nothing but helicopters. It was an important point.

Most of all, however, any attempt to have the Army train all Marine helicopter pilots ignored the fact that learning how to fly is just a part of a much larger education. The young officer student also must learn the ways of the naval service in general, and of the Marine Corps in particular. He must become familiar with the organization, mission, customs, and procedures of the amphibious assault force. Much of this knowledge comes from informal association with Marine and Navy instructors, and by living and working in a naval organization. During the first formative year in the service, it was particularly critical that the students operate in such an environment. It was difficult to put a price tag on this type of training, but after a year of study, even more analysis, and effort, Congress and OSD relented and the Marine Corps and the Navy were permitted to train their own helicopter pilots at Pensacola. The issue, while not dead, at least remains temporarily dormant.

**Post Graduate Flight Training**

Regardless of who trains the Marine pilot, the Air Force, the Army, or the Naval Air Training Command, on graduation he is not ready to fly in combat. First, with a few exceptions, the aircraft in which he trains will not be the aircraft in which he goes to war. Equally important, all the training is aimed at producing a competent pilot, and not necessarily a competent combat pilot. There is quite a difference between the two. Another problem, for which there is no instant solution, is that experience in flight operations is closely tied with capability in flight operations. The newly designated pilot has been trained in the shortest time possible. He needs additional experience before he flies in an attack on the enemy. Thus all the instruction given prior to graduation is, accurately, termed undergraduate flight training. Prior to being ready for combat, the pilot needs postgraduate flight training.

From the late 1950s until shortly after the build-up began in Vietnam, the most common method for providing this instruction was to use a stabilized squadron which completed phase training together. A unit would be formed and almost its entire complement of Marines ordered in from other organizations. At this point, most of the men would be "stabilized" in the squadron and would remain with it for the next few years. The crews and pilots, clerks and technicians simultaneously would begin the first of three phases of training. The initial period was devoted to basics on how to main-

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"The idea of a single service—in this case the Army—training all helicopter pilots was raised again in Congress in 1976 but later dropped."
In the initial phases of post-graduate training, the new aviator co-pilot was prohibited from landing and

received. Initially, the task fell to the squadrons remaining in the United States. MAG–36 had deployed from Santa Ana and MAG–56 was still in a cadre status, so much of the burden fell on MAG–26 at New River.

“We View Our Present Posture With Concern”

In July 1965, Lieutenant General Alpha A. Bowser became Commanding General, FMFLant. Already a veteran of more than 33 years service in the Marine Corps, he had spent much of his career up to the end of World War II in artillery units. A year after assuming command of FMFLant, in July 1966, he arrived in Washington to speak to the general officers’ symposium. The war in Vietnam was being felt acutely in his units. He began his presentation with a photograph flashed on a large viewing screen. It portrayed a possum stranded in a very precarious position. “At FMFLant,” he said, “like the possum, we view our present posture with concern.” He continued:

Our challenge was not one of combat in the literal sense, but rather combating the dual problem of supporting operations in WestPac, and at the same time, meeting our own deployments, contingencies, and [other] war responsibilities.

In many ways, his units had been converted into a giant training command to meet the needs of the war in Vietnam, yet at the same time they had to be prepared to respond to any emergencies which might occur in the Atlantic theater of operations. “One thing became readily apparent early in the year,” he added, “FMFLant could no longer enjoy the luxury of concentrating its efforts in only one direction. We are not two-faced in FMFLant but we have been facing in two directions.”

While the problem existed throughout FMFLant, it was again most critical in MAG–26. The squadrons there already were stretched thin by the transfer of experienced pilots and crews to Vietnam, the shipment of UH–34s and UH–1Es to replace the losses at Marble Mountain, and the demands of converting to the CH–46 and CH–53. To compound the problem, helicopters and crews from New River were required to train the increasing number of new Marines arriving at the near-by Camp Lejeune complex in the art of vertical amphibious assault. The final element of the dilemma was that new pilots arriving from Pensacola had to receive their post-graduate flight training prior to being ready for combat. The heavily committed operating squadrons were the only places where such training was available.

General McCutcheon, who commanded the 1st MAW at the time, had to admit that the program “was a difficult one to administer, but it accomplished the objective.” Appropriately enough, it was called Operation Mixmaster.

Though units could not train and deploy together, the need for post-graduate flight training of new pilots remained. Initially, the task fell to the squadrons remaining in the United States. MAG–36 had deployed from Santa Ana and MAG–56 was still in a cadre status, so much of the burden fell on MAG–26 at New River.
taking off with passengers on board. This, and other restrictions, effectively limited any meaningful training for him while flying on an operational commitment, including the training at Lejeune. The pilots and crews of helicopters in the United States were almost fully committed to operational flights, and training suffered accordingly.

Thus, while units in General Bowser's command might have but slightly more than one half of the pilots required for wartime, many of these were still undergoing post-graduate training and would not be ready for combat, if it occurred in the Atlantic area. General Bowser had to admit reluctantly that though "we have shuffled, strained, and trained in order to accomplish the second half of our mission—that of fulfilling our Atlantic Command requirements—the overriding demands to the Pacific" had lowered the combat readiness to the point where "we cannot field a formidable, fighting, expeditionary force." By an all-out effort, only a small unit could be deployed "for any time of sustained combat operations." He had ample reason to "view our present posture with concern." 45

The key to solving the problem was to relieve the operating squadrons from the post-graduate training requirements, and provide them only with pilots who were completely combat capable. In this way, the tactical units—even if they were short of Marines—at least would have all their personnel ready for war. Even more important, if the post-graduate flight training could be conducted in specialized units specifically designed and staffed for the purpose, the quality of the training—which had suffered under the demands of operational commitment in the tactical squadrons—could be greatly improved. The idea, like many in the development of helicopters in the Marine Corps, was not a new one.

The Training Groups

Until 1958, the Marine Corps had been authorized post-graduate flight training groups with squadrons for fighters (VMFT), attack aircraft (VMAT), and specialized instrument instruction (VMIT). With cutbacks in the Marine Corps, the groups had to be disbanded and by 1965 the individual squadrons had been whittled down until just two remained, one on each coast. In 1966, General McCutcheon reported that "for some years now, we have been trying to reinstate the training groups." "For the last two years," he continued, "our objective consisted of utilizing the two existing VMTs to form a fighter and an attack training squadron within the authorized force levels." Any progress in getting OSD to agree to an increase in squadrons in the Marine Corps was obviously going to be slow and often doomed to disappointment. Suddenly, in November of 1965, "The Secretary of Defense recognized the requirement for the Marine Corps to have a permanent training capability comparable to those of the Navy and Air Force." Two groups were to be formed for fixed-wing aircraft. Entitled, Marine Combat Crew Readiness Training Groups (MCCRTGs), "the east coast" unit, he said, "is scheduled to activate this [1966] December. The west coast group forms in January 1969," at MCAS Yuma, Arizona.46

Not only did OSD agree to the fixed-wing organizations, but General McCutcheon convinced Secretary McNamara to accept two helicopter post-graduate flight training groups though, "in contrast to the fixed wing, they are only approved on a temporary basis and their number is not adequate." He continued to press for "authority and means to expand, modernize, and retain permanently two helicopter training groups." The purpose of these units, he explained, "is to accomplish all transition and familiarization training and provide aircrew qualifications in the primary weapon system of the assigned aircraft." By doing this, "replacement inputs to the tactical squadrons will be combat-capable aircrews." With the shortage of experienced pilots for the United States-based squadrons, and the flow of new aviators from the Training Command, General McCutcheon pointed out, "Presently, the typical squadron has only about 25 percent of its pilots Phase III combat capable at any one time." He predicted that "after the readiness training groups are operating, the squadrons will be filled with combat-capable pilots, will be relieved of much of the training load, and will be combat deployable at all times." 47

At Santa Ana, on 20 January 1966, the first of the Marine helicopter training groups (MHTG–30) was commissioned. Colonel Russell R. Riley, the fifth Marine to be designated a helicopter pilot, was commanding officer. The same day, H&MS–30 was activated and Captain Peter N. Samaras began to assemble the team of Marines who not only would support the training squadrons, but also assist in training the technicians who were destined to maintain the aircraft in the tactical squadrons. The dual ceremony, though a major landmark in the development of helicopters in the Marine Corps, went almost unnoticed, for at the time of commissioning, the total personnel of the group consisted of six officers and four enlisted men. Initially, the buildup was slow, but by 1 April, the group was ready to inaugurate post-graduate flight training, and Marine Medium Helicopter Training (HMMT) Squadron 301 was commissioned under the command of Lieutenant Colonel William R. Duncan. It had been hoped that the unit could be equipped with CH–46s,
but the buildup in Vietnam had priority and there were no aircraft available.

Once again the ever faithful H–34 series came to the rescue. The demands put on this versatile aircraft by the Marine Corps, however, were so heavy that sufficient UH–34s could not be spared to fully equip the squadron. Over half of the helicopters were a Navy anti-submarine warfare version, the SH–34J. They had been transferred to the Marines earlier to help alleviate the shortage created by combat losses and the expansion of units. The training syllabus for the helicopter pilot newly graduated from Ellyson provided for about 75 hours of flight time. This included initial familiarization, formation flying—which was not taught at Pensacola—flight with the aircraft at or near maximum weight, and additional instrument training. The post-graduate instruction required a minimum of 90 days.48 The first of the students began on 13 April, and by the end of June, 12 had completed the course and were rated as combat-capable co-pilots.

During the same period, on 11 May, a subunit of H&MS–30 which conducted post-graduate flight training in the UH–1E at Camp Pendleton, was added to the group. A second training squadron, HMMT–302, was activated on 1 November under the command of Lieutenant Colonel Elvyn E. ("Happy") Hagedorn. Sufficient CH–46s were made available to equip this unit.

A month and a half later, on 15 December, the H&MS–30 subunit at Camp Pendleton was redesignated VMO–5 and became a full-fledged training squadron as part of MHTG–30. By the end of 1966, the training group could offer post-graduate flight training in the UH–34 series, the CH–46, and the UH–1E. Equally vital, it offered courses of instruction to mechanics, crew chiefs, and technicians in the maintenance and repair of all three different models of helicopters. It appeared that the Marine Corps had regained a major device to improve combat readiness.

As so often before, what had been planned and hoped for, was not what happened. The “requirements exceed resources—there is no shortage” disagreement was in full bloom and in July 1967, General McCutcheon had to state, “because of aircraft and pilot shortages, we were able to form only two helicopter training squadrons and slipped the activation of the four [two helicopter, two fixed wing] Marine combat crew readiness training groups to Fiscal 1968.”49 Even that projection proved optimistic.

It was not until 30 June 1969, the last day of FY 69, that MHTG–40 was commissioned at New River under the command of Lieutenant Colonel Morris G. Robbins, who served in that billet until 23 July the next year when he was succeeded by Colonel Robert B. ("Big E") Engesser. At the same time, all three of its squadrons were also activated. H&MS–40 was commanded by Major James T. Gordon and HMMT–402 was under Lieutenant Colonel Donald R. Carpenter. The “heavy” squadron, HMMT–401, was commissioned, but neither aircraft nor Marines were available to be assigned so it was held at “zero” strength until 12 January 1970. The first commanding officer later was Major Chester L. Whipple. The number of mechanics and technicians to be trained created the need for another organization. Officially a subunit of H&MS–40, and initially under the direction of Captain John W. Shoaff, the subunit controlled and monitored all of the training of the crew members.

Unlike its sister training group at Santa Ana, which had been located in old buildings, MHTG–40 moved into a brand new, $10 million complex, specifically designed for post-graduate training. There was a classroom building, new hangars, and administrative spaces, warehouses, and shops. The group even had its own barracks and dining hall. Flight operations began 21 August with the arrival of a CH–46D which was assigned to HMMT–402.50 This aircraft was followed on 29 January 1970, with the acceptance of a CH–53 by HMHT–401.51 By the end of June, 20 CH–46D, and four CH–53s were on hand. At the same time, HMMT–301 at Santa Ana, was redesignated as a “heavy” training squadron and replaced its UH–34s with CH–53s.

In addition to the post-graduate flight and maintenance training, the groups conducted several specialized schools. Courses of instruction on instrument flight were offered. Jet pilots who had been ordered into helicopters completed the transition in the training groups. Likewise, helicopter pilots who had not recently—or who had never—flown the UH–1E, CH–46, or CH–53 received refresher training.

Another school trained crew chiefs and mechanics on the operation of the machine guns firing from the aircraft. If the gunner was not careful, it was possible to shoot the helicopter’s own rotor blades. Thus the initial airborne live firing could be dangerous. The pilots in the operating squadrons, being no different than Marine aviators of any time or type, felt that all officers on the group headquarters staffs were the bane of their lives and had nothing better to do than shuffle papers and interfere with the “real” work in the units. Thus, a custom quickly grew up in which squadron aviators seldom flew the gunners on their first firing flight. That exciting task was always reserved for pilots on the headquarters staff. Any loss would just reduce the number of reports that had to be submitted, so went the logic.
HMMT–402 conducted one school which was unique. The AV–8 “Harrier” jet attack aircraft procured by the Marine Corps was fully capable of taking off and landing vertically, and actually hovering in flight. Jet pilots assigned to the unusual aircraft seldom were familiar with the techniques of such maneuvers. With a slight adjustment of the stability system in the CH–46, the helicopter could be made to handle very similarly on takeoff and landing to the AV–8. Thus, prior to flying the new attack aircraft, the jet pilots were given a special course of instruction in the helicopter to develop the coordination and techniques for VTOL flight. The mutual understanding generated between the helicopter and AV–8 pilots, though not as widespread as that which resulted from the forced transition program in the early 1960s, was a definite and additional benefit to the Marine Corps.

From the time MHTG–30 was first commissioned in 1966, for the next six years, these two training groups repeatedly would validate General McCutcheon’s hopes for them. In 1967 he had spelled out what was to be their service to the Marine Corps.

Even in a stable peacetime situation at least 25 percent of the squadrons are not combat-ready because of aircrew training requirements. In war time there is the difficult choice of holding back a Wing as a training base or of deploying everything and shutting off the rotations. Now [July 1967], for example, we are 50 percent deployed and have been heavily committed for two years, and we cannot muster one combat ready squadron in the United States. The main reason for this condition is the crew training requirement.

With the readiness training groups doing the Phase I and II training, the fleet squadrons can be staffed with Phase III crews and be combat deployable all the time.52

The officers and men of MHTG–30 and –40 provided the combat capable Marines, just as had been expected of them.
CHAPTER THIRTEEN

TWINS AND MIXES

Continue the March

On the first day of January 1968 at exactly one minute after midnight, Washington time, a message from HQMC was flashed to all the Marines in the world. It read:

FROM: CMC
TO: ALL MARINES
1. I HAVE THIS DATE ASSUMED DUTIES AS COMMANDANT OF THE MARINE CORPS.
2. MY PREDECESSOR HAS SET THE DIRECTION AND THE PACE.
3. CONTINUE THE MARCH.
CHAPMAN SENDS.¹

General Greene, after serving four years as Commandant and guiding the Marine Corps through one of its most turbulent periods, retired. He chose a small estate in a Virginia suburb of Washington, D.C. In over 37 years of duty, it was the first time he and his wife ever owned a home of their own. He still keeps an active interest in Marine Corps matters, but now has time for other pursuits. His impact on the development of helicopters in the Marine Corps is difficult to measure, not because his influence was in any way nebulous, but because he had such a direct role in so many facets. Seldom before had a Commandant played such an intimate part in the development of vertical amphibious assault.

His successor, General Leonard F. Chapman, Jr., was born on 3 November 1913 in Key West, Florida.² A graduate of the University of Florida at Gainesville, Chapman, like McCutcheon, had been a member of the Army ROTC and in 1935 was commissioned a second lieutenant in the Field Artillery Reserve. The Marine Corps at that time offered a certain number of commissions annually to honor ROTC graduates at each university. Chapman applied for the one opening given to the University of Florida and of all the applicants was determined to be the best qualified. He resigned from the Army and was commissioned in the Marine Corps on 8 July 1935. Basic School at Philadelphia, duty at Quantico, and Field Artillery School at Fort Sill, Oklahoma, followed.

Chapman participated in the early action in the Pacific in World War II as commanding officer of the Marine detachment on the heavy cruiser USS Astoria. He served in this ship in the battles of Coral Sea and Midway but left her for another assignment in June 1942, just two months before she was sunk by the Japanese in the Battle of Savo Island. After a tour as an artillery instructor in the United States, Chapman returned to the Pacific in June 1944. In command of an artillery battalion, he took part in the assaults on Peleliu and Okinawa. Korea saw him held in a series of assignments in the United States, but in 1953 he went to Japan to command the 12th Marines, another artillery unit. Then came tours as commander of the Marine Barracks, Washington, D. C., and of Force Troops, Atlantic, at Camp Lejeune.

In September 1961, Chapman reported to HQMC as Assistant Chief of Staff (G-4), and three years later, as General Greene assumed the post of Commandant, Chapman, promoted to lieutenant general, became chief of staff. On 1 July 1967, he was designated as the Assistant Commandant. Six months later, he was

USMC Photo A190309

listening to his first New Year's Day concert as Commandant of the Marine Corps.

In the development of helicopters in the Marine Corps, the last two years of General Shoup's commandancy could be characterized as being a period of struggle to define new missions, develop new aircraft, and overcome the chronic shortage of funds. General Greene had been faced with the explosive growth of Marine helicopter forces, the actual introduction into combat of the new designs, and the difficulties of conducting a major war for a nation that remained essentially on a peacetime basis.

For General Chapman, the years 1968 to 1972 would bring a period of retrenchment in the military, a further refinement of the helicopters already in operation, and the laying of the groundwork for yet another generation of vertical amphibious assault aircraft and techniques. As he assumed the duties of Commandant, the CH–46 had been modified and was back in the battle. The CH–53s were deployed in strength. The UH–1E had proved itself invaluable in a variety of missions. The role of the armed helicopter, if not unanimously agreed on, at least was no longer a burning issue.

Further Improvements of the CH–46

On 24 July 1968, still another version of the CH–46 was accepted at the Vertol plant in Morton. Bureau number 154845 looked exactly like the "D" on the outside. Even on the inside, most observers could see little difference. The new aircraft had the same performance and could lift the same amount as the "D" and for all practical purposes, was in fact the same—with one major exception.

The CH–46F, as it was designated, had provisions for the installation of the long-awaited Integrated Helicopter Avionics System (IHAS) which held promise of giving helicopters a true all-weather, low-level, formation flight capability. To an experienced CH–46 crew member, the most obvious difference in the new model was that the avionics compartments had space provided for the electronic components of the IHAS. In the cockpit, the radio control console between the pilots had been rearranged to leave room for the IHAS display.

Once the contract for the instrument system had been awarded to Teledyne and the initial designs completed, a schedule was prepared in 1966 which called for the "navigation system of IHAS" to be installed "in the 360th aircraft delivered from the production line." It was anticipated that the first aircraft to be equipped should be ready in December 1967. Bureau number 154845 was that helicopter. Once the "F" models were coming off the production line, NavAirSysCom confirmed to the Marine Corps that "earliest retrofit is planned to get this navigation capability in all aircraft." Before the first CH–46F could be delivered, however, the IHAS program was in trouble and Teledyne was recommending that only the Self Contained Navigation System (SCNS) portion of the system be installed. Continued delays in production of the electronics and constant increase in the cost of even the SCNS made the future of the CH–46F navigation system doubtful. The end came when the SCNS blanked out all radio transmission from the helicopter. Five months of testing at Vertol in the first half of 1969 could not solve the problem. The CH–46F never went into operation with the IHAS or SCNS that were the sole reason for its new designation.

In spite of the disappointing results of the IHAS, Vertol engineers continued trying to improve the CH–46 series. In late 1966 and early 1967, they conducted a series of experiments with an H–46 which had been converted into a compound helicopter similar to that which had created so much interest prior to the design of the CH–53. Short "stub wings" were mounted directly behind the cockpit and also on the rear tail pylon as part of the company’s "effort to improve speed and payload." The concept, as in all compound helicopters, was that in forward flight, the wings would provide some of the lift necessary, allowing the rotor blades to move faster and give the aircraft a higher speed. Also "The aircraft’s rear rotor pylon has been moved aft and the forward one streamlined," the company announced. Provisions were made for fuel tanks carried on the outside of the aircraft, and the entire fuel system was adaptable for inflight refueling. The helicopter was also used as a "flying guinea pig... to try out new ideas." After a number of successful flights, the aircraft crashed and was destroyed, but Vertol continued to experiment with ways to improve the CH–46 series.

On 2 July 1969, the CH–46 passed a milestone. At ceremonies at the plant in Morton, Pennsylvania, the 500th such helicopter was delivered. Accepting the aircraft for the Marine Corps was Brigadier General Homer S. (Dan) Hill, General McCutcheon's assistant and eventual successor. It was appropriate that General Hill was on hand for the event for he was an experienced helicopter pilot. He had been first commissioned in June 1942 and had flown combat missions throughout World War II. In Korea he had commanded VMF–314. He reported to Ellyson in 1957 to complete the transition to helicopters, and had served as air officer on the Princeton after her conversion to an LPH.
At the time General Hill traveled to Vertol to accept the 500th aircraft, the CH—46 in Vietnam had already flown more than 625,000 sorties while carrying 1,330,000 passengers. In addition it had lifted nearly 100,000 tons of cargo, and most important, had evacuated “more than 120,000 wounded or injured personnel to safety.”

Almost two years later, General Hill, who was now the DC/S (Air), as General McCutcheon had returned to Vietnam, visited the Vertol plant again. At 1100, 2 February 1971, the final production model of the CH—46F rolled out of the plant. Since 30 April 1962 when the first CH—46 had made its debut, a total of 624 A, D, and F models had been delivered. The CH—46 had become, and remains, a versatile, hard working member of the vertical amphibious assault team.

The “Huey” Changes Its Skin

The determination of the U.S. Army to develop an airborne attack capability was understandable and natural. In the aftermath of the bitter fights following World War II over the unification of the armed forces, each had been allowed—and restricted—to very specific missions. Fixed-wing attack was the domain of the Air Force. There was no question that it was extremely competen in providing close air support for the Army; but the many demands on the aircraft and pilots, conflicting priorities, and lack of mutual training often could lead to misunderstandings. The coordination required, no matter how good, just was no substitute for direct control. It was only in the Marine Corps that the air and ground elements were cemented together by a common uniform, a common training, a common doctrine—and most important—a common commander.

The Army had tried to expand its air capability and had built up a modest fleet of small- and medium-sized fixed-wing transports, but shortly after the war in Vietnam began, it had to relinquish most of this to the Air Force. Thus, if the Army was going to have any aircraft of its own, particularly those for attack missions, they would have to be helicopters. The manufacturers capable of developing such an aircraft, specifically designed for the Army’s needs, were aware of the requirement and a number of them proposed attack helicopters.

Most of these manufacturers proposed entirely new helicopter models. The design, testing, and production of these, particularly of the critical drive system—engines, transmissions, connecting shafts, and rotors—would take much time. Thus, even under an accelerated schedule, any new aircraft proposed could not be ready for the operating units for several years, too late to meet the Army’s requirements.

One company, Bell helicopters, had an easy solution to the Army’s problem. A proven drive system from the long-since-tested and -operated UH—1 series could serve as the basis of a helicopter specifically designed for the airborne attack role. A different fuselage would be needed, but compared to designing or building an entirely new aircraft, the problem was minor, and such an aircraft could be put into production in a relatively short time. Bell decided to gamble, though not without some assurance of success, and built an attack aircraft without any firm orders for it. The first model was unveiled in September 1965. It was officially designated the UH—1H, but was more commonly called the Huey Cobra, or just simply “The Cobra.”

On 11 March 1966, Bell announced that “after its development as a company project [The Cobra] has since been flown extensively by both company and military pilots in rigorous test and evaluation programs,” and that “The U.S. Army . . . would order the high speed Bell UH—1H Huey Cobra, the world’s first helicopter developed as an aerial weapons platform.” The aircraft, “featuring functional streamlining, record-breaking speed and tremendous fire-power capabilities, was developed by Bell as a modified version of the Army’s UH—1B Iroquois, which is now being used extensively throughout Vietnam,” the company added. The new machine had demonstrated sustained speeds of 200 miles per hour in level flight during company tests. “The speed attainment have been hailed by Bell engineers as a performance break-through for aircraft of pure helicopter design and are considerably better than the world’s speed record for helicopters of the Huey-Cobra’s weight class,” Bell boasted. The speed record at the time for light helicopters was 180.1 miles per hour set by the UH—1D in 1964.

Bell’s Vice President for Military Contracts, Hans Weichsel, said that the Cobra “is not a new product, but a modified version of the UH—1B, which can be readily deployed directly from production to field units now equipped with the UH—1 series helicopters.” Not only could testing be shortened, but “transition for pilots and mechanics will be simplified due to the similarity of dynamic systems and flying characteristics between the UH—1H and UH—1B.” The new aircraft “retains the UH—1B dynamic components, including the Lycoming T—53—L—13 gas turbine engine. Utilizing proven components currently in the supply system,” it was stated, “results in a highly reliable machine that can be easily maintained with maximum use of on-site parts.”
This Marine AH-1G Cobra, parked at Hunter Army Airfield in 1969, has automatic grenade launchers in its chin turret and rocket pods mounted on its stub wings. The first five Cobras received by the Marine Corps were loaned to the Army for use in training Marine pilots.

It was difficult for an observer to believe that what they saw as a Cobra had anything but the most distant relationship to the UH-1 series. The new attack aircraft was a streamlined, extremely thin helicopter. Viewed from the front, the fuselage was only three feet-six inches wide as compared to over eight feet on the standard UH-1. The narrow profile, however, was effective in presenting any enemy with an exceedingly small target. To accommodate the crew in such an aircraft, the cockpit was arranged so that the pilot sat directly behind and slightly above the front seat. From there, he could have sufficient visibility to maneuver the aircraft in almost any situation. The front seat, which had a slightly better view of the ground immediately to the front of the aircraft, was occupied by the gunner. He had a few of the control mechanisms available to the pilot, but was not a copilot in any conventional respect.

A careful observer would find similarities between the Cobra and its ancestors. At extreme length, the Cobra was less than one half inch shorter than the UH-1. There was also the familiar 44-foot diameter main rotor, and a tail rotor which was but one inch larger than that of the previous models. Typical of the design, the new aircraft had no wheels and used skids instead.

Even though the fuselage was much smaller than the UH-1 series, the Cobra weighed more when empty —5,517 pounds as compared to 4,734. Likewise, the maximum weight was also more—8,620 to 8,500. The
difference was mostly due to the armament, and there was no doubt that the Cobra was armed as an attack helicopter. Two short wings, slightly less than two feet long, protruded from the aircraft. On each of them there were two positions for installing gun and rocket pods and other armament. In addition, the aircraft could be fitted with several models of remote-controlled turrets mounted in the “chin” of the fuselage. Depending on the particular model of turret, they could fire 7.62mm machine guns, 40mm grenades, or a combination of both. The pilot, gunner, and the vital parts of the aircraft were protected by armor.

The Army was delighted with the aircraft, and ordered it into full-scale production. On 29 August 1967, the first Cobras arrived in Vietnam. One week later the aircraft logged its first combat kill—an enemy sampan and crew. Within a year, Bell had delivered more than 350 Cobras to the Army.13

Since the Cobra and the “Huey” were designed for such different roles, and—at least externally—appeared to be different aircraft, the designation UH–1H was confusing. It was subsequently changed to AH–1G (Attack Helicopter–1G)

The Marine Corps watched the development of the Cobra with interest. It requested that sufficient attack helicopters be procured to provide a squadron of 24 in each of the three active wings. In 1967, Brigadier General Earl E. Anderson reported on the results. At the time he was the Deputy Chief of Staff for Research and Development. General Anderson had flown helicopters in Korea with VMO–6 and had been the commanding officer of MAG–36 at Santa Ana during the Cuban missile crisis. He was the youngest active duty Marine ever promoted to general and, later, became the first Marine aviator to hold the rank of full general while on active duty when he was assigned as Assistant Commandant 1 April 1972.9

In July 1967, he said “funding and production of the AH–1G for the Marine Corps have been approved by the Secretary of the Navy. We are now awaiting approval from OSD.”14 General Anderson was destined to be disappointed for only 38 aircraft were approved for FY 69. They were “designed to support 24 operating in South East Asia in FY 70 (2 VMOs with 12 AH–1 each).” This program,” a report concluded, “is not in keeping with the ‘Force in Readiness’ concept.”15

Two weeks after General Chapman had become Commandant, on 15 January 1968, General McCutcheon submitted the latest information on the Cobra program:

Experience in Vietnam has clearly shown that armed helicopters are an essential member of the fire support team. Due to continued circumstances of weather and terrain the armed helicopter has proven to be an absolute necessity in the delivery of close-in fire suppression support during vertical assault operations. Existing UH–1Es were modified to fulfill this requirement. However, in so doing, the availability of the UH–1E for performing the missions for which the aircraft was procured was degraded. While the modified UH–1Es are now doing a creditable job, the AH–1 will provide greater speed and firepower and more flexibility in the performance of the armed helo mission. The AH–1 will also free the UH–1s for light helicopter utility mission, many of which are now neglected.16

He concluded by assuring the Commandant that efforts would continue to have sufficient AH–1s approved, but for the present, the number of AH–1Gs remained at just 38. In February 1969, the first ones were delivered to the Marines at the Bell plant in Fort Worth, Texas.17 Since the total number of Cobras was so small, no postgraduate flight training program was established. Instead, the first five aircraft were loaned to the Army “as training vehicles for instructing Marine pilots.”18 Three months later, the first Marine Cobra pilots graduated from Hunter Army Airfield. They were Majors Jimmie A. Creech, James W. Rider, Ronald J. Thrasher, and John L. “Jack” Pipa. Out of a class of 39 pilots, the four Marines graduated in class standing as one, two, three, and four respectively.19

By the end of June, 17 AH–1Gs had been received. In addition to the five on loan to the Army, two had been sent into a research and development program to study further the potential of such an attack helicopter. The rest had been sent directly to Vietnam,20 the first shipment of four aircraft arriving 10 April. They were assigned to Lieutenant Colonel Clark S. Morris’s VMO–2. At the time, the squadron had a complement of 8 UH–1Es and 23 OV–10s, in addition to the new Cobras. After a week of test and orientation flights, “the first Marine Corps AH–1G in Vietnam went operational 18 April 1969” by flying escort for a medical evacuation flight.21 The pilot was Major Donald E. P. Miller with First Lieutenant Tommy L. James as the gunner in the front seat.

In the next few months the Cobras brought some surprises to the enemy who were more acquainted with the UH–1E gunship or the machine guns of the CH–46 and CH–53. One incident was related by Colonel Kenneth S. Foley. He wrote:

With [Cobras] covering, a Marine rifle company was moving out cautiously. Shots came from around the bend and the [Cobras] covered the area with fire. When the Marines got there, five Viet Cong were horizontal; four dead and one wounded. The wounded VC was shouting

* General McCutcheon was placed on the retired list the same day as his promotion.
and banging his fists into the dust. One company commander asked the interpreter what all the shouting was about.

"He's apparently the squad leader," the interpreter replied. "He's yelling, 'If I told them once I told them a thousand times—don't shoot at that kind of helicopter!'" 22

On 11 July a report was submitted evaluating the AH–1G in its first months of combat. The conclusions were very favorable. When compared with the armed UH–1E the new attack aircraft was called "a far superior weapons platform precluding the need to fly rocket and gun runs below 1000 feet for the required accuracy." The aircraft "has a much improved armament system that provides greater firepower and flexibility . . . and permits steeper dive angles . . . providing greater accuracy." The cruise speed was such that it was "compatible with that of transport helicopters, allowing the AH–1G the capacity to lead troop transport helos into the objective area and be able to loiter overhead for an entire lift." 23 The biggest problem was that most of the spare parts that were not the same as those for the UH–1E had to be ordered from the Army, and delays had been encountered.

By December, VMO–2, now commanded by Lieutenant Colonel Stanley A. Challgren, had its full authorization of 24 Cobras. Then, on 16 December, in a reorganization which affected all units in Vietnam equipped with the AH–1G, UH–1E, and OV–10As, the aircraft were transferred to HML–367. The commanding officer was Lieutenant Colonel Warren G. Cretney who later would serve as liaison officer with the Army during the time it was training Marine Corps helicopter pilots.24

The “Sea Cobra”

Slow delivery of parts, however, was not the only difficulty with the AH–1G. It was an aircraft designed for the Army. Like the UH–1B/D which had led to the Marine UH–1E, the Cobra had no rotor brake and thus was only marginally suitable for use on board ships. It also had Army avionics which, though satisfactory, created additional supply problems. The Marine Corps preferred a different chin turret. It wanted one which had heavier 20 millimeter guns rather than the 7.62mm installed in the Army version. Most important, the Marine Corps felt that the helicopter should have two engines. From the very start of the program it had been pushing for such a twin-engined Cobra. General Anderson had said that such a version "which the Marine Corps desires, offers a substantial increase in relative combat power and reliability over the present [AH–1G]. Its gun platform, stability, cruise, dive, and maximum allowable speeds are marked improvements. Moreover," he continued, "it can deliver twice the ammunition and operate in the objective area twice as long." 25

Colonel, later Lieutenant General, Thomas H. Miller was the Head, Air Weapons Systems Branch, DC/S (Air) during the time the Marine Corps was attempting to win approval for the "twin" Cobra. A highly decorated combat pilot, he had won 18 medals in World War II and Korea, and four Distinguished Flying Crosses, one of which was for setting the world's speed record of 1,216.78 miles per hour in an F4B "Phantom" on 5 September 1959. He summed up the arguments. "Justification for the twin-engine power plant is based on four major factors: improved crew safety, increased reliability in mission performance, increased payload, and growth potential." He went on to point out the "Records of the Naval Aviation Safety Center indicate that during 1956–1967, 17 USN/USMC UH–1 [type] helicopters were lost or damaged in combat or operational mishaps directly attributed to the failure or malfunction of its single engine." The result, he emphasized, was eight fatalities and four major and 20 minor injuries. 26

Another factor, which the Army did not have to face, was that the Marine Corps mission was based on amphibious landings. At sea, in an aircraft with only one engine, a malfunction almost invariably led to the loss of the helicopter and often some of the crew. Recent experience with the twin-powered CH–53 and CH–46 had proved that with two engines, if one malfunctioned, not only could the crew be saved, but often the aircraft, too. Even the mighty "Deuce" had made safe landings on board a ship with one engine not operating, though the event was usually the highlight of excitement for any amphibious force. Over land, it was pointed out, "while it is true that a single engine helicopter can auto-rotate a power-off, controlled descent to a landing in the event of power failure, aircraft losses still occur when the terrain is unfavorable to a landing." Not only that, "in some cases missions can and have been completed on the remaining engine when a single power loss has occurred." 27

There were other reasons, but they all added up to the fact that the Marine Corps required Cobras with two engines and not the Army single-engined version. The Marine Corps model was to be designated the AH–1J. Approval turned out to be more lengthy and difficult than anyone had anticipated. The Marine Corps found itself having to thread its way through a thicket of opposition to the "twin" Cobra. By early 1968 it was apparent that, even if approval could be gained, the additional engineering, design, and testing
of the improved model would delay its introduction into combat. Thus General McCutcheon agreed to accept the single-engine Army version and gained OSD approval “but only until the end of the war.” He added, that “simultaneously with our fight to get Cobras, we have been fighting to get them with two engines. . . . This has been quite a battle in itself both with SecNav, OSD, and the Congress.” Part of the problem, he continued, was that OSD “requested that we offer both equal effectiveness as well as equal cost trade offs of fixed-wing aircraft in order to retain the armed helos.” The staff of OSD remained unconvinced that, in the Marine Corps, armed helicopters and fixed-wing attack aircraft complemented, not competed with each other. General McCutcheon concluded that “We are challenging the validity of the equal effectiveness concept, but we are examining ways to get an equal cost trade off.”

The FY 69 Defense Budget proposed the procurement of 38 AH–1Js. These aircraft were not exactly what the Marine Corps had hoped for. They did have the rotor brake, Navy avionics, and the desired chin turret, but they did not have two engines. Though such a “power pack” was available, the cost of buying enough for such a limited number of aircraft proved to be too high. The AH–1Js requested would still be equipped with a single Lycoming T–55 engine.

The Secretary of Defense, in April, asked Congress for permission to take funds from less urgent programs and divert them to the “Twin” Cobra, which was now also known as the Sea Cobra. Not only was the Marine Corps finally to have its Cobra with two engines, the Secretary of Defense increased the number to 49.

During hearings on the new program before the Senate and House Armed Services and Appropriations Committees, a new controversy broke out. It centered around the use of the Canadian-built, twin-engine pack. On 9 April 1968, the Chairman of the House Armed Services Committee, L. Mendel Rivers, wrote Secretary McNamara voicing his concern over not buying an American-built engine. Congressman Rivers was assured that there would be a competition prior to selecting the engines for the AH–1J. The Naval Air Systems Command sent out requests for proposals on 3 July to all eligible manufacturers, including those in Canada. A month later, at the deadline, only two had answered. They were United Aircraft of Canada, which was the parent company of Pratt and Whitney who had made the original offer, and Continental Engineering Corporation, an American concern. Both engines were suitable, but United Aircraft’s entry already was in production and had been thoroughly tested. The Continental engine would not be available until sometime in the future. The United Aircraft “power pack” was selected and the contract awarded.

On 14 October 1969, Bell Helicopter unveiled the first AH–1J twin-engined Sea Cobra. The ceremony, and a conference on details of delivery and design, was attended by a group of Marine officers including Brigadier General Victor A. Armstrong. He had been designated a helicopter pilot 25 August 1949 and was the 28th Marine to be officially qualified in rotary wing aircraft. He had commanded HMR–161 in Korea and had participated in some of the earliest helicopter combat operations. He had also served as commanding officer of HMX–1 in 1960 and MAG–36 in Vietnam in 1966. In World War II, Korea, and Vietnam he had been awarded a Silver Star, seven Distinguished Flying Crosses, and 12 Air Medals, among numerous other decorations. At the Bell plant, General Armstrong was accompanied by Colonel Edwin H. Finlayson, Head, Weapons Group, at HQMC, and Colonel Henry (“Hank”) Hart, program manager for assault helicopters at Naval Air Systems Command.

The helicopters they saw was almost exactly the one the Marine Corps had wanted. The chin turret was an XM–197 model equipped with a three-barrel 20 millimeter gun firing up to 750 rounds per minute. Also available for mounting on the stub wings were an XM–18 self-contained 7.62 millimeter “minigun” pod and seven-tube XM–157 and 19-tube XM–159 aerial rocket pods. The aircraft had a rotor brake for shipboard operations, standard Navy avionics, and most important, twin engines.
When the Marine Corps had purchased the Army version of the Cobra, no testing had been required prior to introducing the aircraft into combat. The modifications necessary to create the AH-1J, however, were sufficiently extensive that the first four aircraft were delivered to Patuxent River for Board of Inspection and Survey (BIS) trials in July 1970. The next seven arrived in September at New River “to start crew and maintenance training.” The aircraft were assigned to Lieutenant Colonel Robert D. Myer’s VMO-1. There had not been time to install all the parts of the new armament system in the first 11 aircraft, so eventually all were returned to Bell for further modifications.

As soon as pilots and crews could be trained, and all the required changes installed on aircraft at the plant, four Sea Cobras were to be shipped to Vietnam for an evaluation in combat. This test was to be conducted under the supervision of Colonel Paul W. (“Tiny”) Niesen. On 12 February 1971 he, eight other officers, and 23 enlisted Marines departed the United States for Marble Mountain. The same day, the four AH-1Js left in Air Force turboprop C-133 cargo aircraft. The crews arrived 16 February and the aircraft two days later. The evaluation unit was assigned to Lieutenant Colonel Clifford E. Reese’s HML-367. The first combat test of the new twin-engined Cobra came four days after the aircraft had been unloaded. Colonel Niesen and Lieutenant Colonel Reese joined the Army-version aircraft while supporting transport helicopters around a hostile landing zone.

For the next two months, the small detachment kept its four aircraft busy. By 28 April, when the evaluation was completed and the aircraft shipped from Vietnam, they had flown a total of 614 hours, shot 14,950 rounds of 7.62mm ammunition, 72,945 of 20mm, and 2,842 rockets in addition to several other items of ordnance. The Commandant received a report which summarized that “the combat evaluation determined that the AH-1J provides a significantly greater effectiveness in firepower over the AH-1G.”

There were two basic ways to load the AH-1J, depending on the type of targets which could be expected...
and the amount of fuel required for the mission. A “light” load of 1,475 pounds consisted of a full amount of 20 millimeter ammunition, 14 2.75-inch rockets, and either forward firing gun pods or other light ordnance. For the “heavy” version, 2,400 pounds of armament were included. A total of 76 rockets and 300 rounds of 20 millimeter ammunition shells for the chin turret made up this load. The Sea Cobra was capable of speeds up to 155 knots in level flight and could dive at 190 knots. Even with one engine malfunctioning at the maximum weight of the aircraft, it could maintain flight at 2,000 feet.

Coincidentally, on the same day that Colonel Niesen and Lieutenant Colonel Reese began combat operations with the Sea Cobra in Vietnam, at New River the first helicopter attack squadron (HMA) began to form. An “activation cadre” with Lieutenant Colonel Lloyd W. Smith, Jr., as officer-in-charge became a part of MAG-26. Initially, while waiting for its aircraft, the unit was assigned UH-1Es. On 7 April, five AH-1Js arrived from the Bell factory. By the end of June the “cadre” had received 23 more Cobras.

At ceremonies on 1 July, the “cadre” was disbanded and HMA-269 became the first of three helicopter attack squadrons in the active forces and one in the reserves. Armed helicopters had come a long way since the first efforts to give weapons to the crew members of the SHUFLY squadrons in early 1962.

**The Twin “Huey”**

Simultaneously and in conjunction with the efforts to have approved a twin-engined Cobra, the Marine Corps set out to procure a twin-engined version of the UH-1E. The reason was identical to that for the attack helicopter: safety during amphibious operations and improved performance particularly in high altitude or heat. If the Marine Corps had encountered difficulty in obtaining the twin-engine “power pack” built in Canada for the Cobra, it was nothing compared to the difficulties in procuring one for the UH-1E. In February 1968, the Canadian Department of Industry had sent representatives to Washington to sound out the military services on the possibilities of using a twin engine on the UH-1 series. It was reported that the Canadian armed services were planning to purchase “about 100 twin UH-1s” and the “U.S. Air Force has a buy of 125 UH-1Ds scheduled during FY 70 and they may buy the twin pack also in lieu of the Lycoming T-53.”

At the same time, the Army had “completed a series of studies into the cost and technical aspects of installing a twin engine power plant in the UH-1D helicopter.” The conclusions reached were “that the benefits to be gained do not appear to justify the expense of increased development, production and operations.” Thus, the Army did “not intend to further pursue the development of a twin engine power plant for the UH-1 Helicopter.” Part of the reason for the reluctance of the Army to join in the program was that, at the time, it was heavily committed to several new helicopters including a large, super-sophisticated armed one, the Lockheed-built AH-56A “Cheyenne.” Any major program with the UH-1 series might affect the new aircraft.

The Marine Corps, Navy, and Air Force remained enthusiastic about the possibility of a twin-engined UH-1. It was to be designated the UH-1N. By shifting funds from other projects in FY 68, the Air Force was able to gain approval for five of the aircraft, and with FY 69 money, 74 more. For the following year, the Navy requested 40 UH-1Ns and the Marine Corps, 22. They were all to be equipped with the United Aircraft of Canada PT-6T (T400-CP-400) twin “power pack.” OSD agreed that the program was a good one and forwarded the request to Congress but during testimony of 15 July 1969, the Chairman of the House Armed Services Committee, L. Mendel Rivers, unexpectedly and strongly opposed the Navy and Marine Corps’ request.

Several factors influenced the committee’s stand. There was always the question of “gold flow” which occurred when purchases were made from foreign nations. Also, at the time, the government of Canada was publicly expressing its displeasure over the United States commitment to Vietnam—no small item to the Congressmen. A further complicating feature was that Lycoming Corporation, which built the engines for the single-engined UH-1 series, had just developed a new model, which was almost as powerful as the “twin power pack” offered by the Canadian company. Lycoming recently had built a new plant near Charleston, South Carolina, to produce these engines.

Almost simultaneously, the Army’s AH-56 “Cheyenne” armed helicopter had become bogged down in cost and development problems. Other than a few helicopters for test purposes, the program was canceled. Now the Army was faced with having no armed helicopter other than the single-engined UH-1B/D and AH-1G series. It immediately began to show interest in the Marine Corps Sea Cobra and the UH-1N twin-engined model. If the Army, which needed many more helicopters than the rest of the services combined, joined in the program, the resulting contract for engines would be a very large one. The economic and political impact of buying the engine in Canada would be greatly increased.

On 7 August 1969, Colonel Miller and General Lewis W. Walt, Assistant Commandant, met with Chairman
Rivers. “General Walt outlined the Marine Corps’ critical UH–1N requirements, and emphasized the points in justification for the twin engine configuration,” Colonel Miller reported. “He further stressed the importance of these aircraft in support of our forces in South East Asia. After approximately 55 minutes the Chairman indicated that he would support this year’s limited procurement of the twin engine UH–1N.” While the argument as to the increased safety of a twin-engine helicopter had saved the FY 70 program, Congressman Rivers “clearly indicated that his committee would not stand for any follow-on procurement of this engine unless the engine could be built in the United States.”

United Aircraft chairman of the board, W. P. Gwinn, lost no time in reassuring both the military and the congressmen that the company “is prepared to establish a U.S. source for this powerplant and we have now set in motion the necessary planning.” The Navy, which was responsible for procuring the engines for all services, quickly agreed to cooperate and informed the congressmen of the impending developments. The UH–1N program was back on track.

On 7 April 1971, the first of the twin “Hueys” was delivered to the Marine Corps at New River. It had been flown there from the plant at Fort Worth, Texas, by Colonel Glenn R. Hunter, commanding officer of MAG–26. Accompanying him on the same flight was Lieutenant Colonel Smith, officer-in-charge of the HMA–269 “activation cadre.” He and other crews simultaneously delivered the first four twin Cobras.

As there were neither sufficient aircraft nor trained crews to operate two squadrons at the time, both the UH–1N and AH–1Js were assigned to Lieutenant Colonel Smith’s unit. The similarities between the two aircraft, particularly in the propulsion train, aided both training and maintenance.

Four months later, on 10 June, HML–167 was officially transferred from Vietnam to New River. Some members had arrived earlier and it would be a few more weeks before the commanding officer, Lieutenant Colonel Richard J. Blanc, would have his whole unit reassembled. By 28 June, however, enough had checked in that he could begin accepting the UH–1Ns that had been kept in HMA–269. Three days later, Lieutenant Colonel Blanc turned over command of the squadron to Lieutenant Colonel Horace S. (“Hoss”) Lowrey, Jr.

HML–167 was the first of the planned “light” helicopter squadrons to be equipped with the new “twin Huey.”

The Marine Corps now had at least one unit operating with a new and improved version of all the original turbine-powered helicopters. There was the CH–46F, the CH–53D, the AH–1J, and now the UH–1N. Though the older models continued to serve, the acceptance of aircraft by HML–167 marked the beginning of a new era in helicopter development in the Marine Corps.

**Change in the Mix**

The difficulty in winning approval for the improved models of helicopters was just one of the problems

![The twin-engine UH–1N offered greater safety in amphibious operations and had more power than the UH–1E, yet required no more fuel to operate than did the single-engine Huey.](USMC Photo A331874)
TWINS AND MIXES

Facing the Marine Corps. How many of each type were required, and how they would be organized was a serious issue.

Given a specific and reasonable mission to be performed, any designer can produce an aircraft which will be suitable. Such an approach, however, often results in an aircraft which can perform well only the mission for which it was built. There is no way to predict accurately just what missions will be necessary in a war, and equally important, how much of the total effort will be needed for the specific task. As an example, the UH–34, designed as a utility helicopter, proved to be a poor observation aircraft simply due to the cockpit and cabin arrangements. Likewise, on emergency medical evacuation flights, it was vulnerable to enemy fire because of the height of the cockpit and transmission. Attempts to use the UH–34 as an armed gunship also were unsuccessful. If specialized missions, like observation and helicopter escort, were to be performed, aircraft had to be designed specifically for these tasks. Once that was accomplished, the next problem was how many observation or armed helicopters were needed within the Marine Corps limit on total aircraft. It was not an easy job. Nowhere did the relative mix of types of aircraft receive more deep and constant attention than in the assault transports.

The Marine Corps Operations Analysis Group (MCOAG), a part of the Center for Naval Analyses, was created to study such problems as the relative mix of different types of aircraft. In 1966 MCOAG was directed by the Headquarters Marine Corps Transport Helicopter Study Advisory Committee “to examine the possibility of including the smaller and less expensive UH–1D aircraft in the over-all mix,” and requested “an analysis of the cost and effectiveness of the [CH–53, CH–46, and UH–1D] aircraft in a search for the mix that would provide the Marine Corps with the most effective initial assault lift capability.”

The basic assumption was that the Marine Corps had to have a vertical assault capability of “11,000 troops, 850 tons of equipment and supplies . . . to landing zones up to 50 miles from the launching area within 60 to 90 minutes.” The study was detailed and comprehensive. Factors such as the cost of training the crews, their pay, and the necessary bases were included as well as the actual cost of the aircraft and the fuel and parts to operate them. Various combinations were tried, including the inclusion of what was then the promising IHAS instrument navigation system. Assaults from the different types of LPHs were scrutinized. It was quickly apparent that the Army version UH–1D, even though it was single engined and had no safety margin for amphibious operations, was by far the least expensive to buy, maintain, and operate per aircraft. Next was the CH–46. The CH–53, which was just coming into production, was estimated at both a “high” and “low” cost depending on how many aircraft were eventually procured.

Average Costs per Operating Aircraft

<table>
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<tr>
<th>Aircraft</th>
<th>5 year cost</th>
<th>10 year cost</th>
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<td>UH–1D</td>
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When each of the aircraft was compared as to its lift capability, and its operation from an LPH, the results were reversed. The study concluded:

The least-cost alternative for meeting the Marine Corps’ initial vertical assault requirement is procurement of the CH–53 helicopters only, from now on. This conclusion [which remains valid with] changes in assumed aircraft [procurement amounts] and operating variations, is supported by considerations of ship utilization and command and control, and is not contradicted by analyses of the vulnerability of the aircraft.

The report went on that though “helicopter requirements for post assault operations have not been examined in this study . . . some general comments on the subject come out of the analysis of the ship to shore assault phase.” Once the Marines had landed, “resupply and replenishment of assault forces require essentially the same capability as the initial assault: delivery of a given payload in a certain time.” It could be assumed that “if the CH–53 is the least-cost way to provide the initial assault, then it is probably the best way of providing resupply.” In addition, “the same reasoning for expecting the CH–53 to be the best resupply alternative also holds for the general ship offloading, if there is a need to do this as quickly as possible.” The CH–53 “Superbird” could not do everything, however, and the study said that “medical evacuation and utility missions, such as rescue and liaison requirements are another important category.”

In these missions, “there may be a need to have flexibility, in terms of numbers of aircraft rather than tons of payload, because of the possible numbers and diversity of tasks to be taken care of simultaneously.” Thus, in addition to the CH–53, a number of small, relatively inexpensive aircraft would be needed to make up the vertical assault force.

MCOAG was not the only organization studying the problem of the proper mix of helicopters. Even before the report was released, Boeing Vertol had completed one which, naturally enough, concluded that the