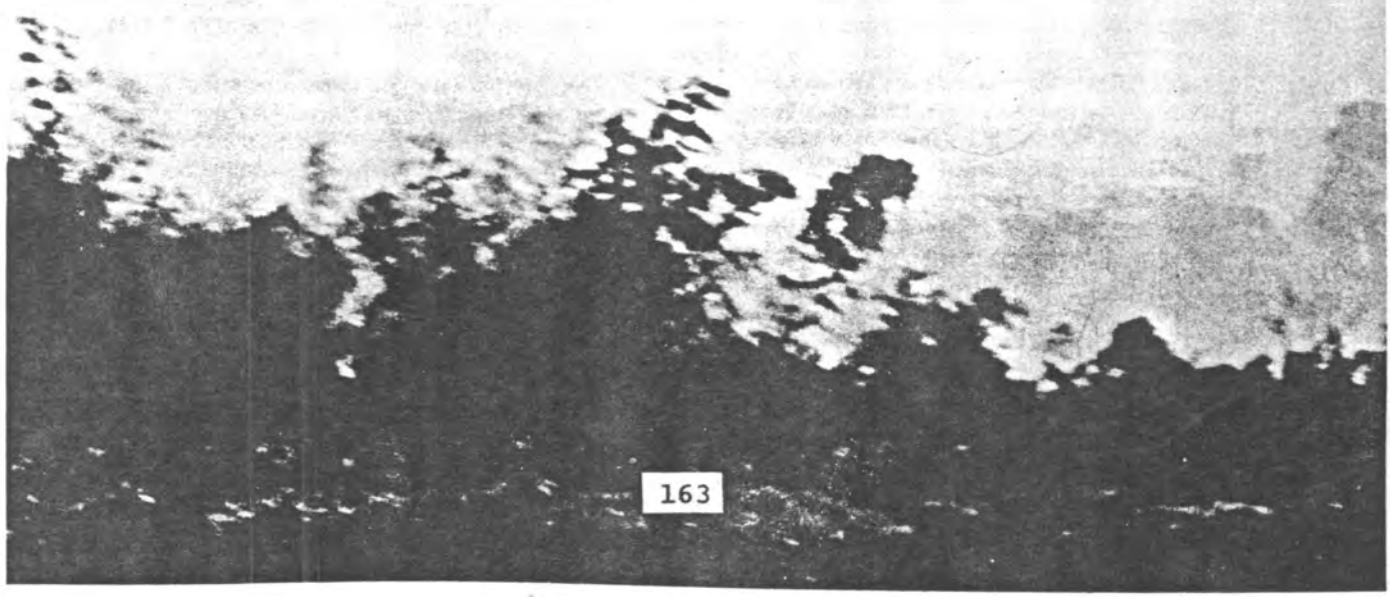
Marine Aviation in Vietnam, 1962-1970

By Lieutenant General Keith B. McCutcheon, U. S. Marine Corps



On the preceding pages, a Marine F-4B Phantom drops a 500-pound bomb on Viet Cong trenches concealed in a tree line south of Da Nang. Close air support missions, which Marine Corps pilots were performing before and during World War II; "vertical envelopment," which Marine Corps helicopter pilots perfected during the Korean Conflict; and the SATS—short airfield for tactical support—concept, which the Corps pioneered after Korea, were three of the major contributions to the defense of I Corps made by Marine aviation during its service in Vietnam. To get the most out of the Da Nang area rain chart on the opposite page, it is helpful to know that Washington, D.C. averages three or four inches of rain a month.

The Beginning

Marine Corps aviation involvement in Vietnam began on Palm Sunday 1962, when a squadron of UH-34 helicopters landed at Soc Trang in the Delta. The squadron was Marine Medium Helicopter Squadron 362 (HMM-362), commanded by Lieutenant Colonel Archie J. Clapp.

Three U. S. Army helicopter companies were already in Vietnam, and the Secretary of Defense had approved deployment of one more unit to Vietnam. The Marine Corps seized this opportunity to fly toward the sound of the drums and offered to send a squadron. They recommended Da Nang as the area of operations, since it was that area to which Marines were committed in various contingency plans. The Commander, United States Military Assistance Command, Vietnam (ComUSMACV), decreed, however, that the need at the moment was in the Delta since that Vietnamese Army corps area was the only one of the four corps areas in Vietnam that did not have any helicopter support.

Colonel John F. Carey was the commanding officer of the Marine task unit of which HMM-362 was a part. He arrived at Soc Trang on 9 April, and over the ensuing five days an element of Marine Air Base Squadron 16 (MABS-16) arrived aboard Marine KC-130 aircraft from the Marine Corps Air Facility at Futema, Okinawa. Squadron HMM-362, augmented by three O-1 observation aircraft, embarked in the *USS Princeton* (LPH-5) at Okinawa and arrived off the Mekong Delta at dawn on Palm Sunday, 15 April. The squadron's helicopters completed unloading the unit's equipment and were ashore by late afternoon. The Marine task unit which was to be known as "Shufly" was established ashore.

The mission of this unit was to provide helicopter troop and cargo lift for Vietnamese Army units and its first operation was one week later, on Easter Sunday. The squadron continued to operate until August when it was relieved by HMM-163, commanded by Lieutenant Colonel Robert L. Rathbun.

In September 1962, the Marines were ordered by ComUSMACV to move to Da Nang, the high threat area, an area with which Marine planners had become well acquainted in contingency plans, war games, and advanced base problems. Some had been there before. In April 1954, Lieutenant Colonel Julius W. Ireland had landed at Da Nang airfield with Marine Attack Squadron 324 (VMA-324) and turned over twenty-five A-1 propeller driven dive bombers to the hard-pressed French. Now he was back as a colonel. He had replaced Colonel Carey as the commander of "Shufly."

The Marines initially occupied two areas on the air base. The helicopter maintenance and parking area was southeast of the runway. The billeting area was across the base on the western side, about two miles away. In those days there was not much traffic at Da Nang, so the Marines got into the habit of driving across the runway as the shortest route to commute back and forth. Four years later, this would be one of the two or three busiest airfields in the world.

In late 1964, the runway was extended to 10,000 feet, and a perimeter road, half surfaced and half dirt, was built around the base.

The Land and the Weather

Da Nang is the second largest city in Vietnam and the largest in the Vietnamese Army's I Corps Tactical Zone, commonly called I Corps and abbreviated as ICTZ. By 1970 Da Nang would have a population of approximately 400,000. An exact count is impossible because of the influx of war victims and refugees. ICTZ[1] consists of the northernmost five provinces of Vietnam: Quang Tri, Thua Thien, Quang Nam, Quang Tin, and Quang Ngai. The length of ICTZ is about 225 miles, and its width varies from 40 to 75 miles. Da Nang is approximately in the center of the north-south dimension and is on the coast. Hue, the next largest city, with a population of about 200,000, is roughly halfway between the Demilitarized Zone (DMZ) and Da Nang. Hue, the old capital of Annam, is inland a few miles on the Perfume River. About halfway between Da Nang and the southern boundary of I Corps is a sandy area on the littoral of the South China Sea that came to be known as Chu Lai.

Called Tourane by the French, Da Nang sits on a fairly large bay which provides a roomy, if not particu-

[1]The Corps Tactical zones were redesignated as Military Regions in July 1970. ICTZ became MR1.

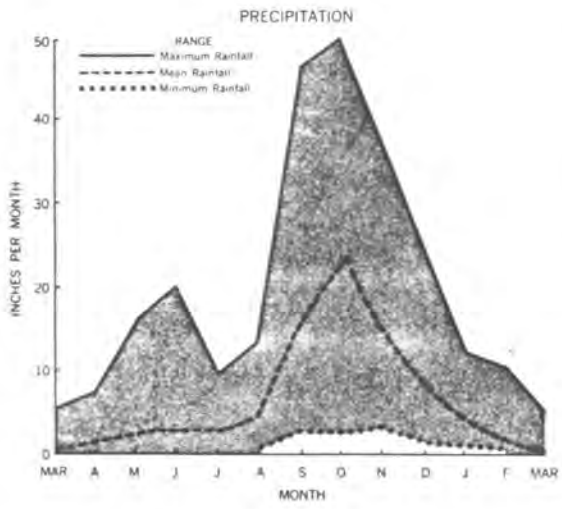
larly safe, deep water harbor and anchorage, although in 1965 it had few facilities to unload ships in any numbers. To the north of the bay are the Hai Van Mountains, called "Col des Nuages" by the French, which stretch eastward from the Annamite Mountain chain to the sea. These mountains are an important factor in I Corps weather and, in fact, form a barrier which can cause one side to be under instrument flight rule conditions and the other side under visual flight rule conditions.

East of Da Nang, across the Song Han River, is the Tien Sha Peninsula that juts past the city to provide a large breakwater for the bay. At the end of the peninsula is a massive 2,000-foot hill known as Monkey Mountain.

The terrain in I Corps rises as you move inland from the Coast. In general, there are three broad regions: the coastal lowlands where rice paddies abound, and there 85 per cent of the three million people live; the piedmont area of slightly higher ground which permits cultivation of other crops, and which is home for most of the remainder of the people; and the hill country, or Annamite chain. These mountains go up to 5,000 feet and higher, some rather precipitously. For the most part they are heavily forested and in places there is a triple canopy which makes observation of the ground impossible.

Running generally from west to east, from the high ground to the sea, is a series of rivers and streams which follow the valleys and natural drainage routes. They are generally unnavigable except for small, oar-propelled, shallow draft boats, but they do offer routes from Laos to the provinces.

The northeast monsoon begins in October and ends in March. September and April are more or less transition months. Rainfall increases in September and October, and by November the northeast monsoon is well established over ICTZ. Weak cold fronts periodically move southward and usually there is an increase in the intensity of low level winds (rising sometimes 20 to 50 knots). This is called a "surge." The "surge" causes ceilings of 1,000 to 1,500 feet with rain, drizzle, and fog restricting visibility to one or two miles. Occasionally the ceiling drops to 200 feet and the visibility to half a mile. After the initial "surge" has passed, the winds begin to decrease and the weather will stabilize with ceilings of 1,500 to 2,000 feet prevailing. Visibility will fluctuate from seven miles or more to three miles or less owing to intermittent periods of fog or precipitation. Cloud tops are seldom above 10,000 feet.



The kind of weather just described was called "crachin" by the French. It can prevail for a few days at a time early in the monsoon season or for several weeks during the high intensity months. As winds decrease, the weather generally improves. When the lower level winds decrease to less than ten knots, or if the wind shifts from the northeast to a northwest or a southerly direction, a break in the weather is usually experienced. Such a break will result in scattered to broken clouds with bases at 2,000 to 3,000 feet and unrestricted visibility and may persist for a week before another "surge" develops.

During December, the monsoon strengthens, and in January, when the Siberian high pressure cell reaches its maximum intensity, the northeast monsoon also develops to its greatest extent. Little change can be expected over ICTZ in February, although "surges" are generally weaker and more shallow than in January. By mid-March the flow pattern is poorly defined and the monsoon becomes weak. During April, traces of the southwest monsoon begin to appear and there is a noticeable decrease in cloudiness over the area. From then through August, the weather in ICTZ is hot and humid, with little rainfall.

The northeast monsoon had a direct impact on all military operations in ICTZ 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 missions when the fixed-wing could not, at least along the flat coastal region. Inland, however, the hills and mountains made even helicopter flying hazardous at best. The pilots all developed a healthy respect for the northeast monsoon.

Early Days at Da Nang

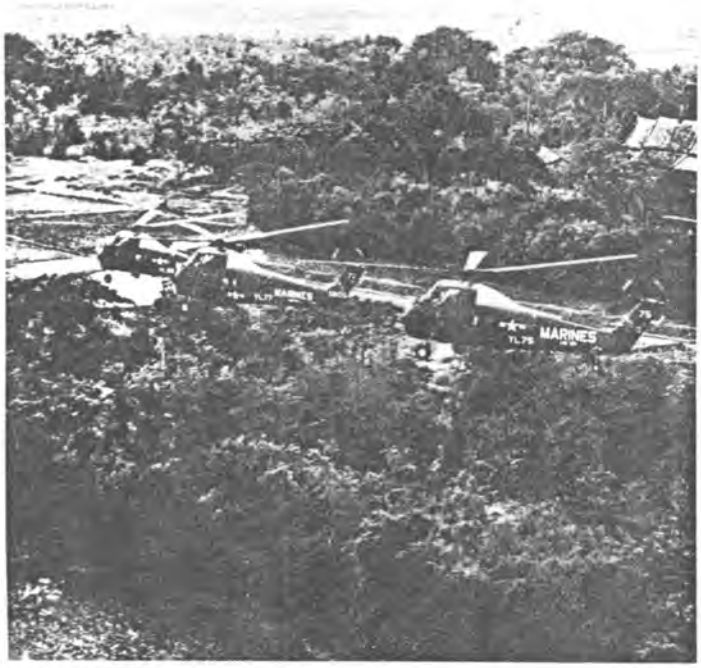
HMM-163 was relieved by HMM-162 in January 1963. Over the next two years other HMMs followed: 261, 361, 364, 162 for a second time, 365, and, finally, 163 for its second tour. Half the Corps' UH-34 squadrons had received invaluable combat experience before the

commitment of the Marine Corps air-ground team of division-wing size.

In April 1963, an infantry platoon from the 3d Marine Division (3dMarDiv) was airlifted from Okinawa to join "Shufly." Its mission was to provide increased security for the base. In a modest way, the air-ground team was in being in Vietnam.

Brigadier General Raymond G. Davis, Commanding General of the 9th Marine Expeditionary Brigade (9thMEB), flew to Da Nang in August 1964, shortly after the Tonkin Gulf affair, and completed plans to reinforce the Marines based there in the event of an emergency. He then joined his command afloat with the Amphibious Ready Group of the Seventh Fleet. This Group was to be on and off various alert conditions for some months to come.

Early in December 1964, "Shufly" received a new title by direction of Lieutenant General Victor H. Krulak, Commanding General of the Fleet Marine Force, Pacific (FMFPac). It was now called Marine Unit Vietnam, or MUV for short.



A division of H-34D helicopters of HMM-362, the first Marine Corps helicopter squadron assigned to Vietnam, transported Vietnamese troops on a strike mission against Viet Cong positions in the Mekong Delta in May 1962. Unlike the aircraft of the three Army helicopter companies then in Vietnam, HMM-362 helicopters lacked installed machine guns; their only weapons were the "greasegun" submachine guns carried by the copilot and crew chief.

Another aviation unit began arriving at Da Nang on 8 February 1965. This was the 1st Light Anti-Aircraft Missile (LAAM) Battalion, commanded by Lieutenant Colonel Bertram E. Cook, Jr. The battalion was equipped with Hawk surface-to-air missiles. Battery "A," commanded by Captain Leon E. Obenhaus, arrived by air and was established on the base just to the west of the runway. Within twenty-four hours it was ready for operation. The remainder of the battalion came by ship from Okinawa, arriving at Da Nang later in the month. This battalion had been sent to Okinawa in December 1964, from its base in California, as a result of ComUSMACV's request for missiles for air defense. The decision was made to retain the unit on Okinawa instead of sending it to Vietnam, but when the Viet Cong attacked Pleiku on 7 February, the United States retaliated with an air strike in North Vietnam. An order to deploy the Hawks to Da Nang was made at the same time. As in the case of Cuba in 1962, when a crisis situation developed, Marine missile units were among the first to be deployed.

By this time MUV was pretty well established on the west side of the Da Nang air base in an old French army compound. Colonel John H. King, Jr., was in command. The helicopters were moved from their first maintenance and parking area, and were now located on the southwest corner of the field. A rather large sheet metal lean-to had been made available by the Vietnamese Air Force (VNAF) to serve as a hangar. The parking apron was blacktop and was adequate for about two squadrons of UH-34s.

Buildup

Late in February 1965, President Johnson made a decision to commit a Marine brigade to protect the air base at Da Nang from Communist attack. On 8 March the 9thMEB, including the 3d Battalion, 9th Marines, was ordered to land. They had been afloat and ready for such an operation for several months. Brigadier General Frederick C. Karch was then the commander of the brigade.

The 1st Battalion, 3d Marines, meanwhile had been alerted on Okinawa for a possible airlift. It, too, was ordered to Da Nang on 8 March. Because of the congestion which developed on the airfield, ComUSMACV ordered a temporary cessation to the lift. It was resumed on the 11th and the battalion arrived in Da Nang on the 12th.

Squadron HMM-365, commanded by Lieutenant Colonel Joseph Koler, Jr., was embarked in the *Prince-*

ton. Koler's UH-34s were flown to the airfield at Da Nang, but the crews reembarked in the *Princeton* for the voyage to Okinawa. Aircrews and squadron personnel of Lieutenant Colonel Oliver W. Curtis' HMM-162 were airlifted by KC-130 from Okinawa to Da Nang to take over the UH-34s left by HMM-365.

Brigadier General Karch took operational control of all Marine aviation units that were already ashore. He also established an MEB command post in the same old French compound where Colonel King was set up. Colonel King had had the foresight to contact General Thi, who commanded I Corps and the ICTZ, to get permission to use some additional buildings.

The air component of the 9thMEB now included two HMMs and one LAAM battalion. Colonel King remained in command of the air units. He also received some service support elements from Marine Aircraft Group 16 (MAG-16) based at Futema, Okinawa, and since his command was now integrated into the MEB, the MUV was deactivated and MAG-16(—)[2] took its place. A rear echelon of MAG-16 remained at Futema, Okinawa.

Requests for additional military forces were submitted by ComUSMACV. One 15-plane Marine Fighter/Attack Squadron (VMFA) was authorized to deploy to Da Nang. VMFA-531 based at Atsugi, Japan, and commanded by Lieutenant Colonel William C. McGraw, Jr., received the order on 10 April. By dusk on the 11th, the aircraft and most of the men were in Da Nang, having flown there directly, refueling in the air from Marine KC-130 tankers as they went. On 13 April, McGraw led twelve of his F-4Bs on their first combat mission in South Vietnam, in support of U. S. Marine ground troops. The F-4 was an aircraft that would perform either air-to-air missions against hostile aircraft or air-to-ground strikes in support of friendly troops.

As the tempo of retaliatory strikes against North Vietnam by the Navy and Air Force increased, the enemy air defense began to include greater numbers of radar-controlled weapon systems. The sole source of tactical electronic warfare aircraft readily available to counter the new enemy defense was Marine Composite Reconnaissance Squadron One (VMCJ-1) at Iwakuni, Japan. On 10 April 1965, the Commander-in-Chief, Pacific (CinCPac), ordered the deployment of an EF-10B detachment to Vietnam. The detachment, led by Lieutenant Colonel Otis W. Corman, arrived in Da Nang the same day. The electronic warfare aircraft (EF-10Bs and later EA-6As) began to provide support to Marine, Navy, and Air Force strike aircraft. The photo-reconnaissance aircraft (RF-8s and RF-4s) arrived later and performed primarily in support of Marine units, but they also supported Army units in I Corps and flew bomb damage assessment missions north of the DMZ.

Southeast Asia was an area familiar to the pilots of VMCJ-1. Detachments of RF-8As, the photographic aircraft of the squadron, had been aboard various carriers in the Gulf of Tonkin continually since May 1964, when CinCPac initiated the Yankee Team operations to conduct photo reconnaissance over Laos. Detachment pilots were also on hand to participate in the Navy's first air strikes against North Vietnam, and they continued photographic reconnaissance activities as part of carrier air wings until the detachment rejoined the parent unit at Da Nang in December 1965.

Colonel King now had an air group that contained elements of two jet squadrons, two helicopter squadrons, a Hawk missile battalion, and air control facilities so he could operate a Direct Air Support Center (DASC) and an Air Support Radar Team (ASRT). He also had the support of a detachment of KC-130 transports that were based in Japan.

The month of May was one of further growth and change. Several additional infantry battalions arrived and elements of MAG-12 landed at Chu Lai to the south of Da Nang. Major General William R. Collins, Commanding General, 3dMarDiv, arrived on 3 May from Okinawa. He set up an advance division command post, and on 6 May he established the Third Marine Expeditionary Force (III MEF); the 9thMEB was deactivated. Within a few days the title of III MEF was changed to Third Marine Amphibious Force (III MAF). The term "expeditionary" seemed to conjure up unhappy memories of the earlier ill-fated French expeditionary corps. And some believed "amphibious" was more appropriate for a Marine command in any event.

On 11 May, Major General Paul J. Fontana opened an advance command post of the 1st Marine Aircraft Wing (1stMAW) in the same compound. On 24 May, Brigadier General Keith B. McCutcheon, assistant wing commander, arrived to relieve General Fontana in the advance command post, and on 5 June he relieved him as Commanding General of the 1stMAW. The day before, Major General Lewis W. Walt relieved Collins as Commanding General, 3dMarDiv and III MAF. McCutcheon became Deputy Commander, III MAF, and Tactical Air Commander.

The Marine Air-Ground Team was in place. The 1stMAW now had elements of a headquarters group and two aircraft groups in Vietnam. Additional units were waiting to deploy and still others were requested. It was but the beginning of a steady Marine buildup in I Corps. It was summer and the weather was hot and dry. The heavy rains were not due to start until September.

[2] Marine terminology often describes units as plus or minus to make clear that a unit is missing a capability normally included in the composition of the unit, or it has been given an additional capability not normally part of the given unit.

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Resources

Bases

The major constraint to receiving any more air units was the lack of adequate bases.

Da Nang Air Base was one of only three jet-capable airfields in all of Vietnam, and the only one in I Corps; the others were Bien Hoa and Tan Son Nhut, both near Saigon. In 1965, Da Nang had one 10,000-foot paved runway with a parallel taxiway. Less than half the length of the runway on the eastern side of the field had associated ramp space for parking aircraft. On the western side there was a blacktop parking apron that could accommodate about two squadrons of helicopters.

A military construction board was formed in III MAF and a list of requirements was prepared and submitted to higher authority. A second runway and taxiway had already been approved at the end of March for Da Nang as well as adequate hardstand and maintenance areas on the western side of the field. This would eventually accommodate one Marine Aircraft Group, a Support Group, and a Navy unit (Fleet Air Support Unit, Da Nang) which arrived in April 1968, in order to carry out various functions for the Seventh Fleet. The eastern side of the field would then be released to the U. S. Air Force and the Vietnamese Air Force. Before this construction could be undertaken, however, a base had to be made available for the helicopters then at Da Nang. And still another base was required for a second jet group.

There were several restrictions confronting III MAF as far as construction was concerned. First, was the problem of obtaining real estate. This was a laborious and time consuming administrative process. Second, was the need to relocate the Vietnamese families living on the desired site. Equally important to the Vietnamese was the relocation of their ancestral grave sites. Third, there was inadequate engineering help available in Vietnam to build everything required, so priorities had to be established. And finally, security forces had to be provided, and any unit assigned to this task meant fewer troops for other tactical operations.

SATS and Chu Lai

A second jet base was essential. Through the foresight of Lieutenant General Krulak, a likely site had been picked out about fifty miles south of Da Nang for a Short Airfield for Tactical Support (SATS). General Krulak had recommended it almost a year before to Admiral Sharp, who was CinCPac. Admiral Sharp and General Westmoreland had been discussing the need for another jet base somewhere in South Vietnam. General Krulak's main concern was to have a jet airfield in I Corps, where his Marines were to be committed if the contingency plans were implemented. Finally, on 30 March 1965, Secretary McNamara approved installation of a SATS at Chu Lai. Chu Lai was not a recognized name on Vietnamese maps at that time and the rumor is that Krulak gave it that name when he chose the place. Chu Lai reportedly is part of his name in Chinese.

By virtue of their experience in Naval Aviation, Marine aviators had long recognized the advantage of being able to approximate a carrier deck sort of operation on the beach. They realized that many areas of the world did not have adequate airfields, and that normal construction methods took too long. Something that approached an "instant airfield" was required.

In the mid-fifties, the Marine Corps Development Center at Quantico, Virginia, intensified development of both the concept and the hardware to realize this project. They visualized a 2,000-foot airstrip that could handle a Marine Aircraft Group of two or three aircraft squadrons. The essential components of such a base would include a suitable surface for the runway, taxiways, and hardstands; a means of arresting the aircraft on landing similar to that on a carrier deck; a catapult or other means to assist in launching the aircraft; provisions for refueling, rearming, and maintenance; air control facilities; and, of course, all the necessities for housekeeping. The installation time was to be from 72 to 96 hours.

Various projects were already underway that could provide solutions to some of these problems. Others had to be started. Furthermore, the entire concept had to be pulled together into a single system. Naturally, a name for the system was required and a name was found—SATS—Short Airfield for Tactical Support.

The kind of surface material to use was one of the harder problems to solve. Fabrics, plastics, soil stabilizers, and many other ideas were tried, but none was able to cope with the impact and static loads of aircraft operations and the temperature of jet exhaust. Finally, attention was directed to metals, and eventually a solid aluminum plank was developed which promised to do the job. It was known as AM-2. A single piece of this mat measures two feet by 12 feet and weighs 140 pounds. The individual pieces are capable of being interconnected and locked in place, thus providing a smooth, flat surface that is both strong and durable.

The arrested landing problem was already in hand with the use of modified shipboard arresting gear. Development of improved equipment was initiated, nevertheless, and the M-21 was the result. This is a dry friction, energy-absorbing device using a tape drive with a wire pendant stretching across the runway. This arresting gear is now standard in the Corps.

Launching in a short space was a bigger problem. JATO (Jet Assisted Take-Off) bottles were available, but

these could be a logistical burden over a long period of time. A catapult was desired. Development and testing were not complete in early 1965, but progress was promising.

The refueling problem was solved by adapting the Amphibious Assault Bulk Fuel Handling System (AABFHS) to the airfield environment. The result was the Tactical Airfield Fuel Dispensing System, or TAFDS. This system used the same 10,000-gallon collapsible tanks, hoses, pumps, and water separators as the AABFHS, but it added special nozzles for refueling aircraft: they were single-point refueling nozzles for jets, and filling-station gooseneck types for helos and light aircraft.

In a similar manner, all of the other requirements were analyzed and action was taken to find a solution. By May 1965, all were available except the catapult, but JATO was on hand, and Marine A-4s were modified to use it.

The concept of SATS visualized seizing an old World War II airstrip or some similar and reasonably flat surface that required a minimum amount of earth moving, and installing a 2,000-foot SATS thereon in about 72 to 96 hours. This would permit flight operations to commence, while improvements and expansion could be conducted simultaneously.

Chu Lai did not meet all the requirements visualized by SATS planners. It was not a World War II abandoned airfield. The soil wasn't even dirt. It was sand. And there was lots of it.[3]

But Chu Lai was on the sea, it had a semi-protected body of water behind a peninsula that could be developed into an LST port, it could be defended, and there were few hamlets in the area that would have to be relocated. All things considered, Chu Lai was the most likely site on which to build a new air base.

On 7 May 1965, Naval Mobile Construction Battalion 10 (NMCB-10), under Commander J. M. Bannister, crossed the deep sandy beach at Chu Lai along with the 4th Marine Regiment and elements of MAG-12. The Seabees went to work on 9 May, constructing the first SATS ever installed in a combat environment.

The landing force commander at Chu Lai was Brigadier General Marion E. Carl, one of the Corps' most famous aviators. He had brought his 1st Marine Brigade from Hawaii to the Western Pacific in March and although that Brigade was disbanded, Carl had become Commanding General of the 3dMEB. As there were no stakes to mark the previously chosen site, he had a hand in picking the exact spot where the runway should go.

The sand proved to be a formidable enemy. Unloading from the ships was hampered, as driving vehicles through the sand was most difficult. Tracked vehicles were essential to move the rubber-tired ones. It required a superhuman effort to get the job done.

The general construction scheme was to excavate some locally available soil, called laterite, and use it as a sub-base between the sand and aluminum matting. Before that could be done, a road had to be built from the site of the airfield to the laterite deposit. This was done, but the combination of temperatures around the hundred mark and the effect of sand on automotive and engineering equipment slowed the progress of construction. Both men and mechanical equipment grew tired quickly in this hostile environment. Needless to say, no one expected to finish in four days. Even thirty looked totally unrealistic, but that was the goal. In spite of the problems and obstacles, Lieutenant General Krulak bet Major General Richard G. Stilwell, Chief of Staff of MACV, that a squadron would be operating there within 30 days.

By Memorial Day, approximately four thousand feet of mat and several hundred feet of taxiway were in place. Chu Lai was ready to receive aircraft, but tropical storms prevented the planes from flying from the Philippines to Vietnam until 1 June. Shortly after 0800 on that date, Colonel John D. Noble, Commanding Officer of MAG-12, landed an A-4 into the mobile arresting gear on the aluminum runway. He was followed by three others, and, later in the day, four more arrived. About 1300, the first combat mission was launched using JATO with Lieutenant Colonel Robert W. Baker, Commanding Officer of VMA-225, leading.

General Krulak paid off his bet of a case of Scotch to Stilwell on the basis that a full squadron was not operating there in the forecast time, only half of one.

But construction continued and, as additional taxiway was built, more planes came in. Meanwhile operations continued on a daily basis.

The laterite, however, simply wasn't doing the job, so when 8,000 feet of runway was installed, it was decided to operate from the southern 4,000 feet and to re-lay the northern 4,000 feet, which were the first to go down. As it turned out, after the northern half was redone, the other half had to have the same treatment, and then the cycle was repeated still another time when, at last, the right sub-base combination was found. Various techniques were tried, including watering and

[3]The sand and dust were problems, but the biggest problem in the early days was a lack of facilities in which to conduct maintenance. Maintenance was performed on the line under strictly expeditionary conditions. As time went by, facilities were built. Structures that could accommodate two A-4s were erected as line hangars, shops were constructed, and electric power was installed. The problems were different at Da Nang. Da Nang at least had some hangar space, even if it was old and in poor repair. Eventually, some of the facilities built at both Da Nang and Chu Lai were probably better than those we have at air stations in the United States. But the Marine Corps does not expect to find these conditions at the outset of any operation. That is why the Corps has placed so much emphasis on the expeditionary aspects of its operations.

packing the sand down without any other material, shooting the sand with a light layer of asphalt, and finally a combination of the latter and using a thin plastic membrane under the matting to keep rain from settling into the soil and undermining the runway surface.

Drainage was essential, of course, as any standing water under the mat set up a pumping action as aircraft rolled over the mat, which was particularly noticeable when a transport like a KC-130 landed and rolled out.

During these periods of 4,000-foot operations, JATO was used when high temperatures and heavy bomb loads required it. In addition, a Marine KC-130 tanker was kept available to top off A-4s after take-off, by inflight refueling.

A catapult was installed in April 1966, so all SATS components were then in place. The catapult was tested and evaluated under combat conditions but was not actually required on that date because of the length of the runway. It was used, but not on a sustained basis.

The SATS concept was proven under combat conditions at Chu Lai. The AM-2 mat became a hot item, and production of it was increased markedly in the United States, as all Services sought it. It was used for non-SATS airfields and helicopter pads, and became as commonplace in Southeast Asia as was the pierced steel plank (PSP) in the Southwest Pacific in World War II. Likewise, TAFDS components became a common sight, and their flexible fuel lines could be seen almost anywhere.

The original "tinfoil strip," as it came to be called, was still in operation late in 1970, more than five years after it was laid down. Not even the planners back in Quantico in 1955 ever envisioned that someone would install a short airfield for tactical support on sand and leave it there for five years. But this is exactly what was done at Chu Lai.

Ky Ha and Marble Mountain

The small civilian airfield at Phu Bai, South of Hue, could accommodate one helicopter squadron, which was required in that area to support an infantry battalion that was assigned to secure the region in 1965. But in addition, two major helo bases were required in relatively short order: first, to take care of MAG-36, which had been alerted to deploy from Santa Ana, California; and second, to free Da Nang of its rotary wing aircraft, so that construction of the parallel runway there could be started.

The peninsula to the northeast of Chu Lai provided a likely site for a helo group as well as an air control squadron. The Seabees began preparation of a flat area and laid down several kinds of metal matting, but they had no time to do anything else in the way of preparing for MAG-36's arrival. The group departed from the West Coast in August 1965, and arrived off Chu Lai early in September. They unloaded, moved ashore, and set about building their own camp. At night they also established their own perimeter defense as there was no infantry to do it for them. And, almost as soon as they landed, the rains began. Whereas at Chu Lai it was sand, at Ky Ha it was pure, unadulterated mud. The base was named Ky Ha after the village nearest the site.

For MAG-16, a site had been chosen east of Da Nang just north of 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. 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 these trees would have afforded against sun, wind, and erosion.

The civilian construction combine in Vietnam, Raymond, Morrison, Knudson-Brown, Root, and Jones (RMK-BRJ), received the job of building the helicopter facility at Marble Mountain. It was sufficiently advanced by late August 1965 to allow MAG-16 to move from Da Nang and operate at the new facility.

All during the summer, the question of whether or not another SATS type airfield should be constructed in ICTZ was under serious consideration. There were four likely sites: from north to south, Phu Bai, Marble Mountain Air Facility, Tam Ky, and Quang Ngai. After much study and many messages, the idea was abandoned when it became clear that Da Nang plus Chu Lai would be adequate.

On the night of 27 October 1965, the enemy executed a coordinated sapper attack against Da Nang, Marble Mountain, and Chu Lai. The attack on Da Nang was thwarted by artillery fire against one column to the west, and by an alert ambush against a second force to the south.

At midnight, three sapper teams hit Marble Mountain Air Facility. The team from the north was met by aviation specialists standing guard duty and every attacker was killed. The southern team was driven off. But the one from the west managed to get on to the parking area and several of the enemy raced from helo to helo throwing charges into each. In short order, the place was a mass of burning aircraft. Over twenty were damaged beyond repair, and an equal number required varying degrees of repair.

At Chu Lai only a handful of sappers made it to

the flight line, and half of them were killed. A few A-4s were damaged, two beyond repair.

Air bases were to become prime targets. They required close-in defense in depth to make sapper infiltration unprofitable, and they required an outer mobile defense by infantry to ward off rockets and mortars. The ground units did a superb job in keeping the enemy off balance, so that only a few rockets and mortars found profitable targets. Further, aviation and ground personnel tightened their perimeter defense, so never again was there an infiltration which equalled the success of the October attack.

Da Nang

Once MAG-16 had vacated the west side of Da Nang, construction could begin on the parallel runway and taxiway. Plans were made to construct the northern and southern concrete touchdown pads and connecting taxiways to the east runway first, the MAG operating and maintenance area on the northwest corner of the base second, the remainder of the runway third, and the parallel taxiway last. The two touchdown pads were required first because there was an urgent requirement to move VMCJ-1 from the parking apron on the east side of the field. Furthermore, an F-8 squadron was authorized for Da Nang, but there was no ramp space. The northern touchdown pad would provide ramp space for these two jet squadrons. The southern pad would provide a place to operate the KC-130s and C-117s.

The 1stMAW did not desire to have the entire runway completed before the MAG operating area was, because if it had been, it would have been used as a runway and not for ramp space. This priority was given to the completion of jobs because the engineer work-force was not adequate to undertake them all simultaneously. Although another runway was sorely needed, parking space was the more urgent requirement. Why wasn't a SATS built so a runway would be available at the same time parking space was? Because what was needed was a long runway for the long haul that would accommodate Marine, Navy, Air Force, commercial, and miscellaneous aircraft of all sizes.

MAG-11 moved into Da Nang from its base at Atsugi, Japan, in July 1965, and took command of the jet squadrons which up to that time had been under control of MAG-16. Colonel Robert F. Conley commanded MAG-11. The F-8 squadron, Marine All-Weather Fighter Squadron 312 (VMF[AW]-312), commanded by Lieutenant Colonel Richard B. Newport, arrived at Da Nang in December 1965 and occupied the completed northern touchdown pad along with VMCJ-1, which had moved over from the east side of the base.

The MAG operating area for MAG-11 and the west runway were completed late in 1966, and the last Marine flight operations were then moved from the east side of the base to the west side.

Chu Lai West

A 10,000-foot conventional concrete runway and associated taxiways, high speed turnoffs, and ramp space for two MAGs was begun at Chu Lai, to the west of the SATS strip, early in 1966 and completed that October. Marine Air Group 13 arrived from Iwakuni, Japan, and occupied the new base. This Air Group had been stationed at Kaneohe, Hawaii, as part of the 1st Marine Brigade. It deployed to the Western Pacific with the Brigade and Brigadier General Carl in March, but bided its time in Okinawa and later in Japan, until a base was available for it in Vietnam. Beginning in the fall of 1967, both MAGs 12 and 13 operated from the concrete runway, and the SATS strip was made available to the Army for helos and light aircraft.

An AM-2 runway, complete with catapult and arresting gear, was constructed to connect the northern ends of the concrete and "tinfoil" runways. This provided for a cross-wind runway, about 4,800 feet in length, as well as an interconnection of the two fields for aircraft movement on the ground.

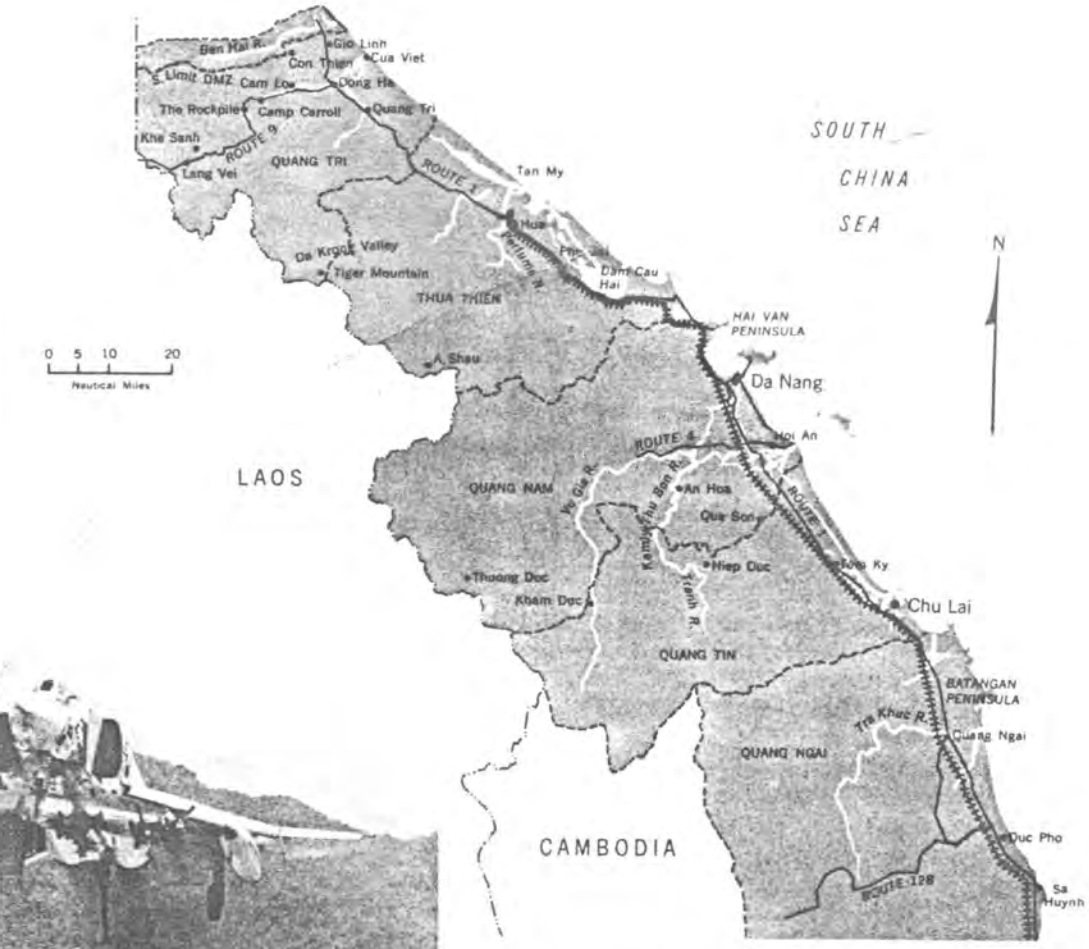
Helo Bases in Northern ICTZ

As the center of gravity of Marine operations moved north, the helos followed. Late in 1967, Phu Bai was expanded to accommodate a full helicopter group, and MAG-36 moved there from Ky Ha, which was taken over by the Americal Division. Later a base was established at Dong Ha to support the 3dMarDiv's operations below the DMZ. This proved to be a particularly hot area, as it came under fire with some regularity from enemy artillery north of the DMZ. In October 1967, the Quang Tri helicopter base, nine nautical miles south of Dong Ha and beyond the range of enemy artillery firing from the DMZ, was completed in a record 24 days. The helicopters were sent there from Dong Ha and operations were begun immediately. In April 1968, a provisional air group, MAG-39, was established out of 1stMAW resources in order to provide better command and control over the helicopter squadrons based at Quan Tri to better support the 3dMarDiv.

Monkey Mountain

Another formidable construction project was the emplacement of a Hawk missile battery on Monkey Mountain just east of Da Nang. The site selected was over two thousand feet above sea level and about one mile east of the Air Force radar site known as Panama. Naval Mobile Construction Battalion 9, led by Commander Richard Anderson, was given this task. A road had to be built first of all, and then the mountain peak

Chu Lai was not a recognized name on Vietnamese maps when, in March 1965, it was chosen to become the second (after Da Nang) jet base in I Corps; yet, in five years, the SATS concept was proven under combat conditions here. Among the techniques tested at Chu Lai was the modified shipboard arresting gear which can stop a jet—such as this F-4B coming into the cross-wind runway with its arresting hook down—in 600 feet.



had to be leveled in order to provide a sufficiently flat area to emplace the battery. On 1 September 1965, the site was sufficiently cleared to receive the equipment, and Captain Charles R. Keith's "B" Battery, 1st LAAM Battalion, was emplaced. As in the case of airfields, development of the site continued concurrently with operations. Late in 1966, a similar but less extensive construction effort was undertaken just to the east of Hai Van Pass, so that the LAAM Battery which was still on Da Nang Air Base could be moved to a better tactical location.

Other Operating Areas

In addition to these permanent bases, many outlying fields and expeditionary operating areas were established as the military requirement dictated. Airfields suitable for KC-130s and helos were built or improved at Khe Sanh, An Hoa, Landing Zone Baldy, Tam Ky, and Quang Ngai; and the 1stMAW at one time or another had detachments stationed at these installations to provide for air traffic control, refueling, rearming, and other essential tasks. ("Suitable for KC-130s" means about 3,000 feet of runway with some sort of hard surface.) The 1stMAW had the capability to move where the action was. Its expeditionary character was well suited to this kind of campaign.

Men, Units, and Aircraft

From the time it established its command post (CP) at Da Nang in June 1965 until April 1966, the 1stMAW maintained a rear echelon under its command at Iwakuni, Japan. During this period the 1stMAW had cognizance over all Marine Corps aviation units deployed to the Western Pacific. It rotated jet units between Japan and Vietnam and helo squadrons between Okinawa, the Special Landing Force (SLF) afloat in the Seventh Fleet, and Vietnam. It also reassigned men.

In Vietnam the wing had a Headquarters Group and four aircraft MAGs: MAG-11 and MAG-12, with jets at Da Nang and Chu Lai respectively; MAG-16 at Marble Mountain and Phu Bai with helos; and MAG-36 at Ky Ha with helos. A Service Group, stationed in Japan as part of the rear echelon, did not arrive in Vietnam until 1966, when facilities became available. The Headquarters Group and the Service Group were both reorganized in 1967 by Headquarters Marine Corps into three groups instead of two: a Headquarters Group, an Air Control Group, and a Support Group. This reflected a realignment of functions to provide better management of resources, based on experience gained in the recent move of the 1stMAW from Japan and Okinawa to Vietnam.

The first aircraft squadrons to arrive in Vietnam were from 1stMAW units in Japan and Okinawa. These were "rotational" squadrons. Each had been trained in the United States and deployed as a team to serve a 13-month tour together in WestPac. At the expiration of that tour, another squadron was scheduled to arrive to replace the old squadron on station.

Because all members of the squadron arrived at the same time, it meant they all had to be sent back to the United States at the same time. Likewise, all the men in squadrons that arrived in Vietnam from Hawaii and the United States, whether their units were rotational squadrons or not, would also have to be replaced at the same time.

The Corps could no longer support unit rotation on that scale, so it was forced to go to a system of replacement by individuals rather than by units, except in special cases. This problem arose because the Stateside training establishment became saturated with training individuals as individuals and had no time to devote to team or unit training, except for those units which were reforming with new aircraft. In the latter case, unit rotation was necessary. In order to preclude all of a unit being replaced in one month, the 1stMAW went through a reassignment program in late 1965 in an effort to smooth out the rotation dates of men's tours. All like squadrons, for example all HMMs, had their men interchanged to take advantage of different squadron arrival times in WestPac so that their losses through rotation would be spread over several months rather than one. Short touring a few men helped further to spread the losses. This program was called "Operation Mixmaster." It was a difficult one to administer but it accomplished its objective.

In April 1966, the aviation units in Japan and Okinawa were removed from the 1stMAW and established as a separate command reporting directly to FMFPac. The rotation of aircraft, men, and units in and out of Vietnam then became the direct responsibility of FMFPac in lieu of the 1stMAW. The principal reasons for this were that the 1stMAW was increasing in size to the point that the staff could not manage men and equipment spread all over the Western Pacific, and the units in Japan and Okinawa were under the operational control of the Seventh Fleet rather than under General Westmoreland in Vietnam, who did have the operational control of 1stMAW. So this realignment logically transferred administrative control to FMFPac.

When the war began in 1965, the Marine Corps was authorized 54 deployable aircraft squadrons in the Fleet Marine Forces: 30 jet, 3 propeller transport, 18 helicopter transport, and 3 observation.

After initial deployments to Vietnam in 1965, action was initiated on a priority basis to expand the Corps. Another Marine division, the 5th; one deployable helicopter group consisting of two medium helicopter squadrons; and two observation squadrons were authorized for the duration of the Southeast Asia conflict. The 5thMarDiv was organized, trained, and equipped, and elements of it were deployed to Vietnam. The helicopter group never did become fully organized or equipped. Only one of its helo squadrons was formed. Additionally, two fixed wing and two helicopter training groups, all non-deployable, were authorized for the permanent force structure, but they were not fully equipped until 1970.

The reasons that these aviation units were not completely organized and equipped were primarily time and money. All of the essential resources were long-lead-time items: pilots, technical men, and aircraft. All of them are expensive.

The Reserves could have provided trained personnel, but they were not called up in the case of the Marine Corps. The Reserve 4th Marine Aircraft Wing was not equipped with modern aircraft equivalent to the three regular wings, and it did not have anywhere near its allowance of helicopters, so even if the men had been left behind, it would not have been much help as far as aircraft were concerned.

Two years later the Department of Defense authorized the Marine Corps to reorganize its three permanent and two temporary observation squadrons into three observation and three light transport helicopter squad-

rons. The net result of these authorization was that the Marine Corps added one medium and three light transport helicopter squadrons, giving a total of 58 deployable squadrons.[4]

The Arrival of New Aircraft

Aviation is a dynamic profession. The rate of obsolescence of equipment is high and new aircraft have to be placed in the inventory periodically in order to stay abreast of the requirements of modern war. In 1965, the Corps was entering a period that would see the majority of its aircraft replaced within four years.

The A-6A all-weather attack aircraft was coming into the FMF to replace six of twelve A-4 squadrons. (The Marine Corps could neither afford nor did it need to acquire a 100 per cent all-weather capability.) The squadrons retaining A-4s would get a newer and more capable series of A-4. Two-seat TA-4Fs would also become available to replace the old F-9 series used by airborne tactical air coordinators.

The F-4B was well along in replacing the F-8 in the 15 fighter squadrons, and in two years, it was to be replaced in part with an even more capable F-4J.

The RF-4 photo reconnaissance aircraft was programmed to replace the RF-8.

The EA-6A electronic warfare aircraft was procured to replace the EF-10B, which was a Korean War vintage airframe.

The O-1 was scheduled to give way to the OV-10A.

The UH-34 medium transport helicopter and the CH-37 heavy transport were to be replaced by the CH-46 and the CH-53, respectively, in the 18 transport helicopter squadrons.

The UH-1E was just coming into inventory to replace the H-43. In a few years, the AH-1G Cobra would fill a complete void. It would provide the Corps with its first gunship designed for the mission. It did not replace, but rather augmented the UH-1E. (The Marine Corps had no AC-47S, AC-117S, AC-119S, or AC-130S. Every C-47, 117, 119, and 130 the Corps had was required for its primary purpose and none was available for modification to a gunship role.)

Only the KC-130 tanker-transport did not have a programmed replacement.

New models were accepted all through the war. As each was received, a training base had to be built, not only for aircrews but also for technicians. In order to introduce a new model into the 1stMAW, a full squadron had to be trained and equipped or, in the case of reconnaissance aircraft, a detachment equivalent to one-third or one-half a squadron. As a new unit arrived in Vietnam, a similar unit with older aircraft would return to the United States to undergo reforming with new aircraft. After several like squadrons had arrived in Vietnam, they would undergo a "mixmaster" process in order to spread the rotation tour dates of the men for the same reason as the first squadrons that entered the country.

In June 1965, nine of the fixed wing and five helicopter/observation squadrons were deployed to WestPac. By the following June, 12 fixed wing and 11 helo/observation squadrons were in WestPac. A year later the total was 14 and 13, respectively, and by June 1968 it had risen to 14 and 14, essentially half of the Marine Corps' deployable squadrons. Except for one or two jet squadrons that would be located in Japan, at any one time all of these squadrons were stationed either in Vietnam or with the Special Landing Force of the Seventh Fleet operating off the coast of Vietnam.

More squadrons could not be deployed because all of the remaining squadrons in the United States were required to train replacements, either for the individual replacement program or for the limited unit rotation program to deploy new aircraft. Other commitments were drastically curtailed or eliminated. For example, no helicopters accompanied the infantry battalions to the Mediterranean. The capabilities of FMFPac and FMFLant to engage in other operations were substantially reduced.

Command, Control, and Coordination

1965–1968

The Marine Corps is proud of the fact that it is a force of combined arms, and it jealously guards the integrity of its air-ground team. Retention of operational control of its air arm is important to the Corps' air-ground team, as air constitutes a significant part of its offensive fire power. Ever since the Korean War, when the 1stMarDiv was under operational control of the Eighth Army and the 1stMAW was under the Fifth

[4] The following table lists the normal planning figures for each kind of aviation unit. Due to operational factors, not all squadrons were equipped with normal complements. Main deviations were VMO, VMCJ, and HML.

Type Squadron	*No. Aircraft*	*Model Aircraft*
VMA	20	A-4
VMA(AW)	12	A-6
VMFA	15	F-4
VMCJ	9	EA-6A
	9	RF-4
VMGR	12	KC-130
VMO	18	OV-10A
	12	AH-1
HML	24	UH-1
HMM	21	CH-46
HMH	18	CH-53

Air Force, the Corps has been especially alert to avoid such a split again. It is even more important now because of the increased reliance on helicopters and close air support.

Long before a Marine MEB landed in Vietnam, CinCPac was also concerned about how tactical air operations would be coordinated in the event of a war. Admiral H. D. Felt, who was CinCPac in the early sixties, had studied the lessons of the Korean War and concluded that we needed to do better. And since there was no doctrine upon which all the Services were agreed on that score, he decided to form a board to look into the matter.

Brigadier General McCutcheon was then the assistant chief of staff for operations at CinCPac, and Admiral Felt appointed him to head a twelve-man board with representatives from the CinCPac staff and the three Service component commands. All four Services concerned were represented. The board convened in September 1963 and deliberated for three months. It looked at the full spectrum of tactical air support, which includes five principal functions:

a. Control. The allocation and management of resources (aircraft and missiles) to achieve maximum effectiveness.

b. Antiair warfare. The destruction of the enemy's air capability in the air and on the ground.

c. Offensive air support. The use of air-to-ground ordnance and other weapon systems in direct and close support of ground troops and in the interdiction of the enemy's rear areas.

d. Reconnaissance. The use of visual, photographic, electronic, and other airborne sensors to acquire information about the enemy and the battlefield environment.

e. Transport. The transportation of men, equipment, and supplies to and from and within the battle area.

The written report of the board contained a number of conclusions. One was that all Services possessed aircraft and that all Services required them in order to carry out their tactical missions. Another was that a joint force commander should appoint one of his Service component commanders to be the coordinating authority for tactical air operations within the area of operations of the joint command.[5]

Admiral Felt neither approved nor disapproved of the board report in its entirety. Nor did his successor, Admiral U. S. Grant Sharp, who relieved him on 1 July 1964. But various recommendations of the report were put into effect by CinCPac in his exercise of overall operational command and management of tactical air resources within the Pacific Command. For example, when photo reconnaissance missions were initiated over Laos in 1964, CinCPac used the coordinating authority technique to coordinate Navy and Air Force reconnaissance efforts. Later on, CinCPac used coordinating authority when air activity was undertaken in Laos and in North Vietnam.

When plans were being made early in 1965 to land Marines at Da Nang, CinCPac informed ComUSMACV that:

a. The Commanding General (CG) of the MEB would report to ComUSMACV as Naval Component Commander.[6]

b. ComUSMACV would exercise operational control of the MEB through the CG of the MEB.

c. Commander, 2d Air Division, in his capacity as Air Force Component Commander of MACV would act as coordinating authority for matters pertaining to tactical air support and air traffic control in MACV's area of responsibility.

ComUSMACV replied to CinCPac that the Marine jet squadron of the MEB would come under the operational control of his Air Force Component Commander and that such control would be exercised through the tactical air control system. Of course, he added, if the MEB became engaged, it was understood that Marine aircraft would be available for close air support.

The following day CinCPac reiterated his previous guidance to ComUSMACV, namely, that operational control of the squadron would be exercised through the MEB and not the 2d Air Division.

In April 1965, CinCPac promulgated a directive on conduct and control of close air support for the entire Pacific Command, but with emphasis on Vietnam. CinCPac clearly stated that the priority mission in Vietnam was close air support, and the first priority was in support of forces actually engaged with the enemy. The directive went on to say that close air support aircraft would be subject to direct call by the supported ground unit through the medium of the related close

[5] "Coordinating Authority" is defined in the *Dictionary of United States Military Terms for Joint Usage* as a commander or individual assigned responsibility for coordinating specific functions or activities involving forces of two or more services, or two or more forces of the same Service. He has the authority to require consultation between the agencies involved, but does not have the authority to compel agreement. In the event he is unable to obtain essential agreement, he shall refer the matter to the appointing authority.

[6] CG III MAF also became Naval Component Commander, until 1 April 1966 when a new billet was created and designated Commander, U. S. Naval Forces, Vietnam. This officer then took charge of all U. S. naval activities in Vietnam including the Naval Advisory Group, the naval construction battalions, the naval support activities, the coastal patrol task force, the mobile riverine force, and the river patrol task force. Thereafter, III MAF consisted of one service reporting directly to ComUSMACV until U. S. Army units were assigned to ICTZ and placed under the operational control of III MAF.

air support agency. Among other things, the directive also said that nothing therein vitiated the prior CinCPac position that ComUSMACV's Air Force Component Commander should act as coordinating authority in matters pertaining to tactical air support and air traffic control.

In June 1965, ComUSMACV initiated a revision of his air support directive, and he drew heavily from the CinCPac Tactical Air Support Board report. The directive was published later that year and revised slightly in 1966, but the pertinent provisions were unchanged.

The MACV directive designated Commander, Seventh Air Force (formerly 2d Air Division), in his capacity as Air Force Component Commander, to act as the coordinating authority for all U. S. and Free World Military Air Force air operations and Vietnamese Air Force activities in the MACV area of operation. Commander, Seventh Air Force, was further given responsibility to establish, in conjunction with U. S. and Vietnamese agencies, an air traffic control system to provide normal processing and flight following.[7] He was also charged to prepare joint instructions, in conjunction with Commanding General, III MAF, and appropriate Army and Navy commanders, to insure integrated and coordinated air operations.

In the same directive, the Commanding General of III MAF was directed to exercise operational control over all Marine Corps aviation resources except in the event of a major emergency or disaster when ComUSMACV might direct Commander, Seventh Air Force, to assume operational control. Commanding General, III MAF, was further enjoined to conduct offensive and defensive tactical air operations to include close air support, interdiction, reconnaissance, maintenance of air superiority, air transport, search and rescue, and other supplemental air support as required. He was also directed to identify to Commander, Seventh Air Force, those resources in excess of current requirements so that such resources could be allocated to support other forces or missions. Finally, he was charged to prepare in conjunction with Commander, Seventh Air Force, joint operating instructions to insure a coordinated and integrated effort.

Concurrently with the revising of the MACV directive, the Commander, Seventh Air Force, Lieutenant General Joseph H. Moore, and the Deputy Commander of III MAF for Air, Brigadier General McCutcheon, were engaged in discussions relative to the degree of control that the Seventh Air Force should have over Marine air assets, particularly with regard to air defense operations. The Air Force desired to have operational control, but the Marines pointed out that the F-4 aircraft was a dual purpose aircraft[8] and that the Marine tactical air control system was used to control all Marine aviation functions, not just air defense. To relinquish operational control would deprive the MAF commander of authoritative direction over one of his major supporting arms.

Nevertheless, the Marines recognized the necessity of having one commander directly responsible for air defense so, after several joint meetings, it was decided to prepare a Memorandum of Agreement which would disseminate basic policies, procedures, and responsibilities. The Air Force was to have overall air defense responsibility and designate an air defense commander. The Commanding General, 1stMAW, was to designate those forces under his command that would participate in air defense, and he agreed that the Air Force would exercise certain authority over those designated resources to include scramble of alert aircraft, designation of targets, declaration of Hawk missile control status, and firing orders. This agreement was signed by the two commanders in August 1965. Overall operational control of Marine air resources was retained under III MAF, but requisite authority for purposes of air defense was passed to the Air Force.

These two documents provided the basic policy for command, control, and coordination of Marine aviation in Vietnam until early 1968, and they were entirely adequate as far as III MAF was concerned.

Single Management (1968–1970)

Late in 1967, the buildup began for the Battle of Khe Sanh. General Westmoreland had directed massive air support for the garrison there, and both the 1stMAW and Seventh Air Force responded in full. Both General Westmoreland and General William W. Momyer, Commander, Seventh Air Force, believed more effective use could be made of MACV's total air resources if they were managed by a single commander and staff. Early in 1968, a directive was prepared to implement the concept.

The proposed directive required the Commanding General, III MAF, to make available to the Deputy ComUSMACV for Air (who was also Commander, Seventh Air Force) for mission direction all of his strike and reconnaissance aircraft and his tactical air control system as required. The term "mission direction" was not defined. Deputy ComUSMACV for Air was to be responsible for fragging and operational direction of these resources. "Operational direction" was not defined either. "Fragging" is a common aviation term which

[7] Flight following is a service performed on request by a radar installation for an aircraft. It is usually used when flying conditions prohibit the pilot from maintaining a visual outlook. The radar site will follow his flight and advise him of any traffic that may interfere or create a potential hazard.

[8] The Marines had no F-8s in Vietnam at the time these discussions took place. The first F-8s arrived in December 1965 and they too had a dual capability.

means to issue a fragmentary order to cover details of a single mission, that is, what is required, where, and when.

The Marines, both in Vietnam and in Washington, objected to the proposed directive on two counts: first, the system as proposed would increase the response time for air support, and second, they reasoned it wasn't necessary.

With regard to the first point, MACV modified the proposed system to improve the response time so that for Marines it wouldn't be any longer than it had been formerly, and for the Army units it would be better. On the second count, MACV remained convinced that it was necessary.

The directive was approved by CinCPac and went into effect in March 1968. The system required the 1stMAW to identify its total sortie capability to Seventh Air Force daily on the basis of a 1.0 sortie rate, that is, one sortie per day for each jet aircraft possessed. Previously the 1stMAW had fragged its aircraft against air support requests received from the Marine ground units, and then identified daily to Seventh Air Force the excess sorties that would be available. These were then fragged by Seventh Air Force on either out-of-country missions or in-country in support of forces other than Marine units. The majority of air support could be forecast and planned in advance except the requirements that might be generated by troops in contact with the enemy. These requirements could be met by extra sorties, scrambles from the hot pad, or by diverting aircraft in the air.

As time went on the participants in the single management system made changes in order to improve efficiency and effectiveness. One such change was the fragging of a portion of the air support on a weekly basis rather than daily. This permitted the more or less standard recurring flights to be handled with less paperwork, while the nonroutine requests could still be fragged on a daily basis. Seventh Air Force also fragged back to 1stMAW a set number of sorties to take care of unique Marine requirements such as helicopter escort and landing zone preparation which were tied closely to helo operations.

When single management was inaugurated, two new DASCs were added to I Corps. One was established at the III MAF Command Post at Camp Horn, in East Da Nang, and one at the XXIV Corps Command Post at Phu Bai. The one at III MAF was the senior DASC in I Corps and was given authority to scramble strike aircraft without further reference to the Tactical Air Command Center (TACC) in Saigon. This scramble authority was not delegated to similar DASCs in other Corps areas. I Corps was unique in that it was the only corps area that had both Marine and Air Force tactical air squadrons and both Marine and Army divisions.

Since the 1stMAW generally exceeded the 1.0 sortie rate, all sorties generated in excess of 1.0 could be scrambled by Horn DASC. These excess sorties, plus those fragged back to meet unique Marine requirements, amounted to a sizeable percentage of the 1stMAW's effort, and so, for all practical purposes, the system worked around to just about where it was in the pre-single management days as far as identification or fragging of Marine sorties was concerned.

There is no doubt about whether single management was an overall improvement as far as MACV as a whole was concerned. It was. And there is no denying the fact that, when three Army divisions were assigned to I Corps and interspersed between the two Marine divisions, a higher order of coordination and cooperation was required than previously.

The system worked. Both the Air Force and the Marines saw to that. But the way it was made to work evolved over a period of time, and a lot of it was due to gentlemen's agreements between the on-the-scene commanders. A detailed order explaining the procedures was never published subsequent to the initial directive. The basic MACV directive on air support, however, was revised in 1970 to take into account the advent of single management.

The revised MACV directive defined the term "mission direction" or "operational direction" which had been used in the basic single management directive but not defined. "Mission direction" was stated to be the authority delegated to one commander (i.e., Deputy ComUSMACV for Air) to assign specific air tasks to another commander (i.e., CG III MAF) on a periodic basis as implementation of a basic mission previously assigned by a superior commander (ComUSMACV). In other words, ComUSMACV assigned CG III MAF a basic mission to conduct offensive air support, and ComUSMACV delegated to his Deputy for Air the authority to task CG III MAF for specific missions on a daily and weekly basis in frag orders in order that III MAF assets could support the force as a whole.

Although single management never took operational control of his air resources away from CG III MAF, the Marines were worried that that might be the next step. If so it would be a threat to the air-ground team, and it would recreate the Korean War situation all over again. The new MACV directive allayed their fears on this score. Not only did the definition of "mission direction" spell out the extent of control to be exercised, but the directive clearly stated that CG III MAF would exercise operational control over all his air resources, and that he would conduct offensive and defensive air support missions to include the full spectrum of tactical air support.

In short, the Marines did not relinquish operational

control of their resources, MACV as a whole received more effective air support, and III MAF continued to receive responsive air support from its own units. Within the system, III MAF had first claim on its own assets, so most Marine air missions were in support of Marine ground units and the majority of air support received by Marine ground units was provided by Marine air.

Control

Marine Corps doctrine prescribes that the commander of an air-ground team will have operational control of all his weapons systems and employ them in concert as a force of combined arms to accomplish his mission. The Marine commander exercises this operational control through his normal staff planning process and by means of the Marine Air Command and Control System.

The senior agency in this system is the Tactical Air Command Center (TACC). Because the Seventh Air Force had a TACC in Saigon, the 1stMAW center was called a TADC (Tactical Air Direction Center) as provided for in doctrine. This center was established in June 1965 in the wing compound at Da Nang and it functioned there throughout the war. Continuous improvements were made in its physical appearance, but the tasks performed remained essentially the same. The TADC monitored the employment of all Marine aircraft and allocated the resources to specific missions.

There were two principal agencies subordinate to the TADC. These were the Tactical Air Operations Center (TAOC) and Direct Air Support Centers (DASCs).

The TAOC is the hub of activity for air surveillance and air defense. It is provided for by a Marine Air Control Squadron (MACS).

On a Saturday night in May 1965, Marine Air Control Squadron 9 (MACS-9), based at Atsugi, Japan, and commanded by Lieutenant Colonel Charles T. Westcott, received a telephoned order to have an early warning radar and team ready to deploy by air to Vietnam the next day. Three KC-130s from VMGR-152 were loaded on Sunday and flown to Phu Bai where the team set up and began operating as a northern radar site for the Air Force radar station Panama on Monkey Mountain.

The remainder of the squadron deployed to Chu Lai in the summer and established a manual TAOC. The information from the various radars was plotted by hand on vertical display boards just as had been done during World War II and the Korean War. MACS-7 relieved MACS-9 in place in September 1965.

In June 1967, MACS-4 arrived in Vietnam and replaced the manual system with a modern semi-automated, computer-oriented TAOC which had been developed as part of the Marine Tactical Data System, or MTDS. This system had been under development since the late fifties and was compatible with two similar developments by the Navy: the Navy Tactical Data System (NTDS) for surface operations and the Navy Airborne Tactical Data System (ATDS) for airborne control centers.

In order to make most effective use of this equipment it was decided to emplace it on Monkey Mountain where one of the Hawk missile batteries was located. This required more construction effort to enlarge the site to accommodate both MACS-4 and the Hawks. A considerable area was required for the radars and their antennae and for the sixteen helicopter-transportable huts that comprised the TAOC and the four huts that made up the Tactical Data Communications Central (TDCC).

The TAOC gave the 1stMAW a capability to handle 250 aircraft tracks, friendly and hostile, at one time. In addition, from an air defense point of view, the controllers could handle more than 25 air intercepts simultaneously and the TAOC had a built-in missile data link capability.

A team from the Joint Chiefs of Staff visited Southeast Asia and recommended that steps be taken to link the various Services' air control systems together in that theater. A joint task group was established to work out the technical details.

The TAOC was already operating with the NTDS and ATDS units of the Seventh Fleet in the Gulf of Tonkin. The interface between MTDS and these two systems was the Marine TDCC on Monkey Mountain. The TDCC was the logical candidate, therefore, to become the interface with the Air Force system. One more shelter was required. This provided a special data terminal, or "modem," to convert from computer mode to communications mode. In addition, a new program had to be written for the Marine computer. In layman's terms, the result produced a TDCC which was the equivalent of a language translator in three languages.[9] It could receive either Navy, Marine, or Air Force messages and translate the one received into the other two and pass the translation to the respective centers where they could be displayed. The net result was that air defense and air control data could be passed from Thailand to Da Nang to naval ships in the Tonkin Gulf and vice versa. This interface became fully operational in August 1969 and marked a significant step forward in joint operations.

[9]This was necessary because the three Services used different data rates and message formats within their own systems. For example, suppose the NTDS plotted an aircraft track in the Gulf of Tonkin. The NTDS would send the essential data via radio to the TDCC on Monkey Mountain. The TDCC would translate this data or change it into two additional forms. One would then enter the MTDS and subsequently the track would be displayed on Marine operators' scopes. Another would enter the Air Force system and the track would appear on Air Force operators' scopes. The reverse process was also applicable.

Whereas the TAOC is the main control center for anti-air warfare and air traffic control, the DASC is the main center for direct support of the ground troops. Each Marine division initially had a DASC located together with its organic Fire Support Coordination Center (FSCC). As the 3dMarDiv assumed responsibility for the very sizeable Northern I Corps area, it was necessary to establish a DASC at Phu Bai with the Division Headquarters and one at Dong Ha with Division (Forward). Requests for air support, both fixed and rotary wing, were requested and controlled through these agencies. During certain peak periods a Helicopter Direction Center (HDC) was established with the Regimental Headquarters at Camp Evans, midway between Hue and Quang Tri, and a mini-DASC at Khe Sanh. Information was provided by these facilities to aircraft, on request, relative to artillery fires in progress and major air strikes to enable planes to navigate safely between areas. This information was particularly helpful to helicopters. The wing also had the capability to install an HDC on short notice in a KC-130 to provide an airborne DASC if required. This was done on several operations. An airborne DASC was used whenever a ground operation was launched at such a distance from Da Nang that ordinary ground to air communication would be unreliable. The need for airborne DASCs decreased as bases were built throughout I Corps.

The Marine Air Support Squadron (MASS), which is the parent squadron for the DASC, also contains three mobile Air Support Radar Teams (ASRTs). Each team is equipped with the TPQ-10 radar course directing central which provides the capability to control aircraft in direct air support under conditions of low visibility. MASS-2 arrived in Vietnam in April 1965 from Okinawa, and MASS-3 arrived in October from California. The TPQs were up and operating early in the war.

During the summer of 1965, one TPQ-10 was set up for about six weeks near Pleiku in II Corps to provide air support for Army units operating in that area. Both Marine and Air Force aircraft were directed by it. Within I Corps the TPQs were moved as required to provide optimum coverage, and eventually they were deployed from near the DMZ to Chu Lai.

Lieutenant General Moore of the Seventh Air Force visited 1stMAW and was especially interested in this gear since the Air Force had nothing comparable. Subsequently, the Air Force took some radar bomb scoring equipment and developed it into a ground controlled radar bombing device. It became known as Skyspot. Compared to TPQ-10, it had longer range but less mobility.

The A-4, A-6, and F-4 were all equipped with beacons, and the TPQ radar could track them to almost fifty miles under the best conditions. Knowing the radar-aircraft and the radar-target sides of the triangle, the computer could solve the aircraft-target problem for the particular ordnance to be delivered and the operator could instruct the pilot when to drop. The A-4 was also equipped with a link to the auto pilot which could permit automatic control and drop by the TPQ with the pilot flying hands off. Aircraft without a beacon could be tracked by radar to a distance of about thirty-five miles.

The TPQ-10 was a development based on the MPQ-14 used by the Marines in Korea. Replacement for the TPQ-10, making use of recent technology, is currently under development in a joint venture with the Air Force.

Although not part of the tactical air control system, the Marine Air Traffic Control Units (MATCU's) played a vital role in the control of air traffic. Their mission was terminal traffic control around an air base. They provided approach control, ground controlled approach, and tower facilities. The Corps is authorized one MATCU per jet group and, because of their dispersed operations, two per helo group. In Vietnam, the wing operated MATCUs at Chu Lai and Marble Mountain throughout the war and at Phu Bai, Quang Tri, Dong Ha, Khe Sanh, An Hoa, and Baldy as long as Marine units were operating at those bases. Without those units, air operations during the monsoon season would have been next to impossible.

The TAOC and MATCUs were linked together with communications so that enroute traffic handled by the former could be handed off to the latter for approach and landing clearance.

All of this command and control equipment—TACC/TADC, TAOC, DASC, ASRT, MATCU—is completely mobile and expeditionary by design. It can all be withdrawn from Vietnam (or wherever) and used elsewhere.

Air-Ground Coordination

The CG of the 1stMAW was designated as Deputy CG III MAG (Air) and as such he was the Tactical Air Commander for III MAF.

In Vietnam, from March 1966 when the 1stMarDiv entered the country, until November 1969 when the 3dMarDiv redeployed to Okinawa, there were two Marine divisions in III MAF. The Marine Corps could not deploy another wing for reasons pointed out earlier, but the 1stMAW was reinforced to the limit of the Corps' resources so it could support two reinforced divisions. Two LAAM battalions and two helicopter MAGs were deployed plus one air support squadron for each division.

The wing was short two or three transport helicopter squadrons, but no additional squadrons were available. The available squadrons were managed centrally by the wing in order to get the most out of them.

Although an air support squadron was placed with each division, it became evident that more authority was required at the DASC. This point was made abundantly clear when the two Marine divisions became geographically separated with one or two Army divisions employed between them. When the 3dMarDiv was operating in Northern ICTZ, it was well removed from the 1stMAW Command Post and TADC at Da Nang. The communications were not fast enough to permit command decisions to be made about aviation problems. The 1stMAW solved this problem by assigning an Assistant Wing Commander and a few staff officers to the DASC at the 3dMarDiv Command Post and empowering him to make decisions in the name of the Wing Commander regarding air support. Later, when it wasn't always feasible to have a brigadier general present, a colonel was assigned to each of the division DASCs and they had the same command authority. This arrangement worked well and provided a one-for-one relationship, air-to-ground, particularly in the vital area of helicopter support. Coordination was vastly improved.

Employment

Anti-Air Warfare Operations

Vietnam, at least as far as the war in the south was concerned, was not a fighter pilot's war. There were no air-to-air engagements for Marine squadrons. No aces.

But there was a possible threat. So there had to be an air defense system and capability, and it was exercised under the terms of the agreement signed by Generals Moore and McCutcheon. The Marines provided two battalions of Hawk surface-to-air missiles for close-in defense at Da Nang and Chu Lai, F-4 Phantoms on hot pad alert, and an early warning and control capability through its air control squadron.

The Marine LAAM battalion is part of the overall anti-air warfare function. Its principal role is in close-in air defense. The battalion is normally a subordinate unit of the Marine Air Control Group, because in actual operations it is linked to the TAOC which provides information on friendly and enemy air traffic. The TAOC also normally gives "commence" and "cease" fire orders to the missiles.

One LAAM battery arrived in Vietnam in February 1965 and took position on the airfield at Da Nang. Subsequently it moved to Hill 327 west of the field. The two other firing batteries of the battalion eventually were placed on Monkey Mountain east of Da Nang, and in the Hai Van Pass to the north. Part of one of the batteries, known as an assault fire unit, was emplaced on Hill 55 eight miles south of the Da Nang vital area. The best defense of the installations at Da Nang would call for five battery sites, but adequate real estate did not become available until months later.

The 2d LAAM Battalion landed at Chu Lai in September 1965, and set up its firing batteries north and south of the SATS airfield. There were no elevated positions, but this posed a problem for any potential attacker as well.

Although neither battalion fired in anger, they did conduct live practice firings annually in order to keep their state of training high. In addition to firing at radio controlled drones, they fired at targets towed by manned fighter planes.

Offensive Air Support Operations

The main employment of Marine jets was in the delivery of air-to-ground ordnance in direct and close support of ground troops.

In this connection there were some local rules of engagement which had developed over the years, influencing the tactics and techniques to be employed. With very few exceptions, all air strikes had to be controlled by an airborne controller, and most had to have a political as well as a tactical clearance. There was good reason for this. The population was spread out over a considerable area along the coastal region and the U. S. and Vietnamese ground units were operating mainly in the same area. This led to the employment of Forward Air Controllers (Airborne) (FAC[A]). Thus, in a departure from prewar practice, the role of the FAC on the ground was minimized as far as control of air strikes was concerned. However, he had other useful employment.

The O-1 aircraft was used initially for this purpose. The Marine O-1s that were brought into Vietnam were rapidly approaching the end of their service lives, however, and on 1 September 1965, the Marine Corps stopped using them. The OV-10A, which was scheduled to replace them, did not become available until July 1968. To partially alleviate this situation, Headquarters Marine Corps and the Naval Air Systems Command managed to locate about a dozen old O-1s and had them overhauled and airlifted to Vietnam. These were too few, however, so the Marines had to rely on Army observation aircraft and Air Force FAC(A)s for those tactical air control missions demanding an airborne controller. The Air Force used the O-1 initially and later the OV-10A and the Cessna O-2. The latter is a small twin-engine, light aircraft with the engines in line. The one in front drives a tractor propeller and the one in the rear a pusher prop.

In addition to FAC(A)s, the Marine Corps employed Tactical Air Coordinators (Airborne) or TAC(A)s. Whereas FAC(A)s flew low performance aircraft and

The Marine Corps' "air-ground team" displayed its standard, but still virtually unstoppable, power sweep when Marine infantrymen who had just landed by helicopter came under fire in a January 1966 operation. Winging past a bomb explosion from another Crusader, an F-8 from VMFAW-312 went after Viet Cong mortar positions which were firing on the landing zone.

operated over friendly terrain and within range of artillery support, the TAC(A)s flew high performance jets and operated over territory controlled by the enemy. Their mission was to coordinate various strike aircraft and to ensure they hit the correct targets. In this role the Marines first used the two-seat F-9, but beginning in late 1967 they employed the two-seat TA-4F. These aircraft provided two sets of "eyeballs" rather than one and gave the TAC(A) an increased visual observation capability. The jet performance added a higher degree of survivability to the mission.

The Corps removed one of the two FACs it had in each infantry battalion because of the few opportunities offered them to control strikes and because their aeronautical talent could better be used elsewhere. The one remaining FAC plus the Air Liaison Officer, both aviation officers, continued to carry out their other responsibilities, which included advising their battalion commander on the employment of air support, requesting such support, and controlling helo operations and helo landing zones. This became big business in Vietnam. When the opportunity presented itself, the FAC did control air strikes from the ground.

The arrival of the A-6 aircraft in Vietnam introduced an advanced avionics weapon system. This system was further improved, as far as close air support is concerned, when the Marines deployed small radar beacons for use with their ground FACs. With this beacon, known as RABFAC, a FAC's precise position on the ground could be displayed on the radar scope in an A-6. The FAC could provide the bearing and distance of the target from the beacon, plus the elevation difference between the two, and the bombardier-navigator in the A-6 could enter this data into the weapon system computer, and bomb the target in bad weather or at night with accuracies approaching that of A-4s in clear, daylight deliveries.

The A-6 aircraft displayed great versatility and lived up to the expectations of those who pushed its development after the Korean War. It is the only operational aircraft that has a self-contained all-weather bombing capability including a moving target indicator mode. In this role it was used rather extensively in the monsoon season, not only in South Vietnam but also in Laos and over the heavily defended area of North Vietnam. The usual bomb load was 14,000 pounds.

Both the A-4 and F-4 were used in offensive air support with great success. The average bomb load for the A-4 was about 3,000 pounds, and for the F-4 about 5,000 pounds. These aircraft were generally fragged against planned missions, but they could also be scrambled from the alert pad, or they could be diverted in flight to higher priority targets.

The F-8 was also used during the period December 1965 through May 1968. It was in the process of being replaced in the Marine inventory by the F-4, but while it was in Vietnam it did a fine job in air-to-ground missions.

The F-8 was also the only Marine strike aircraft to be based on board a carrier of the Seventh Fleet during the Vietnam War. Marine All-Weather Fighter Squadron 212 (VMF[AW]-212), commanded by Lieutenant Colonel Charles H. Ludden, was embarked in the attack carrier USS *Oriskany* (CVA-34) in 1965 when she was operating off Vietnam. The squadron pilots were trained as fighter pilots but, when the carrier arrived in the Gulf of Tonkin, the urgent need was for attack aircraft which could deliver bombs. The primary mission of VMF (AW)-212 became the attack of ground targets, and the squadron flew strikes in North and South Vietnam. Both the Navy and Marine Corps would have liked to have had more Marine squadrons afloat, but if they had been afloat, they wouldn't have been ashore and the Corps couldn't do both. Now that we have cut force levels in Vietnam, the Marine Corps has once again deployed aviation units aboard carriers.

During 1965, and into the early part of 1966, there was a shortage of aviation ordnance. Time was required to set up production lines in the United States and get the pipeline filled all the way to Vietnam. In the meantime, the 1stMAW used what was available in contin-

gency stocks, and this included a great number of old high drag "fat" bombs. The old bombs had a much larger cross section than the new ones, hence they added drag to the aircraft and reduced its speed and radius of action. Again because of their cross section, fewer of the old bombs could be loaded on multiple bomb racks. The wing never lost a sortie because of ordnance, but it did have to substitute items on occasion because the preferred store was not available. In order to husband its resources, the wing commander issued a message directing that if ordnance could not be dropped on a worthwhile target, it would be brought back to base, not jettisoned.

By late 1966, a wide range of ordnance was available, including 250, 500, 1,000, and 2,000-pound bombs; 2.75 inch and five-inch rockets; napalm; 20mm. cannon; smoke; and certain other stores for special targets. There is still a requirement, however, for better aviation weapons. We need to get better first pass accuracy to reduce the number of passes over the target. One promising way to improve effectiveness appears to be offered by lasers.

Up to April 1966, ComUSMACV was not involved in the air war in North Vietnam. That war was conducted by the Commander-in-Chief, Pacific Fleet (CinCPacFlt), and Commander-in-Chief, Pacific Air Force (CinCPacAF). 1stMAW electronic EF-10Bs flew missions in the north before this, but they did so in support of the Seventh Fleet or the Seventh Air Force as subordinates of PacFlt and PacAF. On 1 April 1966, ComUSMACV was authorized by CinCPac to conduct air strikes in, and to the north of, the DMZ in what was known as Route Package One. By summer, Marine aircraft were assigned to strike there against artillery and rocket sites as well as other military targets.

With the addition of the A-6A to its inventory, the 1stMAW had the finest all-weather bombing aircraft in the world. Late in 1966, A-6s began striking targets as far north as Hanoi and Haiphong and carried on until the bombing halt in 1968, striking mostly at night. North Vietnam was, of course, heavily defended with antiaircraft artillery and surface-to-air missiles. EA-6As provided electronic jamming in support of the strike birds, and Marine F-4Bs flew cover for them to keep MIGs off their backs. Additionally, the two Marine A-6 squadrons flew strikes in other route packages as directed.

Reconnaissance Operations

As noted earlier, VMCJ-1 was one of the first fixed-wing squadrons to deploy to Vietnam. In more than five years of continuous operations from Da Nang, the squadron made major contributions in the field of electronic warfare and imagery reconnaissance.

During the opening phases of the air war against North Vietnam, the EF-10Bs of VMCJ-1 were the only jet tactical electronic warfare aircraft available to provide support for U. S. Air Force and Navy strikes. To meet the requirements levied on the squadron, active electronic countermeasures were emphasized. Electronic reconnaissance was conducted enroute to and from the target. In the target area, jamming occupied most of the electronic countermeasure operators' attention. In July 1965, U. S. Air Force aircraft conducted the first strikes in history against surface-to-air missile (SAM) sites. Six EF-10Bs from VMCJ-1 supported the strike. There was no loss of aircraft to radar controlled weapons. The Navy also had an electronic warfare capability, but its EKA-3 was a combination tanker-electronic warfare aircraft and was limited to standoff jamming as opposed to close-in jamming in company with the strike aircraft. The Navy also had some EA-1s, but these were propeller-driven aircraft and were not able to keep up with the jets, hence, they too were used in a standoff role. The Air Force effort in electronic warfare was devoted almost exclusively to larger aircraft and in a "strategic," rather than a tactical, role. After the war in Vietnam got underway, they did modify some B-66 aircraft to the electronic mission.

In November 1966, the EA-6A made its debut in the theater. The quantum increase in electronic warfare capability represented by the EA-6A came in the nick of time. The cancerous spread of SAMs throughout North Vietnam made an eventual confrontation between Marine attack aircraft and SAMs inevitable. In April 1967, a Marine A-4 was shot down by a SAM from a site located in the DMZ. In response to the new threat, EF-10Bs began a continual patrol along the DMZ during hours of darkness when the SAMs were prone to fire. The more sophisticated EA-6As provided electronic warfare support for missions against targets located in the high threat areas of the north. Because of the need for electronic warfare aircraft, it was not until 1969 that the old EF-10Bs were at last able to leave Vietnam. As of this writing the EA-6A is the only tactical electronic warfare aircraft in any Service that can accompany strike aircraft to the target and maneuver with them.

In the relatively new art of electronic warfare, aircraft from VMCJ-1 performed in every role: escort for B-52s, support for tactical air strikes, and as intelligence collectors. Lessons learned were documented, tactics became more sophisticated, and hardware was evolved to increase the effectiveness of the electronic warfare capability.

The other side of the VMCJ-1 house, imagery reconnaissance, was equally engaged. Collection of imagery intelligence in the fight against the hard-to-locate enemy of the south varied to a great degree from flights over

atively well defined targets in the north. In the south, the usual imagery reconnaissance mission produced evidence of enemy activity, but the enemy was seldom pinpointed. To determine enemy intentions, reconnaissance flights over the same areas were conducted periodically. Interpreters then looked for telltale indications of change or deviations from the norm that had been established by previous flights. With the RF-8A, the imagery coverage of large areas required by this type of intelligence determination was confined to periods of daylight hours and relatively good weather. Replacement of the RF-8A with multi-sensor RF-4B aircraft, beginning in October 1966, provided VMCJ-1 with an around-the-clock collection capacity. As experience was gained with the new systems, night infrared reconnaissance played an ever increasing role in the overall intelligence collection effort.

TA-4Fs flew hundreds of missions in the Route Package One area of North Vietnam, performing in the visual reconnaissance as well as in the TAC(A) role. They located SAM sites, truck parks, supply dumps, and other targets, and then controlled other strike aircraft against them. They also spotted and controlled naval gunfire for the USS *New Jersey* (BB-62) and other ships that participated in bombarding the north.

Visual reconnaissance by low performance aircraft is still an absolute necessity. Maneuverable, fixed-wing aircraft still have a place in this role, and the OV-10A performed better than expected. However, there is a requirement for a quieter aircraft that can overfly targets without being detected. Had such an aircraft been available, it could have been used very profitably to patrol the rocket belt around the vital area of Da Nang. There is a prototype aircraft designated the YO-3 that gives promise of this capability, but the Marine Corps does not have any.

Fixed-Wing Transport Operations

Marine transports and helos were not included under single management. The Marines had two models of fixed-wing transports in Vietnam, the venerable C-117 and the work-horse KC-130. The former was assigned only in small numbers, one per group, and was used for organic logistic support. It became apparent in 1965, however, that there were some voids in the Marine capability as far as aircraft were concerned, so the C-117s were rapidly drafted to fill some of these. Examples were flare drops, radio relay, and use as an airborne control center. Later on, US-2Bs and C-1As were assigned to the wing, and sometimes they were also used for some of these tasks.

Marine Refueler Transport Squadron 152 (VMGR-152) was based in Japan when the war began, but it moved to Okinawa late in 1965. It kept a four (or more) plane detachment at Da Nang. This little detachment did everything imaginable as far as air transport was concerned. It hauled men and equipment between major bases in Vietnam and to outposts such as Khe Sanh that had suitable airstrips, and it air-dropped to those that did not. It provided aerial refueler service for Marine jets, particularly those that operated up north. In 1965, whenever the strip at Chu Lai was less than eight thousand feet and A-4s were required to take off with reduced fuel loads, there was a KC-130 tanker in orbit to tank them after climb-out. These Hercules also served as airborne direct air support centers and as flareships. They were a reliable and versatile transport.

The KC-130 is getting on in years, however, and in spite of the fact that it was retrofitted with larger engines, the aircraft is only marginally capable of refueling a loaded A-6 or F-4 in flight.[10] Furthermore, a considerable number of them are required to provide refueling service for a fighter squadron ferrying across the Pacific. Because they can't get to the same altitude as the jets, the jets have to descend to receive fuel. This requires blocking off a lot of airspace and frequently this is a constraint on a long trans-oceanic ferrying operation since it interferes with commercial flights.

What the Corps needs is a transport like the C-141, modified to be similar in capability to the KC-130.

The Corps also needs a replacement for the obsolete C-117s and those C-54s still on hand. It is willing to accept a smaller number of more modern aircraft to carry out the missions that are not applicable for the KC-130 or 141. A combination of T-39s and something like the Fiarchild-Hiller F-227 would give the Corps a modern high-speed passenger and cargo hauling capability.

Helicopter Operations

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

After years of study and development, the Marine Corps pioneered the use of helicopters in ground warfare in Korea. In the following years it planned to build up its force, and simultaneously it pursued the development of more capable aircraft. The Corps' basic requirement was for adequate helicopter lift to execute the ship-to-shore movement in an amphibious operation. To do this two basic transport helicopters were decided on, one for medium lift and one for heavy lift.

Although the Corps was authorized eighteen perma-

[10] A jet heavily laden with bombs or other external stores has to use power or fly faster to maintain a given altitude than one not so loaded. A KC-130 is much slower than a jet and cannot climb to normal jet operating altitude, so fueling is at less than the best altitudes and speeds for the jets, and the jet pilot can have a difficult time making his plug-in and holding formation.

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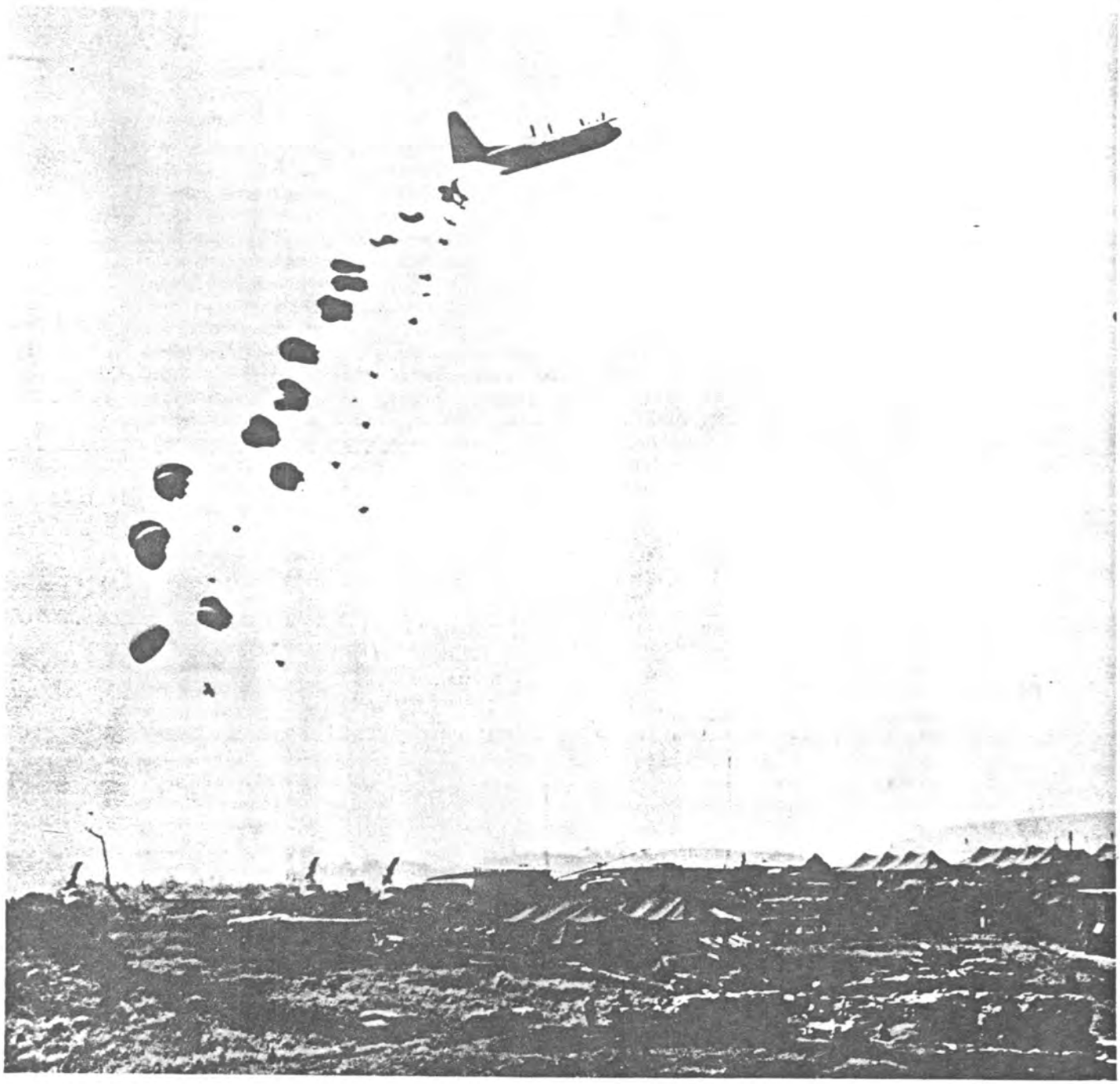


A KC-130 Hercules transport air-drops supplies to the beleaguered Khe Sanh Marine combat base in January 1968. To safeguard helicopter landing of supplies to the garrison, gunships and jets worked the area over with napalm, rockets, 20-mm., and smoke, and as the supplies were delivered, the jets climbed up to waiting KC-130 tankers, were refueled in the air, and returned to their bases.

nent transport helicopter squadrons and two temporary ones for Southeast Asia, it only deployed ten to the Western Pacific. The remaining nine (one temporary one was never formed because of lack of resources) were required to remain in the United States to train replacement pilots for the overseas pipeline. Additional squadrons could not be deployed because they could not be supported. The deployment of even one more would have upset the delicate balance of replacement training versus overseas requirements.

As part of the planning, programming, and budgeting cycle that takes place annually in Washington in

each of the Services and in the Office of the Secretary of Defense, the Marine Corps accepted a change in its transport helicopter mix, from fifteen medium and three heavy to twelve medium and six heavy.[11] With the one temporary squadron added, this gave thirteen and six. Eventually seven of the mediums and three of the heavies were stationed overseas.

The transition from the UH-34 and CH-37 to the CH-46 and CH-53, respectively, represented a major increase in capability, but, at the same time, there were problems involving acceptance of the new models, shaking them down, training pilots and maintenance personnel, developing techniques and procedures, and establishing an adequate supply posture.

Squadrons equipped with the twelve year-old UH-34 bore the brunt of helo operations in 1965 and for well over a year thereafter. CH-46s began to arrive in Vietnam in March 1966, when Lieutenant Colonel Warren C. Watson's HMM-164 flew to Marble Mountain from the USS *Valley Forge* (LPH-8). It was not until 1969 that all UH-34s were withdrawn. On 18 August, the blades of the last UH-34 were folded, thus marking the end of an era for Marine Corps helicopters in Vietnam. The UH-34 had performed for over seven years there in an outstanding manner.

A detachment of obsolescent CH-37s arrived from Santa Ana, California, in the summer of 1965 and did yeoman service pending arrival of the CH-53 in January 1967, when Major William R. Beeler brought in a four-plane detachment from HMH-463. By the end of the year there were two full squadrons of CH-53s in Vietnam.

In Vietnam there were several technical problems that had an impact on helicopter employment. First of all, the tropical environment reduced payload because of characteristically high temperatures and humidity. Second, the sandy and dusty landing zones created extensive maintenance problems, particularly for engines. Filters had to be developed for all helos to reduce the amount of foreign particles that were being ingested into the air inlets. These filters increased aircraft weight and lowered engine thrust by a few per cent. Third, there was a requirement to install additional armor in all helos to protect their vital parts against the ever increasing enemy antiaircraft fire. Finally, the addition of armament and gunners naturally reduced proportionately what could be carried.

As a matter of necessity the transports were armed with door guns. The H-34s could only take the 7.62-mm. machine gun, and two of these with a gunner (the crew chief manned one gun) reduced the troop carrying capacity by two men. The CH-46 and -53 helos were able to carry .50 caliber machine guns, one on each side, and although their loads were reduced too, the reduction, particularly in the case of the CH-53, was not so noticeable.

During the period October 1966 through October 1967, the CH-46 experienced a series of catastrophic accidents which caused the Corps and the Naval Air Systems Command to take a hard look at the design of the aircraft. These accidents occurred in the United States as well as Vietnam and in most cases involved failure of the aircraft's rear pylon. A program was initiated to strengthen that section of the airframe, and it was accomplished in two phases. The first improvement was incorporated in Okinawa for Vietnam-based aircraft. The second phase was performed later at overhaul. The modification program had an impact on helo operations in Vietnam because fewer were available for combat operations. To partially offset this shortage, some UH-34s were airlifted to Da Nang from Cherry Point, North Carolina, in Military Airlift Command transports. Following the modification program, the CH-46 performed in an outstanding manner.

The Marine Corps experimented with armed helicopters as early as 1950, but it did not pursue an active program for several reasons. The transport helicopters in the inventory before the war began in Vietnam were limited in payload to begin with, and the Corps chose to devote their full load capacity to carrying men and equipment, while relying on attack aircraft to escort the helicopters. At the same time, it sought to procure a light helicopter which could perform a myriad of tasks, including the role of a gunship. This program was a long time in materializing, but it finally resulted in the UH-1E. The Army, on the other hand, with no fixed-wing attack aircraft, depended heavily on "gun birds."

One gunship version of the Marine UH-1E was armed with a nose turret which could be elevated, depressed, and swung left and right. In addition, weight permitting, it could mount left and right fixed, forward-firing machine guns, or 2.75 inch rocket pods. A .30 caliber machine gun could also be installed in each of the two side doors.

The helo gunship proved to be indispensable. It was more immediately available than jets, more maneuverable, and it could work close-in with transport helicopters.

The UH-1E has been used by the Marines since 1965

[11] The Corps did not request a change in helo mix. It had just completed a study that essentially reaffirmed the 5 to 1 mix of medium to heavy helos but it also recommended an increase in total numbers to meet the Marine Corps' total operational requirement. The Office of the Secretary of Defense directed the change in mix from 5 to 1 to 2 to 1. One probable reason was that an increase in the percentage of heavies would increase the total lift capability of the fleet so that additional squadrons would not have to be approved. The Marine Corps did not appeal the mix decision. At the time it was made, the CH-46 tail problem was under serious study and it appeared desirable to have a greater percentage of CH-53s on that score alone.

The left-hand CH-46 is diving toward the ground just before levelling off and landing troops of the Ninth Marines in rugged territory near the western end of the DMZ in September 1968. On the opposite page another CH-46 carries an external load of ammunition to a fire support base in the same general area in 1969.

to perform many tasks. They include serving as gunships; as command and control craft for MAF, division, wing, regimental, and occasionally battalion commanders; for liaison, courier, and administrative runs; for visual reconnassiance and observation; as aerial searchlights when special equipment was installed; as platforms for various kinds of sensors; as transportation for VIPs (and this was no small order); for medical evacuation of casualties; and for miscellaneous roles.

In 1965, the Corps was authorized 12 light helos per wing, and these were included in each of the three VMO squadrons. Two additional VMOs were authorized for the war in Southeast Asia and in 1968 the Department of Defense authorized the Marine Corps to convert them to three light helicopter transport squadrons (HML), giving the Corps three VMOs and three HMLs. The VMOs were to have 18 OV-10As and 12 light helos each, and the HMLs were to have 24 light helos. Two of each kind of squadron were on hand in the 1stMAW by the latter part of 1968. This provided 72 light helos (including gunships) to support two reinforced divisions, but it still was not enough to meet all of the requirements. If there is any lesson that has been learned in Vietnam, it is that the Corps needs more light helicopters. The statistics accumulated over the past several years indicate that on the basis of hours of use there is a requirement for these aircraft nearly equal to the combined total of medium and heavy helicopters.

The AH-1G Cobra was not available for Marine use until April 1969. The gunship was accepted with enthusiasm by the pilots, performed well in a fire suppression role, and was maintained at a rather high rate of availability. Organizationally, they might be in a VMO or an HML. Ideally, 24 of them would form an HMA, one in each wing.

The Corps has under procurement twin-engine versions of both the UH-1 and the AH-1, and these should be major improvements over the current single-engine configurations. The benefits will be increased payload capability under a wider range of temperatures and altitudes, and the added reliability provided by having a second power plant. The twin Cobra was due to enter the force in 1970, and the twin UH-1 in 1971.

The first UH-34 squadrons were employed in much the same way as they had been during the "Shufly" years. They lifted troops and cargo on either tactical or administrative missions and performed the usual spectrum of miscellaneous tasks. They conducted the first night assault in Vietnam in August 1965. The 2d battalion, 3d Marines, was lifted into Elephant Valley, northwest of Da Nang.

By the end of 1965, Marine transport helos were lifting an average of 40,000 passengers and over 2,000 tons of cargo a month while operating from their main bases at Ky Ha and Marble Mountain.

In 1968, the helicopters carried an average of over 50,000 men and over 6,000 tons of cargo a month. This increase in capacity was due mainly to the substitution of CH-46 helos for UH-34s between 1966 and 1968. The increase in the requirement came mainly because of heavy assault operations against North Vietnamese Army divisions which had invaded the I Corps Tactical Zone. And in the first half of 1970, even after redeployment had commenced, they were lifting more than 70,000 passengers and 5,000 tons of cargo in a month. Part of this increase can be attributed to the increased use of the CH-53 in troop lifts.

Even back in "Shufly" days, Marine helicopter pilots learned to expect all sorts of strange cargo on the manifest. They often had to move Vietnamese units, and this included dependents and possessions, cows and pigs included.

As larger transports entered service, larger loads were carried. And this of course included larger animals. HMH-463 with its CH-53s was tasked to move a remotely located Vietnamese camp. Included in the lift requirement were two elephants. Not big ones, but nevertheless elephants. These pachyderms were tranquilized and carried externally with no problem. The crews named them "Ev" and "Charlie," which proves that they had found some time to read the newspapers sent out from home.

With the CH-53, the 1stMAW could retrieve battle damaged UH-1s, UH-34s, and CH-46s that might otherwise

have been destroyed. The CH-53 could not lift another 53, however, under operating conditions in Vietnam. There is a need for a small number of heavy lift helicopters that can retrieve all helicopters and all tactical fixed-wing aircraft except transports. Such a heavy lift helicopter would also be useful in lifting heavy engineering equipment and other loads beyond the capability of the CH-53. The Army's CH-54 Skycrane's lifting capability is not sufficiently greater to make it a really attractive choice. A payload of at least 18 tons is required. Furthermore, the helicopter should be compatible with shipboard operations, and it should be capable of being disassembled and transported in C-5A or C-141 cargo planes.

One of the most hazardous helicopter missions was the evacuation of casualties at night or in poor weather. The problem was twofold: finding the correct zone, and getting in and out without getting shot up. Since most medevacs were called in by troops in contact with the enemy, the available landing zones had no landing aides to help the pilot, and so he had to rely on an accurate designation and visual identification or confirmation. At night a flare aircraft was often required to orbit the area and illuminate the zone so it could be positively identified. Gunships or jets would provide fire suppression, if required, and the evacuation helo would make a fast approach and retirement, making maximum use of whatever natural concealment might be available.

There is no doubt about it, the helicopter saved countless lives in Vietnam. If the casualty could be evacuated to a medical facility in short order, his chances of survival were very good.[12]

Although a small number of helos were fragged each day specifically for medical evacuation, any helicopter in the air was available for such a mission, if required, and many evacs were made by on-the-scene aircraft. These helicopters of course did not carry hospital corpsmen as did those specifically fragged for the mission, but they offered the advantage of being closer, and thus quicker to respond.

The number of medevac missions flown by Marine helicopters is large indeed—in the peak year of 1968, nearly 67,000 people were evacuated in just short of 42,000 sorties—and a great many of the helos sustained hits and casualties themselves in the process of flying these missions. As a group, helicopter crews were awarded a very high percentage of Purple Hearts for wounds received in combat. They were and are very courageous men.

Multi-Function Operations

The majority of operations conducted by III MAF required some degree of air support, and in most cases the support involved two or more tactical air functions. A complete recounting of all these operations is beyond the scope of this article. However, some representative examples are in order so that the reader may appreciate the role of Marine air in MAF operations.[13]

As the MAF units began to undertake offensive operations, helicopters were essential for troop transport and logistic resupply, and jets were equally important for close air support. Operation Double Eagle in late January and early February 1966 illustrates several techniques and tactics that were used quite frequently in later operations. This was a multi-battalion force commanded by the Assistant Division Commander of the 3dMarDiv, Brigadier General Jonas M. Platt. The operational area was southern I Corps. Coordination was required with Vietnamese Army units in I Corps and with U. S. Army units in II Corps, specifically the 1st Air Cavalry Division. One Marine battalion and helo squadron belonged to the SLF and were embarked in the USS *Valley Forge*

[12] See Doctors and Dentists, Nurses and Corpsmen in Vietnam by Commander F. O. McClendon, Jr., MSC, in *Naval Review 1970*. The patient's chances were about 99 per cent once admitted to a Navy field hospital or hospital ship.

[13] For more details on Marine operations in Vietnam, see Brigadier General Simmons' excellent essays in recent *Naval Reviews*.

and other ships of the Amphibious Ready Group. MAG-36 was placed in direct support of Platt's Task Force Delta. Colonel William G. Johnson, Commanding Officer of MAG-36, located his command post adjacent to Platt's. He also established a helicopter operating area with limited maintenance support. This became known as "Johnson City." Logistic support was added: fuel, ammunition, supplies, and a medical aid station. This was in effect a Logistic Support Area (LSA), and it was essential to establish one in order to support mobile ground operations such as those in which General Platt was engaged. As the war progressed, these LSAs would become strategically located throughout the Corps area and close to main roads so that the bulk of supplies could be brought in by truck convoys. If an airfield were near, fixed-wing transport could be used. MAG-36 and Task Force Delta had a mini-DASC located at "Johnson City" through which they could control aircraft assigned to them. Helicopters were immediately available through Colonel Johnson. Jets had to be requested, but the route was direct to the TADC which could scramble A-4s from Chu Lai or F-4s from Da Nang.

Major General McCutcheon was relieved as CG 1stMAW by Major General Louis B. Robertshaw on 15 May 1966. The Struggle Movement within South Vietnam which led to the establishment of the Ky government in Saigon was still unresolved at this point, and an upsurge of political activity forced the cancellation of the planned change-of-command ceremonies. A small impromptu one was held outside III MAF Headquarters.

During General Robertshaw's tenure, the center of action tended to shift north, both on the ground and in the air. In July and August 1966, Operation Hastings produced the highest number of enemy killed to date. The Prairie series of operations, which began shortly thereafter, took place in the same locale, just south of the DMZ. Names like Dong Ha, the "Rockpile," and Con Thien came into prominence. But there was another name which was destined to become even more prominent, Khe Sanh. Late in April 1967, a Marine company made solid contact with North Vietnamese regulars northwest of Khe Sanh. On the 25th, the 3d Battalion of the 3d Marines was helo-lifted into Khe Sanh, and the next day the SLF battalion (2d Battalion, 3d Marines) was heloed into Phu Bai and thence lifted by KC-130 to Khe Sanh.[14] Both battalions took the offensive and attacked the enemy on Hills 881 South and North. In two weeks of bitter fighting, the 1stMAW flew over one thousand sorties in around-the-clock close and direct air support of Marine infantry in the area. Here was an example of the integrated employment of fixed- and rotary-wing transports, close air support, and air control.

Major General Norman J. Anderson relieved Robertshaw on 2 June 1967. His tour was marked with a further buildup of North Vietnamese forces in Northern I Corps and the introduction of single management. The enemy's Tet offensive of 1968, the battle of Hue, and the campaign of Khe Sanh all occurred on his watch. During the Khe Sanh campaign, the entire spectrum of tactical air support was called into play—not only Marine, but also Air Force, Navy, and Vietnamese Air Force. And SAC's B-52s dropped their heavy loads upon the enemy in the surrounding hills.

One example of how all Marine tactical air functions could be coordinated into a single operational mission was the "Super Gaggle." This was a technique developed by the 1stMAW to resupply the hill outposts in the vicinity of Khe Sanh. These hills were surrounded with heavy concentrations of enemy antiaircraft weapons, and every flight by a helo into one of the outposts was an extremely hazardous mission. Additionally, the weather in February was typically monsoon, and flying was often done on instruments. The "Super Gaggle" was a flight of transport helos escorted by A-4 jets and UH-1E gunships, all under the control of a TAC(A) in a TA-4F. The key was to take advantage of any break in the weather and to have all aircraft rendezvous over the designated point at the same time.

The operation was usually scrambled at the request of the mini-DASC at Khe Sanh on the basis that a break in the weather was expected shortly. The TAC(A) and KC-130 tankers took off from Da Nang, the A-4s from Chu Lai, UH-1E gunships from Quang Tri and CH-46s from Dong Ha. All aircraft rendezvoused over Khe Sanh within a 30 minute period under control of the TAC(A). Instrument climb-outs were often required due to weather. Even the CH-46s with external loads would climb out on a tacan bearing until they were on top. Under direction of the TAC(A), and taking advantage of the break in the clouds if it did develop, the area was worked over with napalm, rockets, 20-mm., and smoke. The CH-46s let down in a spiral column and deposited their loads on Khe Sanh and the hill outposts in less than five minutes and then spiralled back on top and returned to their bases. The jets also climbed back on top, plugged in to the KC-130 tankers for refueling, and headed back to Da Nang and Chu Lai.[15]

The fourth commander of the 1stMAW was Major General Charles J. Quilter. He relieved Anderson on

[14] Before the Seabees improved the strip with AM-2 matting, in the summer of 1966, there was a short strip at Khe Sanh made of pierced steel planking. When the base was closed in 1968, the AM-2 was recovered.

[15] Distance to Khe Sanh from
a. Dong Ha is 23 nautical miles
b. Quang Tri is 27 nautical miles
c. Da Nang is 94 nautical miles
d. Chu Lai is 136 nautical miles.

June 1968. His tour saw a reversal of the trend that started in General Robertshaw's era. The enemy withdrew after taking severe beatings at Khe Sanh, Hue, and elsewhere in ICTZ. The enemy gave up conventional large scale operations and reverted to the strategy of small unit actions and harassment.

III MAF forces underwent an operational change too. Since the 3dMarDiv was relieved of the requirement for a static defense along the strong-point barrier, they were free to undertake a mobile offensive in Northern ICTZ and strike at the enemy in the western reaches. One of the finest examples of air-ground teamwork took place during the period of January through March 1969.

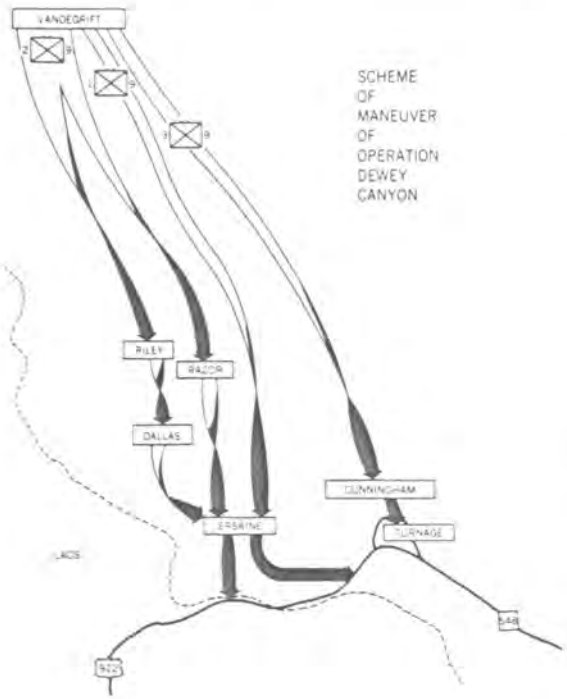
The code name of the operation was Dewey Canyon. The locale was the upper A Shau Valley and southern Da Krong Valley. This was a multi-battalion operation involving the 9th Marine Regiment, commanded by Colonel Robert H. Barrow, and two battalions of the 1st Vietnamese Army Division.

During the last week of the pre-Dewey Canyon period, Marine attack and fighter-attack aircraft from MAGs 11, 12, and 13 flew 266 sorties over the objective area, dropping over 730 tons of ordnance.

On 21 January, D-1, a "Zippo" team, was formed of representatives of the 1stMAW and 3dMarDiv. Infantry, engineer, helicopter, and observation aircraft specialists were included. This team was responsible to the overall ground commander for landing zone and fire support; base selection and preparation; and coordination of the helicopter assault.

Early on D-Day the initial landing zones (LZ) were prepared by fixed wing air strikes (made suitable for helo landings by bombing and strafing to reduce threat of opposition to a minimum), and elements of the 2d Battalion, 9th Marines, landed at 0800. In the rapid buildup that followed, CH-46s, under the control of the division DASC and under the protective umbrella of gunships and observation aircraft, brought 1,544 Marines and 46 tons of cargo into two LZs. By the evening of 24 January, a battery of 105-mm. howitzers from the

Since 1965, the UH-1E has served as a gunship, a command and control craft, a liaison, courier, and administrative support craft, a visual reconnaissance and observation craft, a platform for aerial searchlights and sensors, and a means of transportation for VIPs. But, perhaps its finest hours were served as, almost without regard to weather, it helped to evacuate casualties such as this Marine (center) wounded near Dong Ha in December 1967.



2d Battalion, 12th Marines, and the Command Post of the 9th Marines were in place on one of these landing zones, which became known as RAZOR.

The following day, three companies of the 3d Battalion were helo-lifted on to a ridgeline further forward, known as Co Ka Va. It would soon be developed into Fire Support Base (FSB) Cunningham, named for the first Marine aviator. In a few more days, elements of the 2d Battalion from FSB Riley pushed down the ridgeline to establish another FSB, Dallas, to guard the western approach to the area from Laos. To the east, the two Vietnamese battalions were lifted into two other bases. They would secure the left flank and cut off the enemy escape route to the east.

About the 1st of February, the "Crachin" season really began to make itself felt. This is a period when low clouds and drizzle cover the mountain tops in Northern I Corps and obscure visibility in the valleys.

Operation Dewey Canyon Air Operations Statistics

22 January–14 March 1969

Helicopter Support	*Fixed Wing*
14,893 Sorties	1,617 Sorties
5,050 Flight Hours	1,973 Flight Hours
3,515 Tons of Cargo	3,679 Tons of Cargo
21,841 Troops Lifted	390 TPQ Missions
611 Medevacs	

On 4 February, a company of the 3d Battalion moved into and occupied what was to become the last FSB for the coming infantry advance. Erskine was to be its name.

Marine helicopters continually worked out of FSB Vandegrift carrying essential supplies of ammunition, rations, and water to the various bases.[16] On the return trips they carried wounded back to aid stations. Often the weather precluded access to the area except by flying on instruments. Under such conditions, over 40 pallets of critically needed supplies were dropped by KC-130s and CH-46s under control of the TPQ-10 at Vandegrift.

When artillery was in place on both Cunningham and Erskine, the 9th Marines began moving on foot from their bases into the Da Krong Valley with battalions on line. Their objective was Tiger Mountain and the ridgeline that ran west from it. As they advanced, landing zones were carved out of the jungle with 2,000-pound bombs or, as a minimum, sufficient space was created so that a medevac could be performed by helo hoist, or an external load could be dropped to the troops on the ground.

On 17 February, Marine helicopter resupply during instrument conditions received its biggest boost. Instrument departure and return corridors were established to permit loaded helos to operate out of Quang Tri in support of the operation. The technique was the same as that employed during Khe Sanh operations. During the next month of corridor operation, over 2,000 Marine aircraft were funneled in and out of this highway in the sky to keep Dewey Canyon alive.

Other elements of the air component continued to seek out the enemy and to attack him. O-1, RF-4, EA-6, A-4, F-4, and A-6 aircraft all participated. And when emergency missions arose during darkness, OV-10A, C-117, or KC-130 aircraft were called in to provide illumination by dropping flares.

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

The 24th found the 1st Battalion in possession of the enemy's headquarters at Tam Boi. The 2d Battalion took control of the ridgeline overlooking Route 922, where it crosses from Vietnam into Laos.

The 27th marked the first time a TPQ-10 had ever been emplaced and operated from an FSB. One was placed on Cunningham and remained there for 17 days,

[16] Distances between Vandegrift and

Dong Ha	15 nautical miles
Riley	16 nautical miles
Razor	18 nautical miles
Dallas	19 nautical miles
Cunningham	20 nautical miles
Erskine	23 nautical miles
Tiger Mountain	26 nautical miles

Operation Dewey Canyon Results

Enemy Personnel Losses
- 207 KIA
- 3 POW
- 3 Detainees

Weapons Captured
- 142 Individual Weapons
- 25 Crew Served Weapons
- 12 122-mm. Guns
- 4 85-mm. Guns
- 6 82-mm. Mortars
- 12 60-mm. Mortars
- 21 57-mm. Recoilless Rifles
- 3 37/40-mm. AA Guns
- 4 23-mm. AA Guns
- 39 12.7-mm. AA Guns
- 20 7.62-mm. AA Guns

Ammunition Captured
- 7,287 122-mm. Arty Rounds
- 779 122-mm. Rockets
- 187 140-mm. Rockets
- 4,983 120-mm. Mortar Rounds
- 210 85-mm. Arty Rounds
- 23,171 82-mm. Mortar Rounds
- 994 75-mm. RR Rounds
- 33,509 60-mm. Mortar Rounds
- 2,004 57-mm. RR Rounds
- 13,521 B 40 Rockets
- 23,730 37 mm. AA Rounds
- 4,500 23 mm. AA Rounds
- 98,526 12.7 mm. AA Rounds
- 50,193 Grenades
- 9,576 Rifle Grenades
- 1,621 AT Mines
- 855 AP Mines
- 444 Claymore Mines
- 553,000 Small Arms Rounds

Vehicles Captured
- 66 Trucks
- 6 Truck Prime Movers
- 14 Bulldozers
- 3 APCs
- 1 Front Loader
- 1 Air Compressor
- 108 Bicycles

Rations Captured
- 110 Tons of Rice
- 2 Tons of Salt

Installations Seized
- 2 Major Headquarters
- 1 Base Hospital
- 2 Major Vehicle Maintenance Repair Shops
- 1 Major Communication Center

controlling 72 air strikes, ten A-6 beacon drops, and three emergency paradrops.

The days that followed turned up masses of enemy equipment and stores, and the quantity accumulated and sent back to our bases was easily the largest amount ever discovered during the war.

The 18th of March marked the final day of operation of Dewey Canyon. On this day virtually the entire resources of the 1stMAW were committed. Over 350 tons of cargo and 1,400 Marines were helo-lifted out of Tumage and Tam Boi without a casualty. These were the last two bases to be vacated. Gunships and jets flew close cover and close air support.

Perhaps the most notable accomplishment of the operation was that only one helicopter was lost in spite of the adverse weather and terrain and the efforts of a stubborn, well-trained, and professional enemy to counter the operation. Lieutenant General Richard G. Stilwell, U. S. Army, commander of all U. S. ground forces in Northern I Corps under CG III MAF, summed it up in a few words when he said, "Dewey Canyon deserves some space in American military history by sole reason of audacity, guts, and team play. I cannot applaud too highly the airmen of the 1stMAW in a variety of roles."

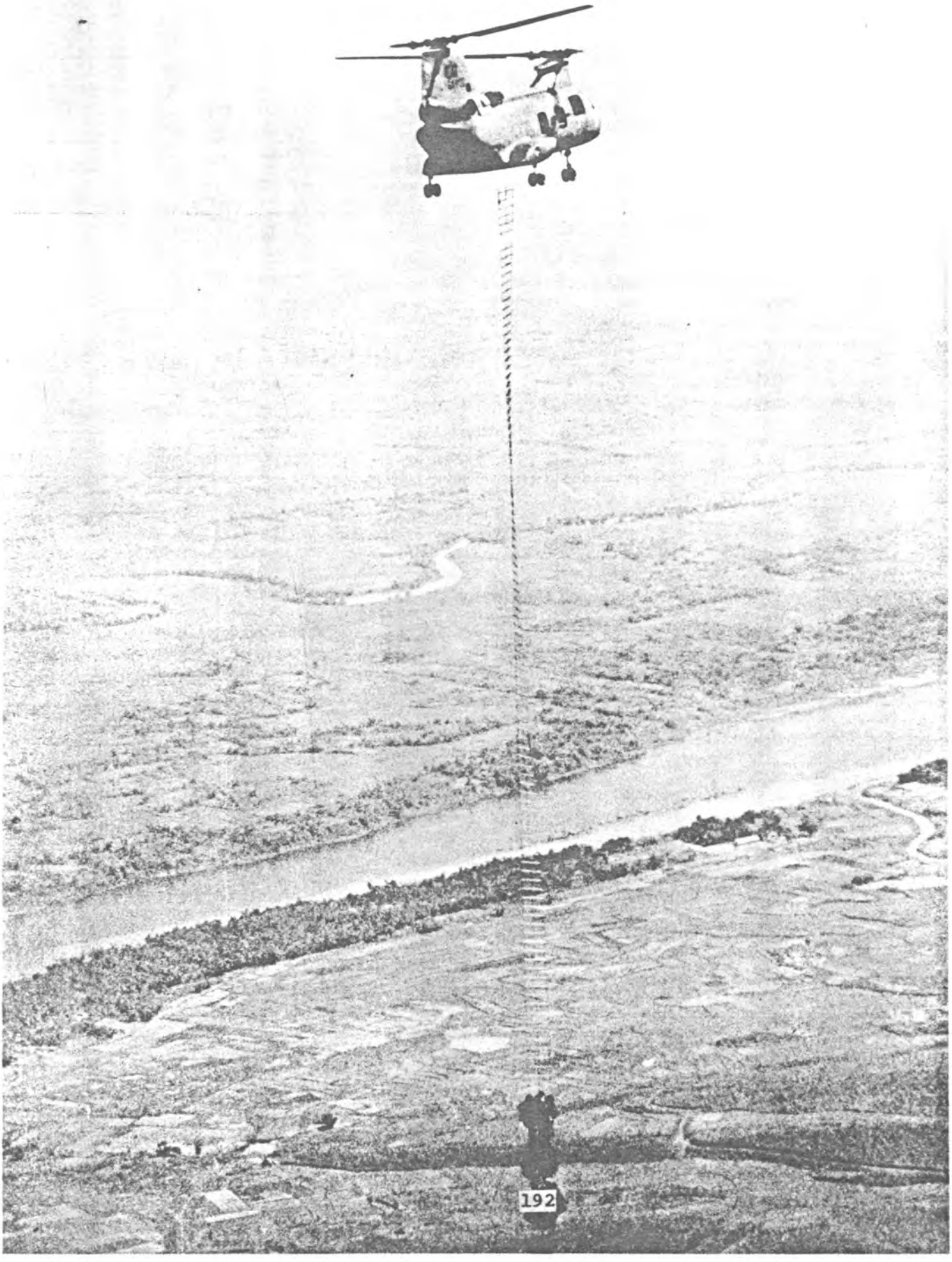
General Quilter was relieved by Major General William G. Thrash on 7 July 1969. Thrash took command when the wing was at its maximum strength and operating a peak number of facilities. The wing was supporting two Army divisions, two ARVN divisions (splitting the helo load with Army helicopters), and the Korean Marine Brigade, in addition to the two Marine divisions.[17] It also flew out-of-country missions. Air-ground team performance reached a new high.

Several techniques that had been in use for several years were further improved during General Thrash's period of command. One of the most interesting was the insertion and extraction of reconnaissance teams. By their very nature, these teams operated well in advance of friendly lines and in enemy controlled territory. Most of the terrain there was high and forested, and there were few landing zones that permitted helos to land. Teams frequently used long ropes and rappelled in.

Getting out was something else. If it was an emergency situation due to enemy contact, it was not feasible to use a one-man hoist. So flexible ladders were employed. These were as long as 120 feet, and 6-feet wide. They were dropped from the rear ramp of a CH-46, and the pilot would hover at a height so that 20 or 30 feet would lie on the ground. The recon team would hook-on individually to the ladder and the pilot would then execute a vertical climb-out. The team would ride back to base hanging on the end of the ladder, 80 to 100 feet below the chopper and 1,500 to 2,000 feet or more above the ground.

During the extraction, a TAC(A) in an OV-10A would coordinate the air effort. Helo gunships would be directed to provide close in fires to protect the reconnaissance team on the ground. A-4s and F-4s were avail-

[17]The VNAF had two helicopter squadrons, but these were not enough for the ARVN's needs. The Army and ARVN received jet support from Marine, Air Force, Navy, and VNAF aircraft. The same general system of air support was used by all Services. The language barrier was overcome by the fact that many Vietnamese and Koreans understood English.



...e with larger ordnance if more authoritative action ...s required.

As soon as the CH-46 pilot cleared the pick-up zone, ... would turn away from a planned artillery-landing ...ne line and call in artillery fire to the zone he had ...st left. This technique became well known to the ...emy, so they did not always come too close. If they ...d not close, the Cobra gunships would work them ...er while the actual extraction was in process.

Another operation that was continually improved ...on as the war progressed was the Sparrow Hawk or ...ingfisher, or, as it later became known, the Pacifier. ...n any case, the basic idea was the same: find the enemy ...d preempt his move. A package of aircraft was mar...ed up to a rifle platoon: CH-46s to provide troop lift, ...unships for close-in support, an OV-10A for visual ...connaissance, and a UH-1E for observation and com...and and control. The OV-10A and gunships would ...ut out the target area and attempt to find the enemy, ...d then the CH-46s would insert the reaction force to ...troon off the area and fix the enemy. If heavier air ...pport was needed, the command and control helo ...uld request a scramble. This technique proved to be ...ry profitable, and it was often used to seek out the ...emy in areas which fired at Marine aircraft, particu...rly helicopters. Prompt retaliatory action was one of ...e best measures to reduce this enemy harassment.

Phase Down

The first Marine aviation unit to come into Vietnam after "Shufly" was a LAAM Battalion. The first aviation unit to redeploy without replacement was also a LAAM Battalion. The 2d LAAM Battalion departed in October 1968 for Twentynine Palms, California. The 1st LAAM Battalion followed in August 1969. Even though they had never fired a missile at an enemy aircraft, they had served their purpose.

On 8 June 1969, the President announced his intention to withdraw 25,000 U. S. Servicemen from Vietnam. This increment became known as Keystone Eagle. One HMM departed from the 1stMAW for Futema, Okinawa, and one VMEA departed for Iwakuni, Japan. The 1st LAAM Battalion was part of this increment.

You're a "Recon" Marine and you and your team have made your reconnaissance in enemy-controlled territory. It's time to go home and a hovering Sea Knight has dropped its 120-foot sky-hook, and you and your buddies climb on and hang on for the ride back to the base. You don't have a worry in the world; you don't know who the pilot of the helicopter is, and you couldn't care less. He's a Marine and getting you back safely is now his *problem.*

Three months later, on 17 September, another incremental withdrawal was announced, this time 40,500 men from all of the Services—nickname, Keystone Cardinal. The 3dMarDiv was the major unit to leave Vietnam in this increment, and it went to Okinawa. This division plus the 1stMAW (Rear) with headquarters at Iwakuni constituted I MAF. It is to be noted that the 1stMAW (Rear) was not associated organizationally in any way with the 1st MAW in Vietnam. It was simply a temporary title conferred on those aviation units outside of Vietnam that were deployed in WestPac as a component of the Seventh Fleet.

MAG-36 was the largest aviation unit to accompany the division. It deployed to Futema and became the parent group for all Marine helicopter squadrons in 1st MAW (Rear). One HMH, one HMM, and one VMO went to Futema as part of MAG-36. Another HMM returned to Santa Ana, California, to become part of the 3d MAW. One VMA(AW) with 12 A-6 aircraft deployed to Iwakuni and was attached to MAG-15 located there. These moves were all completed by Christmas 1969.

The President announced, on 16 December 1969, his intention to withdraw another 50,000 men. This increment was called Keystone Bluejay. MAG-12 from Chu Lai was the major Marine air unit to leave in this increment. It went to Iwakuni and joined the 1st MAW (Rear). One VMA accompanied it. Another VMA and one VMFA redeployed to El Toro, California, home station of the 3dMAW. One HMH also went to the 3d MAW. It was then stationed at Santa Ana. Keystone Bluejay ended on 15 April.

Before completing Keystone Bluejay, III MAF underwent a change in organization. Lieutenant General Herman Nickerson, Jr., turned over command, on 9 March 1970, to Lieutenant General Keith B. McCutcheon. At the same time General Nickerson was relieved as the senior U. S. Commander in ICTZ by Lieutenant General Melvin Zais, U. S. Army, Commanding General of XXIV Corps. After nearly five years, III MAF relinquished its position as the senior U. S. command in the area. The XXIV Corps headquarters took possession of Camp Horn, on Tien Sha Peninsula across from the city of Da Nang, and III MAF established a new command post at Camp Haskins on Red Beach, very close to where the 3d Battalion, 9th Marines, had come ashore on 8 March five years earlier. Camp Haskins was a Seabee cantonment, where the 32nd Naval Construction Regiment was headquartered.

On 20 April 1970, the President announced the largest withdrawal yet, with 150,000 to leave by 1 May 1971. On 3 June it was announced that 50,000 of these would be out by 15 October 1970. Keystone Robin was the nickname for this undertaking.

Another MAG was included in this increment. MAG-

Marine Corps Deployable Squadrons

Type of Marine Squadron	*Abbrev*	*Number of Sqdns End FY*		*Model Acft in Sqdn End FY*	
		1965	*1970*	*1965*	*1970*
All-Weather Fighter	VMF (AW)	8	—	F-8	—
Fighter Attack	VMFA	7	13*	F-4B	F-4B F-4J
Light Attack	VMA	10	7*	A-4C/E	A-4E/F
All-Weather Attack	VMA (AW)	2	6	A-6A	A-6A
Composite Reconnaissance	VMCJ	3	3	RF-8A EF-10B	RF-4B EA-6A
Refueler Transport	VMGR	3	3	KC-130	KC-130
Observation	VMO	3	3	O-1 UH-1E	OV-10A AH-1G
Light Helo Transport	HML	0	3		UH-1E
Medium Helo Transport	HMM	15	12	13 UH-34 2 CH-46	CH-46
Heavy Helo Transport	HMH	2	6	CH-37	CH-53
Total		53	56		

*One Squadron given up in order to retain three HMLs in Force Structure. VMFA-513 redesignated VMA-513 and placed in cadre status 30 Jun 1970; will become a Harrier squadron in last half FY71.

13, along with one VMFA and one VMA(AW), deployed to El Toro. Another VMFA deployed to MCAS Kaneohe, Hawaii, and joined MAG-24 stationed there. These three jet squadrons flew across the Pacific refueling from KC-130s and following the general route, Cubi Point in the Philippines, Guam, Wake, Midway, Kaneohe, and finally El Toro. Jet squadrons in previous increments had followed the same route.

The departure of MAG-13 marked the end of an era at Chu Lai. The last Marine jet flew off the concrete west runway on 11 September and headed east. The air base at Chu Lai was taken over by the U. S. Army's Americal Division.

VMCJ-1 also departed Vietnam and returned to Iwakuni, where it had been stationed prior to its arrival in Vietnam in 1965.

The other major aviation units included in this package were one HMM, which departed for Santa Ana, and Marine Wing Support Group 17, which was relocated at Iwakuni.

The deployments of units in these four increments reduced the 1stMAW from a wing of six aircraft groups and three supporting groups[18] to a wing of two aircraft groups and two supporting groups.[19] The number of aircraft squadrons was now 10, compared to a peak of 26 in 1968 and 1969.

[18]MAGs 11, 12, 13, 16, 36, ProvMAG-39, Marine Wing Headquarters Group 1, Marine Wing Service Group 17, Marine Air Control Group 18.

[19]MAGs 11 and 16, Marine Wing Headquarters Group 1 and Marine Air Control Group 18.

Shortly after the initiation of Keystone Robin, on 1 July 1970, Major General Thrash stepped down as CG of 1stMAW, and Major General Alan J. Armstrong took command. It was to be his lot to continue the reduction of Marine aviation units in Vietnam and probably take the 1stMAW headquarters out of that country.

Retrospect

Marine Corps aviation was in Vietnam in strength for over five years. It was ready when the order was issued to go. The years since Korea had been used to good advantage. New techniques and new equipments were operational. The overall performance from 1965 to 1970 was outstanding.

It was a dynamic period. The Marines deployed to Vietnam in 1965 with UH-34, UH-1, and CH-37 helicopters; A-4, F-8, F-4B, RF-8, and EF-10B jets; and O-1, C-117, and KC-130 propeller aircraft. They added the CH-46, CH-53, AH-1G, A-6, F-9, TA-4F, F-4J, RF-4B, EA-6A, OV-10A, US-2B, and C-1A. From 1966 on they stopped using the UH-34, CH-37, F-8, F-9, RF-8, EF-10B, and O-1. Only the UH-1, A-4, F-4B, C-117, and KC-130 participated in operations from beginning to end.

Dynamism is one characteristic of a strong and viable air arm. Technical advances continually present the planners with decision points. Marine and Navy planners had done well in the fifties, and that is one reason

why so many new aircraft were under development in time to enter the Vietnam War. It is also interesting to note that A-1, A-4, A-7, F-4, F-8, and OV-10A aircraft in use by other Services, U. S. and foreign, were the products of the naval aeronautical organization, as were such air weapons as Sidewinder, Sparrow, Shrike, Snakeye, Bullpup, and Walleye.

The Marine Corps takes pride in the fact that it has always put a great deal of emphasis on planning and looking ahead. Before World War II, it pioneered the fundamentals of close air support, and during that war it perfected the techniques that are still basic. After that war it entered into the evaluation and application of helicopters to ground combat. When the Korean War began, it was ready to test the concept in a combat environment. Following Korea, it accelerated the development of its concept of a short airfield for tactical support. All three of these major contributions to the state-of-the-art in tactical air warfare were used in Vietnam, not just by the Marines, but by the other Services too. There were other Marine Corps contributions which included the MTDS, TPQ-10, RABFAC beacon, and tactical electronic warfare.

Even while the war in Vietnam was being fought, the Marines were still looking ahead to the future. As was discussed, earlier, the lack of suitable air bases in Vietnam was one major constraint on the buildup of tactical airpower. There are still only two airfields capable of handling jets in ICTZ, and there is still not one south of Saigon. But there are airfields capable of taking light aircraft, KC-130, and Caribou transports and helicopters. And many of these fields could take the Harrier.

The Harrier is a jet vertical take-off and landing strike aircraft developed in England with the help of U. S. dollars, and it is operational now in the Royal Air Force. The Marine Corps saw in the Harrier an aircraft of great potential and initiated procurement action in the FY69 budget for twelve of them. It gave up some F-4 aircraft to get them, and they are coming aboard now. By the end of FY71, the Marines will have their first squadron.

The Harrier will not only permit operations from more sites; it will improve response time in close air support by reducing the time taken to request support (there will be fewer centers and echelons of command to go through), and it can be staged closer to the action, thus cutting flight time. The fact that it can operate from more sites should reduce its vulnerability on the ground, and because it can land vertically there should be a reduction in its accident rate (more landing areas available in an emergency).

The year 1965 was one of buildup. Bases had to be obtained and developed, supply pipelines filled, and initial operating difficulties overcome. The sortie rate for jet aircraft gradually climbed to over 1.0, which was the magic figure used by planners to compute sorties. That means one sortie per day per aircraft assigned. In 1966, the rate went well beyond that, and for the entire period the Marines averaged more than 1.0. When the occasion demanded it, they surged to 1.3, 1.4, or even 1.5 for days at a time. The 1st Wing was a consumer-oriented tactical air support command. If the customer had the demand, the wing would supply the sorties.

Twelve of the Corps' total of 27 fighter-attack squadrons were deployed most of the time and 10 or 11 of these were in Vietnam. Fourteen of its 25 helicopter squadrons were deployed—well over fifty per cent. The same airpower was diminished by the following losses in aircraft in all of Southeast Asia in the period starting 25 August 1962 and ending 10 October 1970.

USMC Aircraft Losses in Southeast Asia

Helicopter combat losses	252
Fixed wing combat losses	173
Helicopter operational losses	172
Fixed wing operational losses	81

Marine Corps aviation surged for over five years in order to sustain the maximum possible strength overseas. The units overseas in turn exceeded all planning factors in terms of output and productivity, under less than ideal conditions.

Marine Corps aviation will leave Vietnam with a sense of accomplishment. It performed its mission for nearly six years and carried out every function in the tactical air book. The innovations and developments it had worked on over the years were proven in combat. The new environment created new challenges for men in Marine aviation, and these were met head-on and solved. The war was the longest, and in many ways the most difficult, one in which Marines have had to participate. The restraints and constraints placed upon the use of air power, and the demanding management reports of all aspects of aviation required by higher authority, imposed additional requirements on staffs with no increase in resources, in most cases, to perform the tasks. In spite of these difficulties, Marine aviation performed in an outstanding manner. An analysis of sorties flown compared to assets on hand will prove that no one outflew the United States Marines.

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