AVIATION

£6.99

Although the value of the helicopter as a military aircraft was first appreciated during the Korean War, it was in the treacherous jungle and swampland of Vietnam that it later proved itself indispensable.

Described and illustrated here are all the craft that contributed to the crucial 'airmobility' concept which permitted essential troop movements, combat, and search and rescue operations to take place even in such an inhospitable environment.

- Detailed specifications of each helicopter
- Development and deployment histories
- Specific operations vividly recounted

Examining the complete background to the role of the helicopter in Vietnam, this is a useful illustrated guide for the aviation enthusiast and a fascinating study for the military historian.

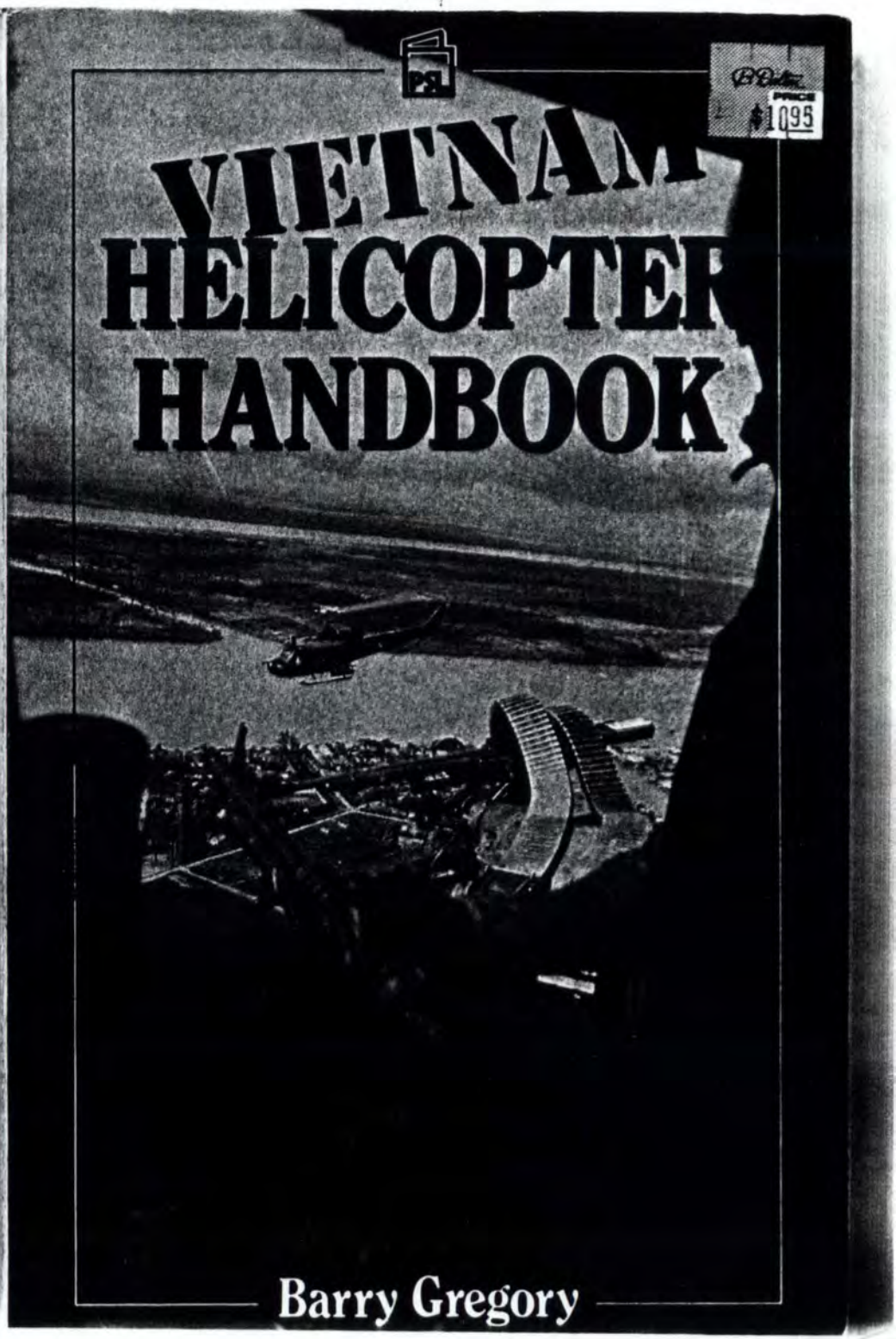
ISBN 1-85260-024-1

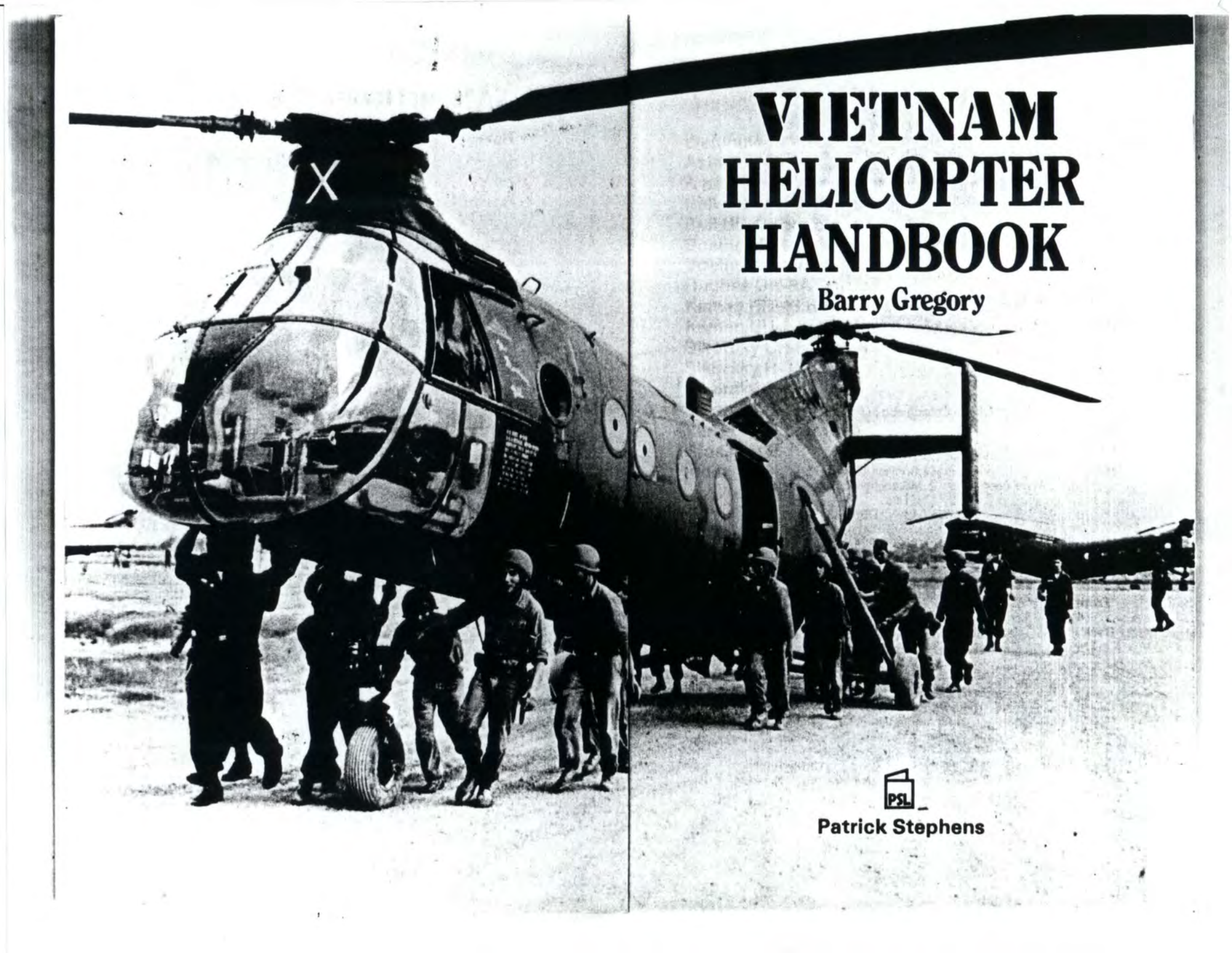
A THORSONS COMPANY

PATRICK STEPHENS LIMITED

VIETNAM HELICOPTER HANDBOOK

Barry Gregory

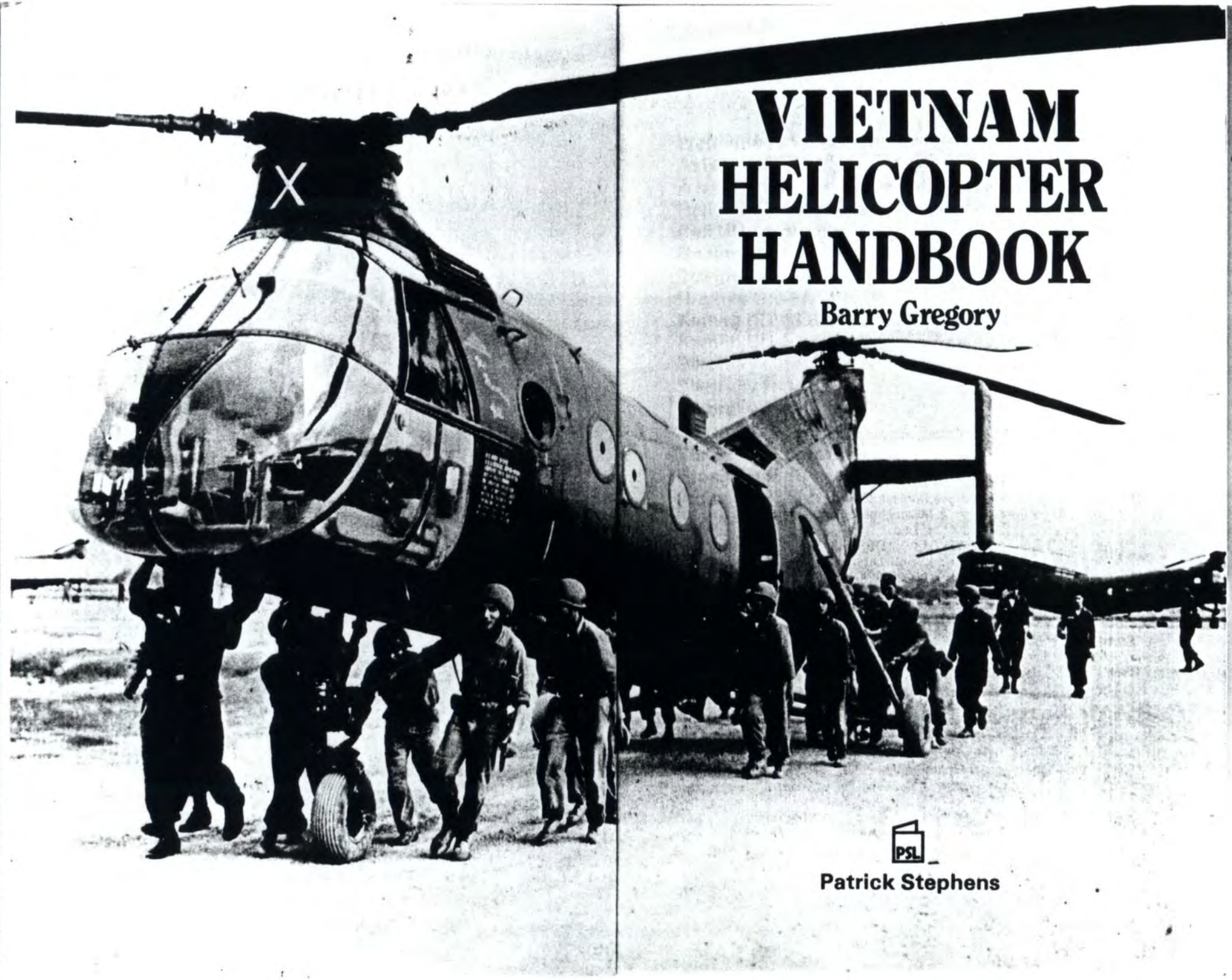




VIETNAM HELICOPTER HANDBOOK

Barry Gregory

Patrick Stephens



VIETNAM HELICOPTER HANDBOOK

Barry Gregory

Patrick Stephens

First published in 1988

All pictures supplied by Military Archive and Research Services

British Library Cataloguing in Publication Data

Gregory, Barry
Vietnam helicopter handbook.
1. Vietnamese Conflict, 1961-1975—
Aerial operations 2. Military helicopters—History
I. Title
959.704'348 DS558.8

ISBN 1-85260-024-1

Cover illustrations

Front 'Hueys' over Can Tho, Vietnam in 1967: a door gunner scans the rice paddies for signs of enemy movement.

Back A UH-1D helicopter provides support to Infantry preparing to move out behind the cover of an M-113 Armoured Personnel Carrier in 1969.

Patrick Stephens Limited is part of the
Thorsons Publishing Group,
Wellingborough, Northamptonshire, NN8 2RQ, England

Printed in Great Britain by Baker, Land and Unwin Printing,
Wellingborough, Northamptonshire.

1 3 5 7 9 10 8 6 4 2

CONTENTS

WELCOME TO VIETNAM

On 11 December 1961, the United States aircraft carrier USNS *Card* docked in Saigon harbour with 32 US Army H-21 helicopters and 400 men. The 57th Transportation Company (Light Helicopter) from Fort Lewis, Washington, and the 8th Transportation Company (Light Helicopter) from Fort Bragg, North Carolina, had arrived in South-east Asia. This event had a two-fold significance: it was the first major symbol of United States combat power in Vietnam, and it was the beginning of a new era of airmobility in the United States Army.

Just 12 days later, these helicopters were committed to the first airmobile combat action in Vietnam, Operation 'Chopper'. Approximately 1,000 Vietnamese paratroopers were airlifted into a suspected Viet Cong headquarters complex about ten miles west of Saigon, where they captured an elusive underground radio transmitter after meeting only slight resistance from a surprised enemy.

The events of December 1961 prefaced a decade of unparalleled growth of airmobility, but they also were a culmination of many decisions taken during the preceding decade which allowed the President of the United States to exercise this option in support of the Government of South Vietnam. Early in 1961, General Maxwell D. Taylor, a firm favourite of President John F. Kennedy, had gone to South-east Asia to make a situation report. During the General's visit, he had decided that the lack of adequate roads, lines of communication and means of mobility contributed heavily to the government's problems in fighting the Viet Cong guerrillas.

As a result of General Taylor's recommendations, the President approved a more active support programme for South Vietnam to assist in the fight against the VC, who were controlled by Ho Chi Minh and his Communist High Command in Hanoi. Generally, the American support included the establishment of a joint headquarters to direct the programme, an increase in the number of US advisers for the South Vietnamese armed forces and additional support through Army Aviation, communications units and Navy and Air Force units. Thus began a chain of events that led to the arrival of the helicopter units in Saigon in December 1961.

Following the 57th and 8th, the 93rd Transportation Company (Light Helicopter) arrived off the coast of Vietnam in January 1962. The first two helicopter units were based at Tan Son Nhut, Saigon's commercial airport, but this time the USNS *Card* was assigned to Danang in the northern I Corps Tactical Zone. Ten miles out in the South China Sea, the aircraft were flown off the carrier deck to Danang Air Base. This unique delivery of H-21

Crew members have stripped a Vertol H-21 Shawnee 'Flying Banana' helicopter that crashed into an embankment near Cau Mau in December 1962, while a second H-21 provides cover for disembarked South Vietnamese troops. These helicopters were amongst the first to arrive in Vietnam on 11 December 1961.

helicopters was accomplished without serious incident even though ceilings were down to 100 feet over the ocean.

The US aviation companies were at once engaged in a heavy combat flying programme, but difficulties were experienced because of a critical shortage of engines and a deterioration of rotor blades and aviation equipment. The first Marine helicopter squadron arrived in South Vietnam in April 1962 and was established at the old French base at Soc Trang in the Mekong Delta. In June and July of that year the Marines swapped bases with the 93rd Transportation Company at Danang because of the greater ability of the Marine H-34 helicopters in the mountainous region south of the Demilitarized Zone (DMZ) on the 17th parallel.

In order to provide better command and control of the Army's growing fleet, the 45th Transportation Battalion was deployed to South Vietnam in early 1962 from Fort Sill, Oklahoma, and assumed command of the three Army helicopter companies and a fixed-wing UH-1A Otter company, which had arrived in January from Fort Riley, Kansas. Two more helicopter companies, the 23rd and 81st, made their appearance and were placed under the command of the 45th Transportation Battalion.

In the first months of 1962, the first of a long line of 'Hueys' also arrived in South Vietnam as part of the 57th Medical Detachment (Helicopter Ambulance). The growing number of casualties amongst the Army of South Vietnam (ARVN) and their American advisers had called for the urgent despatch of the 57th from Fort

Top *Vietnamese Rangers board US Army H-21 helicopters about to take off in the hunt for Viet Cong guerrillas on the Plain of Reeds in the Mekong Delta in 1962.*

Above *The same flight of US Army H-21s, airborne.*

George Meade, Maryland, to provide the aerial ambulances for the 8th Field Hospital, which was equipped for dental, thoracic, orthopaedic and neurosurgical care. Arriving in April 1962, the 57th remained on duty in South Vietnam for the next eleven years.

When the 57th, which was commanded by Captain John Temperelli Jr, was alerted at Fort George Meade, the unit was taken by surprise. As the Department of the Army had not thought to appoint a cook for the mission, Temperelli obtained a six months

supply of C-rations, and since they had no survival equipment, the men hastily made up their kits from local stores. The typical kit, stored in a parachute bag, contained a machete, canned water, C-rations, a lensatic compass, extra ammunition for their personal weapons, a signalling mirror and sundry items the men thought they might need in a crisis.

When they arrived in Vietnam in late April, the pilots had five 'Hueys', as their UH-1 helicopters were nicknamed. Along with the 8th Field Hospital, the 57th set itself up in the seaside town of Nha Trang, 200 miles (320 km) north-east of Saigon. It flew its first mission on 12 May when a Huey flew up the coast to Tuy Hoa, a distance of 40 miles (65 km) from Nha Trang and picked up a US Army captain suffering from an extremely high fever.

The 57th were shortly followed by the 23rd Special Warfare Aviation Detachment equipped with fixed-wing OV-1 Mohawks to provide reconnaissance and photographic coverage in support of the ARVN.

Much of this activity in Vietnam at the time was classified and what information did trickle through to the outside world did not arouse much interest in the 'man in the street'. However, even if the halls of military power in Washington were not engulfed in any real sense of drama in 1962, the commanders and their staffs were already at work considering the kind of war America might soon be fighting in a little-known country in South-east Asia.

One of the keys to success in the Second World War had been land mobility. The principal means of deploying an infantry soldier

An American aviator briefs a company of South Vietnamese soldiers before a heliborne mission in 1962. A 'Flying Banana' is seen in the background.

into battle had been in a wheeled or tracked vehicle or on foot, and although some airmobility had been achieved during the years 1939-45 with the development of parachute, glider and a few air-landing divisions, these operations had met with mixed success.

In its broadest sense, the airmobility concept envisages the use of aerial vehicles organic to the Army to assure the balance of troop movements, firepower, intelligence, support — and command and control. The terrain in Vietnam with its highlands, jungled lowlands and tortuous waterways and swamps of the Mekong Delta, along with the monsoon season, presented real problems to counter-insurgency operations, requiring the swift dispatch of troops to a battle zone or trouble spot. So, although in the early 1960s the helicopter was thought by many to be an expensive toy and vulnerable to an expert with a catapult, a rotor-winged aircraft was clearly more suited than the fixed-wing variety, by virtue of its lower speed and greater manoeuvrability, for all-round observation in fire support, intelligence and command and control roles and for landing and taking off with troops in restricted spaces.

While the first Army aviation units were deploying to Vietnam, settling 'in-country' and making their first tentative tests in combat, there were events in Washington which would have a profound influence on the future of airmobility. The Army was cautious, but Secretary of Defense Robert McNamara goaded the commanders into action and asked General Hamilton H. Howze, Commanding General of the Strategic Army Corps and of XVIII Airborne Corps at Fort Bragg, to report on the potential of airmobility and the helicopter in the US Army.

The final report of the Howze Board was submitted on 20 August 1962. The air assault division was the principal tactical innovation; as compared with about 100 aircraft in the standard division, it would have 459. Ground vehicles would be reduced from 3,452 to 1,100, which would also reduce the airlift requirement for strategic deployment. Artillery would consist of only 105 mm howitzers and Little John rockets (airtransportable in the Chinook helicopter). Augmenting this greatly reduced firepower, the division would employ 24 armed Mohawks, primarily a fixed-wing reconnaissance aircraft, and 36 Huey helicopters armed with 2.75 inch rockets.

The Howze Board also emphasized the need for a new breed of Army aviators. Some 8,900 aviators would be required in 1963, growing to 20,600 in 1968. The Board foresaw an increased need for Warrant Officer pilots and recommended an officer-to-warrant-officer ratio of one to one by the end of five years. It also recommended major changes in the officer career programme to

enhance their training, administration, and utilization.

The recommendations of the Howze Board and experimental work at the Army Aviation School, Transportation School, Signal School and Aberdeen Proving Ground made possible the order to form an air assault (test) division on 7 January 1963. The test division, which was activated at Fort Benning, Georgia, on 11 February was named the 11th Air Assault Division to revive the colours of the 11th Airborne Division, which had included the first parachute battalions to be raised in the United States in 1940 and which served in the Pacific Theatre from 1942 to 1945.

Brigadier General Harry W. O. Kinnard was selected to lead the 11th Air Division and he handpicked his key personnel and gave them the widest possible latitude in accomplishing their particular roles in the mission. Lieutenant Colonel John B. Stockton's 227th Assault Helicopter Battalion — the first in the Army — spent much of its time experimenting with the flying of Bell UH-1B Iroquois (Huey) helicopters over long distances through low cloud and maintaining tight formation flying at night. Meanwhile, the Boeing Vertol CH-47 Chinook Battalion under Lieutenant Colonel Benjamin S. Silver Jr devised new methods of moving artillery and key supplies.

The newly formed 10th Air Transport Brigade, under Colonel Delbert L. Bristol, with a combination of the fixed-wing Caribou, a STOL transport aircraft, and Chinooks devised the first workable air line of communications. Throughout the early formation and training period of the 11th Air Assault test units, there was a

In this early shot of a Bell UH-1B Iroquois in Vietnam, petrol is being pumped aboard from a 55-gallon drum. The location is Tay Ninh airstrip, 50 miles north-west of Saigon. The Hueys were used as armed escorts for H-21s (seen overhead) while on combat support missions.

The H-23 Hiller was primarily a trainer but, as the CH-23 Raven, also flew reconnaissance and medical evacuation missions in Vietnam, such as here in 1963.

continuous cross-feed of people, information, equipment and ideas between what was going on in Vietnam and what was going on at Fort Benning. In addition, the 11th Air Assault Division formed a total of six airmobile companies that were sent to Vietnam during the testing period.

In March 1965, when President Lyndon B. Johnson had already committed combat troops to the Vietnam War, a tentative decision was made to convert the 11th Air Assault Division (Test) to a fully-fledged fighting division, and it was decided that it would carry the colours of the 1st Cavalry Division which was then deployed in Korea. Thus the 'Air Cav' was born, and in the words of General 'Jumping Jim' Gavin — 'I don't mean horses'.

Hundreds of pilots arrived at Benning in the middle of June, but until the end of July were told that there was no truth in the rumours that they were going to Vietnam. Like most Americans at the time, the pilots knew little or nothing about the political situation in Vietnam but they were eager to fly. During their nine-month period of flight training discipline was harsh and the fall-out rate high, but those with the right aptitudes relished the new and thrilling experience of flying helicopters.

Training commenced at the US Army Primary Helicopter School at Fort Wolters, Texas, where the pilot candidates underwent one month of pre-flight training and four months of primary flight training. This was followed by four months of advanced training at Fort Rucker, Alabama. The pilots did their primary training on the H-23 Hiller, or CH-23 Raven as it was properly known, primarily a

Above *A US Air Force Sikorsky H-19 Chickasaw helicopter at Bien Hoa Air Base in the Republic of Vietnam, 1962.*

Below *An H-19 medium-transport helicopter of the US Air Force lands a National Guard squad on a training exercise in the USA.*

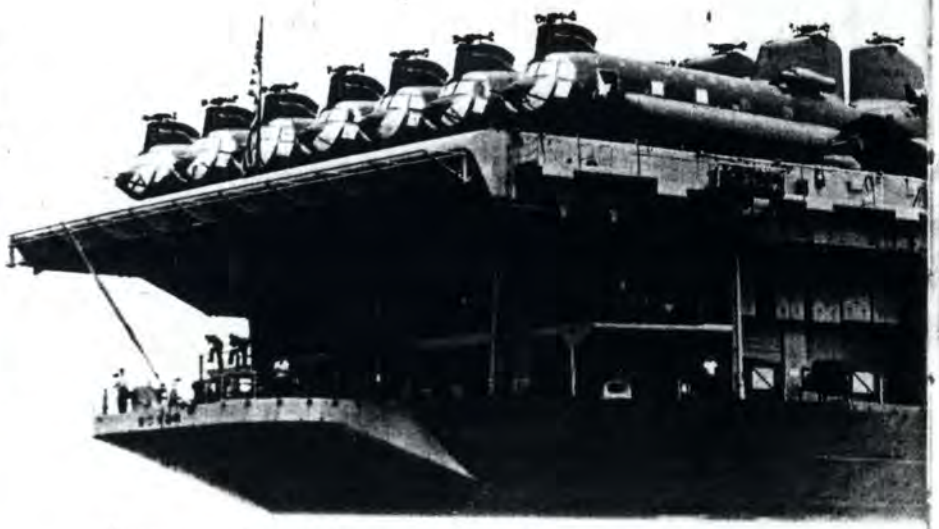
The CH-23 was also in action in the thick of the fighting of the Vietnam War. Here a Raven comes in for a landing among tanks and armoured personnel carriers of the 11th Armored Cavalry Regiment near Bien Hoa in 1966.

trainer, but which also flew reconnaissance and medical evacuation missions in Vietnam.

A total of 85 hours of flight time was logged by each trainee at Wolters, then a further 88 hours were spent flying the H-19 Sikorsky, correctly designated the UH-19D Chickasaw, whose mission included transportation of cargo and up to ten passengers, together with rescue and observation operations (cargo was carried externally). During the last month at Rucker, each pilot would log 27 hours in the ship all were lusting to fly — the Bell UH-1B Iroquois — which in its wide-ranging roles was to be the universally recognized silhouette in the Vietnam skies.

When the pilot graduates reached the 1st Cavalry Division *en route* for Vietnam, they went through a rush course in combat techniques devised by the 'old salts' who had taken part in two big wargames in the Carolinas during the previous two years. Their speciality was low-level flying following the map contours, and to increase their confidence the pilots were taught barnstorming tricks like flying under power lines and making low-level turns so steep that the rotor tips nearly touched the ground.

With the Hueys, the most important technique for refinement was close formation flying. At Rucker, the pilots defined 'close' as



Boeing-Vertol CH-47 Chinooks of the 1st Cavalry Division (Airmobile) are seen aboard the US aircraft carrier USS Boxer *at Qui Nhon in September 1965.*

being in sight of one another, but now proximity must be measured in rotor diameters. In Vietnam, a flight of four Huey 'slicks' (the term coined for a transport helicopter) would have to fly, land and take off very close together from a small landing zone (LZ). Closeness meant from one to three rotor diameters, although in practice they flew at one or less.

On 28 July 1965, nearly 20,000 men of the 1st Cavalry Division knew for certain that they were on their way to Vietnam. On that day, President Johnson announced on television 'We will stand in Vietnam' and 'I have today ordered to Vietnam the Air Mobile Division'. The games were over. Life was getting very serious for the 'Air Cav'.

The division staged out of Mobile, Alabama, and Jacksonville, Florida, on the USS *Boxer*, three Military Sea Transportation Ships, six troop carriers and seven cargo ships. Approximately 80,000 man hours were required to process the cargoes of Hueys, Chinooks, Mohawks and Caribous crammed aboard the four aircraft carriers for protection against the sea conditions. The USS

Boxer proceeded via the Suez Canal while the other vessels crossed the Pacific.

An advance party of 1,000 men was airlifted and landed in the Republic of Vietnam on 25 August. They proceeded to An Khe, which was situated about halfway between the coastal town of Qui Nhon and Pleiku on the 100-mile (160-km) east-west stretch of road called Route 19, and which was to be the 'Air Cav's' highlands base in the heart of Viet Cong territory. An Khe itself was a tiny village two miles off the main highway, and here the advance party commenced work clearing the surrounding countryside for what was to be the world's largest helipad.

The ships dropped anchor in Lang Mai Bay, south of Qui Nhon, checked, loaded and off the ships on arrival. The vinyl coating during the second week of September after about a month at sea. Three days were allowed to get the helicopters assembled, applied to those lashed to the flight-decks was peeled off and thrown overboard, and boxes of rotor blades were brought up to the decks to be sorted out and attached to their mountings. More helicopters were stored in the hangars and they also needed assembling before the flight to An Khe.

While the choppers were being readied for flight, the pilots observed the Marine helicopter carrier *Iwo Jima*, which was also lying in the bay, with great interest. Marine pilots launched their huge UH-34D Seahorses, which specialized in supply delivery and rescue missions, off the rolling decks of their carrier, flew to the shore and then returned. For the 'Air Cav' crews it would be different: they would live in tents and be in the thick of the fight daily. The helicopters took off for An Khe with a brief stop for fuel at Qui Nhon. The US Cavalry was about to add a new chapter to its proud history.

The UH-34E Seahorse, a utility helicopter of the US Marine Corps, demonstrates its ability to deliver ammunition on a training exercise in the United States.

requirement specified a lightweight, simple and flexible turret gun to be provided for all Army transport helicopters. Tactical experiments had proven the obvious requirement for some type of suppressive gunfire to be delivered by transport helicopters during the critical approach phase of a combat assault, and although the light turret gun was never developed as conceived, the Army was soon looking at other ways of arming helicopters. By mid-1957, a 'Sky Cav' platoon had been formed at the Army Aviation School at Fort Rucker, Alabama. This experimental team, led by Colonel Jay D. Vanderpool, acquired two H-21s, one H-25 and one H-19, and

An H-37 beats up the water as it strains to lift a 'Flying Banana' from a paddy field in the Mekong Delta in 1964.

A Sikorsky H-37 Mohave helicopter of the US Army in flight.

armed them with a variety of machine-guns and rockets. One of the most important milestones during this period was the development of the XH-40 Bell Utility Helicopter, powered with a gas turbine. Although designed as an aerial ambulance, it was recognized even then that this machine might turn out to be the most useful aerial platform ever put into production.

The early Bell XH-40 was standardized as the HU-1 and was envisaged then to be the replacement for the L-20 utility fixed-wing aircraft and the H-19 utility helicopter. Further developments of the Bell machine were planned to assume the bulk of the missions then performed by the Sikorsky H-34 and the

A crashed helicopter (Mohave H-37) which went down while trying to lift out a damaged Huey lies immobile in a clearing north of Bien Hoa, South Vietnam, in September 1965.

Air Assault Division (Test), and when the new division was activated on 1 July 1965 it was up to the 'Air Cav' to see through the job which had begun so well. Altogether, the Cavalry Division consisted of 15,787 officers and men.

It was also during this second stage that the Huey series came into its own. The turbine-engined helicopter, with its great power, its reliability and its minimum requirement for maintenance, was the technological turning point as far as airmobility was concerned. Actually, the key improvement of technology was the trio of the Huey, as a troop-lift bird, the Chinook, with its larger capacity for resupply and movement of artillery, and the fledgling attack helicopter — these together allowed the Americans to take a giant step forward.

The lie of the land and the guerrilla nature of Viet Cong warfare in South Vietnam dictated the creation of the new era of the helicopter. South Vietnam consists of three major geographic features. A coastal plain, varying in width from 9 to 15 miles (15 to 40 km), extends along most of the 870 miles (1,400 km) of the coast. This plain abuts on the second feature, the south-eastern edge of the Annamite mountain chain (known in South Vietnam as the Central Highlands) which runs from the northern border along the old Demilitarized Zone southwards to within 31 miles (80 km) of Saigon. The Central Highlands are mostly steep-sloped, sharp-crested mountains varying in height from 5,000 feet (1,500 m) to 8,000 feet (2,435 m), covered with tangled jungles and broken by many narrow passes. The southern third of the country consists almost entirely of an arable delta.

These three geographical features helped shape the four military zones of South Vietnam. The northern zone, or I Corps Zone, which ran from the Demilitarized Zone down to the Kontum and Binh Dinh provinces, consisted almost entirely of high mountains and dense jungles. At several points the Annamites cut the narrow coastal plain and extend to the South China Sea. II Corps Zone ran from I Corps Zone south to the southern foothills of the Central Highlands, about 62 miles (100 km) north of Saigon. It consisted of a long stretch of coastal plain, the highest portion of the Central Highlands, and the Kontum and Darlac Plateaux.

III Corps Zone ran from II Corps Zone south-west to a line 25 miles (40 km) below the capital, Saigon. This was an intermediate geographic region, containing the southern foothills of the Central Highlands, a few large, dry plains, some thick, triple-canopy jungle along the Cambodian border and the northern stretches of the delta formed by the Mekong River to the south.

Finally, IV Corps Zone consisted almost entirely of this delta, which has no forests except for dense mangrove swamps at the southernmost tip and forested areas north and south-east of

Saigon. Seldom more than 20 feet (6 m) above sea level, the delta is covered with rice fields separated by earthen dikes. During the rainy season the paddies are marshy, making helicopter landings especially difficult. Hamlets straddle the rivers and canals, and large villages (up to 10,000 people and usually surrounded by bamboo brakes and tropical trees) and cities lie at the junctions of the waterways. Altogether there are 3,000 miles of navigable waterways in the Mekong Delta.

South Vietnam lies below the Tropic of Cancer, between the 8th and 17th parallels, and the climate is generally hot and humid all year round. In winter the country lies under a high pressure system that causes a dry season in the south, but in the summer, however, rains fall heavily, varying from torrential downpours to steady mists (the monsoon in the I Corps area actually occurs later in the year). The northern region of South Vietnam has the highest rainfall averaging 128 inches (325 cm), while the Saigon region averages 80 inches (203 cm). In the northern region and the Central Highlands, where most of the fighting by US troops took place, dense fog and low clouds often grounded all aircraft. About ten times a year, usually between July and November, typhoons blow in from the South China Sea, soaking South Vietnam with heavy rains and lashing it with fierce winds.

Early attempts had been made to arm the Vertol CH-21 Shawnee helicopter, popularly known as the 'Flying Banana', which the US Air Rescue Service had acquired in 1956 as an Arctic rescue chopper (SH-21B). As a rescue helicopter, the SH-21B carried twelve stretcher patients and a medical attendant, while the CH-21 was armed with a light machine-gun at its door although the fire was relatively ineffective. The Shawnee nonetheless made its mark in the early years of the American involvement in Vietnam. In January 1962, South Vietnamese intelligence had heard of an enemy radio station operating near the village of Ap Bac in the Plain of Reeds. Fifty US advisers and 400 men of the ARVN 7th Infantry Division flew in ten CH-21 Shawnee helicopters to the area, five UH-1s that would serve as close air cover escorted the convoy.

The first three waves of helicopters dropped their troops into the landing zone without difficulty, but just as the fourth wave was touching down, Viet Cong opened fire with automatic weapons and shot down four of the CH-21s. A Huey moved into the face of the enemy fire to try to rescue one of the downed crews but it too crashed — the first UH-1B destroyed by the enemy in the Vietnam War. The other four UH-1s suppressed the VC fire, allowing the Shawnees to leave the hotly contested area without further loss.

Other than the unusually large number of forces involved, the battle was typical for this period: in the ground fight that followed,

CH-21 helicopters return to Soc Trang airfield after carrying South Vietnamese troops on strikes against the Viet Cong in February 1963.

the South Vietnamese infantry failed to surround the Viet Cong, who escaped under the cover of night. Three American advisers and 64 ARVN soldiers were killed, and unfortunately the 57th Medical Detachment, still stationed at Nha Trang and Qui Nhon far to the north, was out of range to evacuate the wounded. The radio station had been silenced, though, and there is no doubt that the VC realized for the first time that in the helicopter they were facing a potent weapon. Shortly afterwards the 57th moved to Tan Son Nhut Air Base in Saigon.

To meet the requirement for a suitable armed helicopter, the Army had formed the Utility Tactical Transport Helicopter Company and deployed it to Vietnam in mid-1962. This company was equipped with UH-1 helicopters armed with .30 calibre machine-guns and 2.75 rocket launchers and was designed to provide protective fire for the CH-21 transport helicopters.

Much of the tactical doctrine for armed helicopter employment was evolved during this period, including the techniques for protective fire and the preparation of landing zones prior to and during a helicopter assault. The Utility Tactical Transport Helicopter Company was redesignated the 68th Aviation Company and later the 197th Airmobile Company, and its early history was studied intensely by a special group known as the Army Concept Team in Vietnam which was established in Saigon on 6 November 1962.

The first element of 15 armed Hueys arrived in Vietnam in September 1962. During the period from 16 October 1962 to 15 March 1963, General Rowny, who headed the Army Concept

Team, subjected the Hueys to severe testing in actual combat conditions. Fundamental limitations were imposed, though, in the form of the 'rules of engagement' for US Army armed helicopters, which precluded testing of any tactical concepts involving 'offensive' employment. Under these rules, the armed helicopters could deliver fire only after they or the escorted transport helicopters had been fired upon. In late February 1963, the rules were modified to permit the armed helicopters to initiate fire against clearly identified insurgents who threatened their safety or the safety of the escorted transport helicopters.

Initially, the 15 UH-1A helicopters were armed with locally fabricated weapons systems consisting of two .30 calibre machine-guns and 16 2.75 inch rockets. In November 1962, the unit was augmented with 11 UH-1B helicopters, which were equipped with factory-installed weapons systems of four M-60 machine-guns per aircraft and locally fabricated clusters of eight 2.75 inch rockets. In this form the 'B' model eventually replaced most of the less powerful 'A's.

The provisional Utility Tactical Transport Helicopter Company was based at Tan Son Nhut and was under the direct operational control of Military Assistance Command, Vietnam. From this base, it supported the transport operations of the 57th, 33rd and 93rd Light Helicopter Companies, all equipped with CH-21 aircraft. In the latter part of the test period, one platoon of Hueys was sent to escort the Marine H-34 squadron operating in I Corps.

The first consideration of the armed helicopter was to preserve the safety of the troop transport. This 'escort' role was never precisely defined but broadly speaking it broke down into two phases. There was the '*en route*' phase, which was generally flown at a safe altitude, and the 'approach phase', where the heliborne force descended to almost ground level several miles from the landing zone. The escorts preceded the transports into the LZ and remained until all the latter had departed. From the commencement of the run-in, the helicopters were at all times vulnerable to small arms fire, and when the LZ was small and the transport force used an extended formation, the period of exposure for armed escorts was unnecessarily long.

By mid-1963, the 1st Platoon of the Utility Tactical Transport Helicopter Company which worked with the H-34s in the I Corps sector had become adopted by their comrades-in-arms as an integral part of their operations, and few, if any, H-34 pilots elected to fly without the armed Hueys nearby. Procedures were developed whereby the Hueys picked up the fire support immediately the fixed-wing fighter aircraft broke off their support for safety reasons, and that, in most cases, was after last minute reconnaissance of the LZ by the armed choppers.

The Sikorsky UH-34D Seahorse was the Marine Corps version of the US Army H-34A Choctaw, and was also flown by the US Navy. It carried two crew and 18 passengers or eight stretchers and was unarmed. On 6 and 7 July 1964, the Viet Cong attacked the Green Beret Civilian Irregular Defense Group (CIDG) camp at Nam Dong in south-west Thua Thien province. Located at the junction of the borders of South and North Vietnam and Laos, the defenders had no tactical air support available, and their only hope lay in the unarmed helicopters which would have to run the gauntlet to come to their aid. Eighteen Marine Corps Seahorses and ten Army Choctaws met the challenge, delivering 9,500 lbs (431 kg) of ammunition, medical supplies and other equipment. The VC were driven off after three ground assaults.

When the UH-1B transport helicopter was first introduced in Vietnam, it usually carried ten combat-equipped Vietnamese soldiers. When ten soldiers were loaded into the Huey with a full fuel load, a US Army crew of four, armour plate, a tool box, a container of water, a case of emergency rations, weapons and armoured vests for the crew, it was grossly over the maximum operational weight. Not only that, but the centre of gravity shifted beyond the safe limits. As a consequence, the standard procedure was to limit the UH-1B to eight combat troops except in grave emergencies. It was also directed that the armed helicopter would carry no more than the normal complement of five personnel and armament with the basic load.

The lack of heavy enemy air defence had much to do with the selection of flight altitudes. During the early years, flights were made at 1,500 feet (456 m) to reduce the chances of being hit by ground fire. Various companies used different helicopter formations *en route* to a combat assault, and a major consideration in the selection of a formation was the size and shape of the landing zone and the company commander's requirements for disembarking his troops after landing. A modified trail formation was sometimes used when an uninterrupted flow of troops into a small landing area was desired. The formation most frequently used was the 'V', which proved to be versatile and easy to control, and also permitted landing of the flight in a minimum of time without bunching.

Helicopters normally flew about 45 degrees to the side and rear of the lead ship and high enough to be out of the rotor wash, while armed helicopters operated at the same altitude as the escorted force. A reconnaissance element of two or four armed helicopters preceded the transports by one to five minutes while the remaining escorts normally flanked the transports in a trail formation. If additional armed ships were available, they were positioned in the rear of the transports to engage targets under the flight.

A UH-1B Huey brings in 50-gallon water-drums to an outpost on Black Virgin Mountain, a Viet Cong stronghold, just 60 miles north-west of Saigon.

The helicopter companies always attempted to plan return routes that were different from the approach routes. For subsequent lifts, routes were varied slightly to avoid flying over a given area more than once, and, if one landing zone was used several times, the final approach and entry for each lift was varied if at all possible. In mountainous areas and in some jungle areas, it was not possible to vary the route of approach; consequently, every attempt was made to land the troops in the shortest possible time to minimize danger.

The critical approach phase was initiated by all transport helicopters at the same time in an attempt to place all aircraft on the ground simultaneously. This was difficult to accomplish because of the stepped altitude of the formation, the rotor wash encountered during descent, and the difficulty in finding a suitable touchdown spot for each ship — however, it remained a goal. The terrain in the landing zone sometimes slowed the disembarking of troops — in the Mekong Delta, for example, water was often chest deep and the ship had to maintain a low hover with the skids just beneath the water level, while in jungle areas, grass taller than the average man was encountered. Two minutes from the moment the first helicopter touched down until the last ship lifted off was considered average unloading time for a 12-ship formation.

To lessen the possibility of fire being concentrated on a single ship, all helicopters attempted to depart at the same time. Direction of take-off was varied for subsequent flights, and whenever possible the armed escorts used the same tactics on both the

approach and return routes with the exception that the ships originally used for reconnaissance were the last to leave the landing zone and consequently usually brought up the rear. If another lift was required, the formation returned to the loading area for troops and, if necessary, the aircraft were refuelled and rearmed.

By November 1964, all helicopter companies in South Vietnam had organized their own 'Eagle Flight' formations, air assault teams constantly on alert. Each infantry company had at least one such flight in an alert status; the Vietnamese troop commanders were particularly enthusiastic about the arrangement for it provided a very close working relationship between the air and ground elements, and a special *esprit de corps* was built up from the day-to-day operations. A typical 'Eagle Flight' would consist of the following: one armed Huey would serve as the command and control ship and would have the US Army aviation commander and the Republic of Vietnam troop commander aboard; seven unarmed Hueys were used to transport the combat elements; five armed Hueys gave the fire support and escort to the troop-carrying helicopters; and one Huey was usually designated as a medical evacuation ship.

The 'Eagle Flights' were usually kept on a standby basis or sometimes even airborne searching for their own targets. Not only were the 'Eagle Flights' immediately available for those missions which required a minimum of planning, but they also provided the basis for larger operations. Sometimes several were used against targets that, when developed, proved too large for a single unit.

Simply stated, the 'Eagle Flight' was a microcosm of the large airmobile assaults that were destined to take place later. It had all the attributes of a true airmobile force with the self-contained reconnaissance and surveillance ability, firepower, and infantry troops. Above all, these early 'Eagle Flights' were able to capitalize on the element of surprise which was so often lost in the detailed planning cycle with ARVN forces.

Three other helicopters were employed in the pre-1965 line-up of US aircraft in Vietnam. At the beginning of 1964, the United States had 248 helicopters 'in-country', which included nine US Army Sikorsky CH-37A Mohaves. This cargo, equipment and troop carrier was first placed in service in 1956, and could accommodate pilot, co-pilot, equipment operator and 23 passengers or 24 stretcher cases. Its payload was 5,300 lbs (2,404 kg) and it could carry an external cargo of 10,000 lbs (4,536 kg).

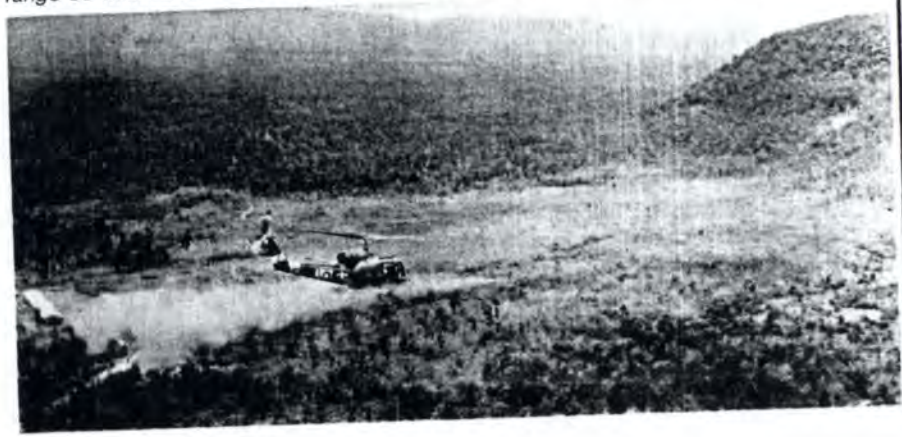
In the early 1960s, the Kaman HH-43 Huskie, a short range (220 mile/354 km) helicopter, was the only crash rescue helicopter in the US Air Force inventory. However, local base rescue units in the United States and overseas which operated the HH-43

Crew members load rockets into the launchers of a Bell UH-1B Iroquois in Vietnam, September 1964.

considered it inadequate for duty in South-east Asia and the loss of two American aircraft within 24 hours over northern Laos urged the Joint Chiefs of Staff to hasten the dispatch of Rescue Service units to Vietnam. As a result of a directive in May, two HH-43Bs together with their crews and mechanics were sent from the 33rd Air Rescue Squadron at Naha Air Station, Okinawa, to Bien Hoa. In the event, the Huskies were diverted and re-routed to Nakhon Phanom Royal Thai Air Force Base on the Thai-Laos border. At the same time, Marine H-34s at Khe Sanh were also alerted for Air Rescue Service.

The HH-43B was a turbine-powered development of the earlier HH-43 piston-engined series and the first production model flew in December 1958. One interesting feature of the Huskie was introduced in 1961 when a new type of rotor blade was fitted,

A Bell UH-1A Iroquois fires a couple of HEAT rockets at a target on a firing range 35 miles north-east of Korat, Thailand, in August 1963.



made entirely of glass fibre. Another feature of the HH-43B was that it had twice the cabin space and payload capacity of the HH-43A, the increased space having been made by mounting the lighter and more compact turbine engine above the cabin and between the rotor pylons, instead of at the rear of the cabin. The Huskie accommodated two crew and six passengers and was not armed.

On 1 October 1961, the Air Rescue Service in the USA integrated 70 local base units into its structure. These utilized 69 H-43Bs, 17 piston-driven H-43As, 58 H-19Bs and four SH-21Bs. A handful of Sikorsky H-19s (US Army name Chickasaw) from the US Air Rescue Service stateside arrived at Udorn in June 1962. The H-19, which had seen service in Korea, Indochina and featured in pilot training was the Sikorsky S-55; it was adopted by the USAF, US Army Field Forces, US Navy, US Marine Corps and US Coast Guard, and flew in British colours with the Royal Air Force and Royal Navy as the Westland Whirlwind.

BELL AH-1 HUEYCOBRA

(AH-1G, AH-1J)

Origin Bell Aerospace Corporation, Buffalo 5, New York; **Mission** *En route* escort reconnaissance, direct fire support; **Service** (AH-1G) US Army, (AH-1J) US Marine Corps.

AH-1G HUEY COBRA LYCOMING

Engine T53-L-13 1,400 shp (derated to 1,100 shp) shaft-turbine; **Rotor diameter** 44 ft (13.41 m); **Overall length** 52 ft 11½ in (16.14 m); **Skid track** 7 ft (2.13 m); **Overall height** 13 ft 5½ in (4.1 m); **Weight** (empty) 6,096 lbs (2,765 kg), (loaded) 9,500 lbs (4,309 kg); **Maximum speed** (loaded, at sea level) 219 mph (352 km/h); **Cruising speed** (loaded) 205 mph (330 km/h); **Range** (loaded, no reserves) 387 miles (622 km); **Armament** GAU 2B/A (formerly XM-134) minigun six-barrel 7.62 mm machine-gun with 8,000 rounds; TAT-102A turret superseded on AH-1G by XM-28 subsystem, mounting either two miniguns with 4,000 rounds each, two XM-129 (similar to XM-75 40 mm grenade launchers) with 300 rounds each or one minigun and one XM-129; four external stores attachments beneath stub-wings accommodating various loads including a total of 76 2.75 in rockets in four XM-159 packs, 28 similar rockets in four XM-157 packs, two XM-18E1 minigun pods, one XM-35 20 mm gun kit, or two pods each containing four TOW wire-guided missiles; **Accommodation** Crew of two (pilot and co-pilot/gunner), no passengers.

AH-1J SEACOBRA

Engine Twin engine, Pratt & Whitney (UACL) T400-CP-400 1,800 shp coupled free-turbine/shaft-turbine power plant; **Rotor diameter** 44 ft (13.41 m); **Overall length** 53 ft 4 in (16.25 m); **Skid track** 7 ft (2.13 m); **Overall height** 13 ft 8 in (4.16 m); **Weight** (empty) 6,518 lbs (2,956 kg), (loaded) 10,000 lbs (4,536 kg); **Maximum speed** (loaded, at sea level) 207 mph (333 km/h); **Cruising speed** (loaded) 202 mph (325 km/h); **Range** (loaded, no reserves) 359 miles (578 km); **Armament** Electrically-driven 20 mm turret system, developed by the General Electric Company, faired into the forward lower fuselage housing one XM-197 three-barrel weapon, a lightweight version of the General Electric M-61 cannon (M-61A1 20 mm Vulcan) (structured provision in the AH-1 airframe also given for a three-barrel 30 mm turret system); four external stores attachment points beneath stub-wings accommodating various loads, including XM-18E1 7.62 mm minigun pods as well as 2.75 in folding fin rockets in either 7-tube (XM-157) or 19-tube (XM-159) packs; **Accommodation** Crew of two (pilot and co-pilot/gunner), no passengers.

The HueyCobra came into being as the result of an urgent programme initiated by the US Army when the Vietnam War revealed the need for a fast, well-armed helicopter to provide escort and fire support for the CH-47A Chinook. None of the helicopters then existing in the Army inventory had the ideal

Maintenance was not the only problem. The enemy considered the Marine helicopter units to be a particular thorn in their side and began to plan a devastating attack. In a well-mounted night assault on 27 October 1965, the Viet Cong hit Marble Mountain airbase with rockets, grenades and gun fire, completely destroying 19 helicopters and inflicting substantial damage on 11 others. Marine Air Group 16 suffered particularly heavily, losing 13 of its UH-1Es as completely destroyed while several others were knocked out of action for major repairs. In the space of a couple of hours, MAG-16 was reduced to flying only four UH-1Es.

The Marines were always short of UH-1Es, and only 56 of the type were active by March 1966. Two other VMO squadrons, however, were formed during this period and the Marines had to take twenty UH-1Bs from the Army. These aircraft were used for training, but they had drawbacks including the fact they were not equipped with rotor brakes, making them distinctly unpopular with the deck crews! However, this infusion enabled training UH-1Bs to be assigned to combat units. The UH-1E built up an excellent combat record in Vietnam and the type served until 1973 when the Americans pulled out of the Vietnam War.

Following replacement of the original T53-L-11 shaft-turbine by

A crew chief from the 162nd (Assault Helicopter) Aviation Company prepares to refuel a UH-1D helicopter in 1970.

A member of Co 'B', 2nd Bn, 7th Cavalry, 1st Cavalry Division (Airmobile) guides in a UH-1D helicopter for extraction operations in Phuoc Thanh Province, 1971.

the 1,400 shp T53-L-13, the version of the UH-1D in production in 1967 was redesignated UH-1H. The details for the UH-1H were the same as for the UH-1D, with the exception of the more powerful engine. Initial deliveries began in September 1967 and continued at a steady rate; a contract was placed the same month for 553 aircraft, of which deliveries began in December 1968.

Although the basic overall details were the same, the UH-1H did have other advantages over the UH-1D (which incidentally was the most numerous helicopter in Vietnam) apart from its engine. In the tests at Long Binh referred to on page 72, the UH-1D could not lift a casualty of average weight in those temperature conditions; the UH-1H on the other hand could pull five hoist patients. After the departure in September 1968 of the last UH-1Ds, the entire air ambulance fleet was equipped with UH-1Hs, solving many of the problems caused by high density altitudes, hoist missions and heavy loads.

Also, unlike most of the UH-1Ds, the UH-1H was fully instrumented for flight at night and in poor weather, and proved to be a rugged machine, needing comparatively little time for maintenance and repairs. Like the earlier models, the single-rotor

most critical of all its Cambodian operations, best illustrated the use of the cargo helicopters. The withdrawal sequence was time-phased to allow for the redeployment of one fire support base each day. This phasing would allow for a realistic spreading of the aircraft schedules, particularly the CH-54 Sky Cranes of the 273rd Aviation Company which were required for the movement of bridges, 155 mm howitzers, ½-ton trucks and bulldozers. On the second day of the extraction, while lifting the 1st Battalion, 50th Cavalry, from Fire Support Base David, the aviation units ran into extremely poor weather with ceilings at zero, fog and rain. The Chinooks from the 228th Assault Support Helicopter Battalion showed the ultimate in professionalism by flying at extremely low levels through the valleys, skirting the fog-covered hills, to extract the unit.

SIKORSKY H-34 SERIES

Origin Sikorsky Aircraft, Division of United Aircraft Corporation, Stratford, Connecticut **Mission** General purpose helicopter **Service** US Army (CH-34 Choctaw), US Navy (LH-34 and SH-34 Seabat), US Marine Corps (UH-34 and VH-34 Seahorse)

Engine One 1,525 hp Wright R-1820 84 B/D; **Rotor diameter** 56 ft 8 in (17.25 m); **Overall length** 46 ft 9 in (14.23 m); **Width** (blades folded) 12 ft 11 in (3.92 m); **Overall height** 15 ft 11 in (4.84 m); **Weight** (empty) 7,900 lbs (3,583 kg), (loaded) 13,000 lbs (5,897 kg) (UH-34D); **Maximum speed** (loaded, at sea level) 122 mph (196 km/h) (UH-34D); **Cruising speed** (loaded) 97 mph (156 km/h) (UH-34D); **Range** (loaded, with reserves) 247 miles (398 km) (UH-34D); **Armament** None; **Accommodation** Two crew, dual control, seated in compartment above main cabin which carried 16-18 troops, eight stretchers, or supplies.

The H-34, which was basically the Sikorsky S-58, was supplied at the time of the Vietnam War in the following versions:

CH-34A (formerly H-34A) Choctaw, the transport and general purpose helicopter in service with the US Army, armed experimentally with rockets and machine-guns.

An early version of the US Army H-34 'Choctaw' stands in front of a hangar at Fort Lewis, Washington.

CH-34C (formerly H-34C) Choctaw, similar to the CH-34A, and fitted with airborne search equipment.

LH-34D (formerly HSS-1L), a US Navy Seabat adapted for winter conditions.

UH-34D (formerly HUS-1) Seahorse, a utility version first accepted into service by the Marine Corps in January 1957, firing experimentally Bullpup missiles. Altogether 519 were completed by January 1964.

UH-34D (formerly HUS-1Z), a Seahorse fitted out for VIP travel.

UH-34E (formerly HUS-1A) Seahorse, a version of the UH-34 fitted with pontoons for emergency operation from water and during amphibious assaults.

SH-34G (formerly HSS-1) Seabat, an anti-submarine version accepted into service by the US Navy in February 1954.

SH-34J (formerly HSS-1N) Seabat, a version of the SH-34G developed for the US Navy utilizing Sikorsky automatic stabilization equipment and suitable for day and night instrument flying.

The first prototype of the H-34 flew on 8 March 1954, and the first production machine on 20 September 1954. Of the various types in service, including the US Coast Guard and commercial operators, the Marine Corps had the largest supply. With its four-blade, all-metal main and tail rotors, the H-34 was a sturdy helicopter with a semi-monocoque structure, primarily of magnesium and aluminium alloys but with some titanium and stainless steel. The pilots sat side by side operating the machine by dual control. The H-34 was supplied to ten foreign nations and gas-turbined versions were produced by Westland in the UK under the name Wessex.

As has been remarked elsewhere in this handbook, the first Marine helicopter squadron arrived in South Vietnam in April 1962 and was first stationed at Soc Trang in the Mekong Delta, although 16 US Army H-34 Choctaws were in South-east Asia as early as March 1961. These Choctaws, which were based at Udorn in Thailand, were provided for Air America, the CIA-sponsored 'company with government contracts', to fly men and material in South-east Asia. President Kennedy, who was closely watching events in Laos at the time, did not want to involve American personnel in Laos, but the Choctaws, flown by civilian crews, were available for rescue missions should the need arise.

The Marine UH-34D, or Seahorse, gained prominence in Vietnam as a search and rescue helicopter and a re-supply aircraft which on 6-7 March 1964 went to the aid of the Green Berets besieged at Nam Dong, and between 20 January and 1 April 1968 also played an important part transporting supplies in to the Marines and ARVN holding out at Khe Sanh. During the siege, UH-34s, CH-46s and UH-IEs were subjected to a murderous

Above *Marines of the 1st Battalion, 7th Marines, disembarked from UH-34 helicopters pause after an unopposed landing in a rice paddy during Operation 'Nevada' on the Batangan Peninsula in April 1966.*

Below *In the South China Sea, US Marine Corps UH-34 Seahorse helicopters line the deck of the Amphibious Assault Ship USS* Iwo Jima *(LPH-2) in February 1967.*

barrage by North Vietnam Army heavy automatic weapons emplaced on the tops of surrounding hills.

In the early 'advisory years', the USAF Air Rescue Service was restricted in its activities by political considerations. Since the US aircrews were supposedly conducting training missions only, there should have been little chance that anyone would be shot down. The presence of regular search and rescue forces, however, complete with helicopters and HU-16 amphibious craft, advertised the existence of air operations with a casualty potential far greater than that to be expected in the course of normal flight training. A small Search and Rescue Centre was, nevertheless, set up at Tan Son Nhut Air Base, Saigon, in December 1961.

As the pace quickened in the Vietnam conflict, the USAF was painstaking in its efforts to pick up downed flyers, and many aircraft and lives were lost in these gallant attempts, often carried out in the face of Viet Cong fire. One typical rescue operation involving Marine H-34 helicopters began on the afternoon of 8 October 1963, when two T-28 Nomads of the 4400th Combat Crew Training Squadron, code-named 'Farm Gate', rolled in on a target in the mountainous jungle area west of Danang near the Laotian jungle. One of the T-28s piloted by Americans went out of control when making a bomb run and the aircraft disintegrated on impact with the ground.

The pilot of the second aircraft returned to base and reported the loss of the T-28, which had crashed near a swollen stream that flowed into the Buong River. When the report reached Major Alan W. Saunders, Commander, Detachment 3, Pacific Air Rescue Centre, at his Saigon office, he immediately left for Danang to organize the rescue bid. On arrival, he was told that two Marine H-34s had flown to the crash site only a few hours earlier and disappeared in an area known as 'VC Valley'.

At dawn on the 9th, H-34s lifted two Vietnamese Infantry companies to the area of the downed aircraft, and as the helicopters landed enemy troops firing from the surrounding hillsides wounded three US Marine crewmen and killed a Vietnamese soldier. 'Farm Gate' T-28s, B-26s and a Vietnamese Air Force A-1 Skyraider responded by strafing the enemy positions. An American L-19 light observation plane directing the strike aircraft was hit, but managed a forced landing in friendly territory. Meanwhile, the South Vietnamese Army force began to hack out a larger landing zone to facilitate further landings.

When that task was finished, the troops began to work their way to the site of the H-34 crashes, reaching the downed choppers the next morning, 10 October, only to find the remains of ten of the twelve persons who had been aboard the two aircraft. The other two, if they had survived, had probably been carried off by the Viet

It took two days, with a battle raging nearby, for a Marine Aircraft Group (MAG)-16 maintenance crew to dismantle a troop-carrying UH-34D helicopter so that a larger CH-37 could carry it home. This action took place within ten miles of Danang in October 1965.

Cong. On 11 October, more Marine helicopters airlifted Major Saunders and his rescue team to the landing zone where they located heavy fire from hostile forces nearby. The pilots diverted to a clear area along the stream about 2½ miles north of the T-28 wreckage, from whence Major Saunders led his party through the dense jungle undergrowth, avoiding trails to lessen the risk of encountering Viet Cong booby traps. It was several hours before they hacked their way to the partially submerged wreckage of the T-28, but there was no sign of the two crewmen. After picking up the party, one of the H-34s was hit but fortunately all on board were retrieved by another H-34. The South Vietnamese Army troops in the clearing spent the night in Viet Cong territory before being lifted out the following morning.

On 15 October, Major Saunders, this time assisted by a Green Beret team and a South Vietnam Army Ranger unit, returned in H-34s to the landing zone in another effort to find any clues to the fate of the crew. Enemy resistance slowed their progress, so they did not reach the T-28 wreckage until the following day. When the party reached the crash site, the Viet Cong launched a heavy attack which was broken up by the Rangers taking up positions on a ridgeline overlooking the shattered aircraft.

After the area was finally cleared of Viet Cong, Major Saunders organized an intensive search that lasted three days, but other than the pilot's headset no sign of the missing men was ever found. Saunders believed that either the Viet Cong had killed the two men, or they had been carried away in the fast-moving waters of the swollen stream. A helicopter then extracted the search team without further loss.

SIKORSKY S-61

(S-61A, S-61B, S-61F, S-61R)

Origin Sikorsky Aircraft, Division of United Aircraft Corporation, Stratford, Connecticut **Mission** All-weather transport, search and rescue helicopter **Service** US Navy (UH-3 and SH-3D Sea King), US Air Force Air Rescue and Recovery Service (HH-3E Jolly Green Giant)

HH-3 and SH-3D SEA KING

Engine Two General Electric T58-GE-10 1,400 shp shaft-turbine; **Rotor diameter** 62 ft (18.89 m); **Overall length** 72 ft 8 in (22.14 m); **Width** (rotors folded) 16 ft 4 in (4.97 in); **Overall height** 16 ft 10 in (5.12 m); **Weight** (empty) 9,763 lbs (4,428 kg), (loaded) 21,500 lbs (9,752 kg); **Maximum speed** (loaded, at sea level) 166 mph (267 km/h); **Cruising speed** (loaded) 136 mph (219 km/h); **Range** (loaded, with reserves) 625 miles (1,005 km); **Armament** Provision made for 840 lbs (381 kg) of weapons, including homing torpedoes; **Accommodation** Four crew — pilot and co-pilot on flight deck, two sonar operators in cabin. The cabin seated 25-30 passengers, 15 stretcher cases, or 5,000 lbs (2,268 kg) of cargo.

HH-3 JOLLY GREEN GIANT

Engine Two General Electric T58-GE-5 1,500 shp shaft-turbine; **Rotor diameter** 62 ft (18.89 m); **Overall length** 73 ft (22.5 m); **Width** (rotors folded) 15 ft 10 in (4.82 m); **Overall height** 18 ft 1 in (5.51 m); **Weight** (empty) 13,255 lbs (6,012 kg), (loaded) 22,050 lbs (10,002 kg); **Maximum speed** (loaded, at sea level) 162 mph (260 km/h); **Cruising speed** (loaded) 144 mph (231 km/h); **Range** (loaded, with reserves) 465 miles (748 km); **Armament** Provision for 840 lbs (381 kg) of weapons; **Accommodation** Two crew seated side by side on the flight deck, provision in the cabin for flight engineer and attendant. Normal capacity was 25 fully-equipped troops or 15 stretcher cases, but alternative arrangements accommodated 30 troops, 15 stretcher cases or 5,000 lbs (2,268 kg) of cargo.

SH-3D Sea King Navy helicopters return to the flight deck of USS Yorktown *for refuelling and fresh crews in 1968.* Yorktown *was normally employed in the anti-submarine role.*