Chapter XI

Air Refueling

On 9 June 1964, four KC-135 jet tankers operating out of Clark AB in the Philippines under the nickname Yankee Team Tanker Task Force (TTF) provided inflight refueling over Da Nang to eight F-100 fighters on their way to strike Pathet Lao antiaircraft emplacements on the Plain of Jars. The KC-135's then loitered over southern Laos, ready to provide post-strike refueling as needed. After refueling two of the fighters, the KC-135's returned to Clark. They remained there until 15 June, then returned to Andersen AFB, Guam, where they rejoined the main body of the tanker task force supporting routine Tactical Air Command (TAC) deployments across the Pacific.

The Yankee Team refueling of 9 June was significant because it marked the first time that SAC tankers had directly supported combat operations in Southeast Asia. Also of interest was the fact that the receiving aircraft were fighters rather than B-52 bombers, the aircraft usually paired with the giant Stratotanker. The routine manner of performing the intricate aerial refueling in their unusual 9 June assignment also provided testimony to the proficiency that KC-135 crews and fighter pilots had attained in this technique.

Introduction of the KC-135 into the USAF inventory in 1957 provided significantly improved means of aerial refueling for SAC's bomber force. With it, refueling could be done at altitudes and speeds approaching or equalling those of the receiver aircraft. While refueling bombers was its primary mission, in 1959 the KC-135 was successfully tested with jet fighters and assigned to refuel TAC aircraft during some exercises and movements to and from overseas bases. In 1961, the Air Force designated SAC as single manager for the aerial refueling of its own and TAC forces.

Following the Gulf of Tonkin incident in August 1964, the Air Force ordered a deployment of 84 fighters from the United States to the western Pacific. They were supported by 48 tankers, some of which were quickly deployed to augment those already based at Andersen AFB, Guam, and Hickam AFB, Hawaii. By 15 August, after flying 172 refueling sorties, all deployed tankers returned to their home bases. At this time, the JCS directed reestablishment of the Yankee Team TTF in the Philippines to provide refueling support for SEA combat missions. Renamed Foreign Legion, the task force of eight KC-135's undertook its first operational refueling on 28 September.

In October 1964, when PACAF's obsolete KB-50 tankers were permanently grounded, SAC assumed responsibility for the PACAF air refueling requirements, with the Foreign Legion task force given the job. By the end of 1964, its KC-135's had flown 235 sorties, made 948 refuelings, and offloaded 11,900,000 pounds of fuel in western Pacific operations. To carry on this expanding task, the Air Force instituted a system wherein the aircraft and crews rotated with those at home on a regular basis.

The Foreign Legion force operated only until the end of the year, when the Air Force worked out a more permanent arrangement. Effective 12 January 1965, SAC organized the 4252d Strategic Wing at Kadena AB, Okinawa. It was assigned responsibility for operating and maintaining a tanker task force of about 15 KC-135's in support of tactical aircraft operations in Southeast Asia (nicknamed Young Tiger). As before, the task force consisted of aircraft and crews on tempo-

An inflight refueling of the F-4 Phantom.

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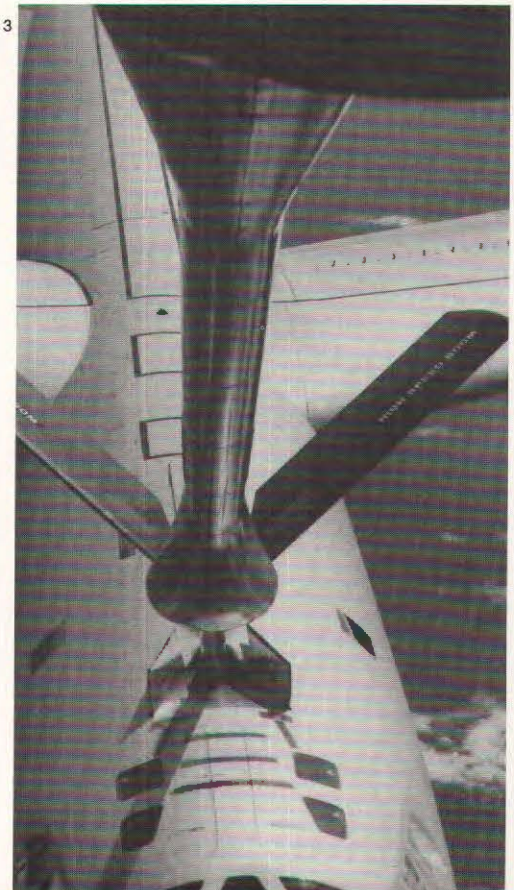

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(1-3) Inflight refueling of B-52's. (4) An F-105 trails another in a refueling operation. (5) Refueling F-105's. (6) Refueling an F-4 Phantom. (7) Refueling an Air Force HH-3E helicopter over the Gulf of Tonkin by an HC-130.

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rary duty, replaced periodically by others from the United States. The first Young Tiger inflight refueling occurred on 25 January 1965.

The 4252d soon developed a forward operating task force, designated Tiger Cub, at Don Muang Airport, Thailand. Early in March, this detachment, with four tankers acquired from the discontinued Foreign Legion force at Clark, began refueling combat fighters. The remaining Foreign Legion tankers were sent to Kadena.

In early 1965 a B-52 force also was deployed to Andersen for possible combat in Southeast Asia. Departing stateside bases on 17 February, the 30 bombers were refueled enroute by a tanker force of 38 KC-135's gathered in from 9 different air refueling squadrons and operating out of Castle AFB, Calif. Simultaneously with the bomber flight, an Arc Light tanker force, composed of the 904th and 913th Air Refueling Squadrons, was on its way to Kadena. These tankers performed no inflight refueling. Instead they carried about 30,000 pounds of cargo and passengers. This logistical role for the KC-135 would be repeated often within the Strategic Air Command as it airlifted personnel and supplies from one Pacific base to another or between them and the United States.

In mid-May, the 913th tankers returned to Barksdale AFB, La., along with the 2d Bomb Wing's B-52's. They were replaced at Kadena by KC-135's of the 7th Air Refueling Squadron, a subordinate unit of the 7th Bomb Wing which had joined the 320th at Andersen to form the Arc Light contingent. Thus, the pattern of maintaining Arc Light forces—bombers at Andersen and tankers at Kadena—was firmly established well before the bombing commenced. This mode of deployment would undergo several changes during the next few years. As the bomber and tanker forces grew, their basic elements consisted of "cadre units" to which were added aircraft called "augmentees." Both Young Tiger and Arc Light tankers, although sent for different purposes, were organizationally placed under the 4252d Strategic Wing. And until the first B-52 bombing mission in June 1965, both sets of tankers were used to refuel tactical combat aircraft.

On 18 June, when 30 bombers took off from Andersen on their first bombing mission, 30 tankers left Kadena, arrived on schedule at the designated rendezvous northwest of Luzon, and refueled 27 bombers (two were lost in a mid-air collision and one did not take on fuel) on their way to South Vietnam. Refueling 30 bombers was accomplished without incident on 5 and 7 July, setting a pattern that continued for the next several months. Only the rendezvous point shifted occasionally to accommodate changes in weather. During October, the number of B-52's dispatched on missions began to vary, sometimes numbering as few as 15, and the refueling force was, of course, adjusted accordingly. Bomber destinations also influenced the number of tankers dispatched; obviously the closer the targets to Guam, the less fuel was required.

To transfer fuels from the tankers required two different techniques, depending on the type of aircraft being serviced. All bombers and some fighters, particularly those employed late in the war, had receptacles for the tankers' flying boom. To effect a hookup, the pilot of the receiver aircraft simply positioned himself behind and slightly under the tanker. The boom operator on the tanker then directed a 46-foot boom into the receiver's refueling receptacle, and the fuel transfer began. Several fighters used in the early years of the war, notably the F-100, were not equipped with boom receptacles and relied instead on the probe and drogue system. In this instance, the KC-135 used a drogue (a funnel-like device at the end of a flexible hose) which could be installed quickly on the boom. The latter was extended and maintained in a stable flight posi-

tion, and the fighter aircraft then flew its probe into the drogue.

In addition to its boom operator, who was the only enlisted man on board, the KC-135 crew consisted of a pilot, co-pilot, and navigator. With such a small crew, the members performed some duties (flight engineer and loadmaster functions, for example) normally done by others on cargo aircraft. The pilot and co-pilot were responsible for fuel management—the distribution, balance, and offloading of the fuel. The navigator operated the electronic rendezvous equipment, and the boom operator assisted the navigator by making celestial observations with a periscope sextant.

Increasing Demands for Fuel

As bomber and fighter operations expanded, demand for inflight refueling grew. This, in turn, led to the idea of moving more KC-135's closer to the combat areas, particularly in view of the satisfactory Don Muang arrangement. Thereafter, and during the next 8 years, the Air Force stationed tankers at three additional Thai bases (Takhli, U-Tapao, and Korat) and at Ching Chuan Kang AB, Taiwan (commonly called CCK). The first of these expansions occurred in September 1965, when tankers moved to Takhli under the designation of King Cobra and supplemented those at Don Muang in refueling the Thai-based fighters. This had the beneficial effect of eliminating the long flights from Okinawa to the refueling areas over Thailand. By the end of 1965, there were about 55 tankers in the western Pacific: 40 at Kadena, 10 at Takhli, and 5 at Don Muang. During the year the tankers flew more than 9,200 sorties, conducted 31,250 refuelings, and transferred approximately 315,000,000 pounds of fuel.

On 2 June 1966, SAC organized the 4258th Strategic Wing at the U-Tapao AB, then under construction in Thailand, to take over the Young Tiger job —refueling tactical combat aircraft— from the Kadena-based tankers of the 4252d. On 11 August, with the runway just completed, the first KC-135 landed at U-Tapao, then flew its first mission the same day. Throughout the remainder of the year—pending arrival of permanent ground personnel (flight crews normally were on temporary duty)—the U-Tapao tankers operated as a forward operating element of the 4252d. In late October, the Don Muang force ceased operations and its aircraft relocated to U-Tapao.

By the close of 1966, there were 75 KC-135's in the western Pacific. About 45 were at Kadena, primarily supporting Arc Light flights, although a few still flew tactical missions; another 20 were at U-Tapao, and the remainder were at Takhli, During the year, the tankers flew about 18,203 sorties, almost 11,000 of them in support of the fighters. More than 78,000 refuelings were effected in offloading more than 850,000,000 pounds of fuel.

On 1 January 1967, the 4258th Strategic Wing assumed full responsibility for the U-Tapao operations; a month later it assumed control of the Takhli tankers formerly belonging to the 4252d. The separation of refueling responsibilities was now complete. The 4252d at Kadena supported Arc Light bombers and the 4258th at U-Tapao and Takhli refueled the fighters. On occasion, however, the Kadena tankers furnished fighter support as required. Early in April, part of the B-52 Arc Light force began operating out of U-Tapao. These B-52's could normally complete their missions without inflight refueling.

At year's end, the tanker force numbered approximately 80—45 of them at Kadena, 30 at U-Tapao, and 5 at Takhli. Southeast Asia aerial refueling statistics during 1967 were again impressive, with approximately 22,891 sorties and more than 103,415 inflight transfers involving more than 1 billion

pounds of fuel. Arc Light and other SAC support activities accounted for 9,180 sorties and 7,469 refuelings. The importance of the KC-135 to tactical operations was evident from the 13,711 sorties and 95,946 refuelings. In providing this support, one tanker ordinarily satisfied the needs of several fighter aircraft.

On 23 January 1968, North Korea seized the USS *Pueblo* in the Sea of Japan, and on 30 January the enemy launched the Tet offensive in South Vietnam. The United States responded to these crises by sending more B-52's to Andersen, others to Kadena, and increasing the number of fighters in the western Pacific, particularly in Korea. By mid-year, with demand for inflight refueling having reached an all time high, the tankers engaged in supporting operations had grown to more than 90, including 35 at Kadena, 40 at U-Tapao, and 15 at Ching Chuan Kang.

Although their primary job continued to be the refueling of the B-52's from Andersen, the Kadena tankers also supported PACAF flights in the northern Pacific areas and, after mid-February 1968, refueled B-52's launched from Kadena. Located closer to the target areas, these B-52's required fewer refuelings than those from Andersen. Normally, one tanker could service three Kadena bombers. As before, refueling for fighter combat operations came from U-Tapao, with Ching Chuan Kang now the second base. CCK entered the scene in February when the 4200th Air Refueling Squadron was activated with tankers formerly based at Takhli.

Concurrently with the tanker move to CCK, KC-135 radio-relay aircraft, operating since 1966 from U-Tapao, relocated there. Although these tankers had an emergency refueling capability and occasionally performed for that purpose, they were primarily responsible for operating a continuous radio link in the area of the Gulf of Tonkin. Through their radio contact

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with tactical air control centers in Vietnam, these tankers served as airborne information and communication posts for American aircraft operating over much of Southeast Asia. In addition, as had been the case since the beginning of Arc Light, several KC-135's maintained an emergency strip alert on Andersen.

Southeast Asia refueling operations in 1968 broke all records, even though bombing of North Vietnam was halted during the year. During approximately 32,000 KC-135 sorties, more than 1.6 billion pounds of fuel was offloaded in more than 129,000 refuelings. As in previous years, tactical aircraft received most of the inflight support—18,667 sorties and 114,744 refuelings.

In 1969, KC-135 sorties dropped by more than 10 percent, to below 28,000, and fuel offloaded decreased to about 1.4 billion pounds while refuelings actually increased to 138,164, approximately 9,000 more than a year earlier. This apparent contradiction in increased fighter and decreased B-52 requirements stemmed from the gradual shift of bomber operations from Andersen to Kadena and U-Tapao. In fact, about 65 percent of the B-52 sorties originated at U-Tapao and normally required no aerial refueling.

During the next 2 years, as the American air campaign in Southeast Asia declined, air refueling activity dropped correspondingly. By mid-September 1970, all Arc Light operations were concentrated on U-Tapao, eliminating the requirement for air refueling support from Kadena. Late in 1970, fewer than 50 tankers were operating in the western Pacific: 30 at U-Tapao which refueled fighters and flew radio-relay missions, 15 at Kadena supported other requirements, and several continued on emergency strip alert at Andersen. Refueling operations dropped precipitously in 1970 to the lowest level in 5 years. Of approximately 19,540 sorties flown, more than 13,500 were devoted to fighter support and associated activities, while less than 6,000 assisted several types of strategic and related operations. The fighters accounted for about 82,000 individual refuelings, another 2,800 were specifically for B-52 bombing operations, and the remainder supported other strategic activities. Offloaded fuel in 1970 totalled 888,200,000 pounds.

In 1971, aerial refueling operations dropped again. In approximately 14,400 sorties, the KC-135's conducted 62,600 refuelings to offload 618,500,000 pounds. As usual, the preponderance of refueling activity—approximately 10,500 sorties and 61,000 refuelings—supported fighters. In November and December there was a noticeable increase in refueling as the Seventh Air Force conducted Operation Commando Hunt VII against growing personnel and materiel traffic on the Ho Chi Minh trail.

The 1972 Surge

The North Vietnamese invasion of South Vietnam during the spring and summer months of 1972 prompted expanded B-52 and tactical air operations and a concomitant surge in air refueling. The revival of Andersen as a B-52 base for these operations imposed greater demands on Kadena tankers. By the end of June, approximately 60 KC-135's, including the radio-relay aircraft which had relocated from U-Tapao, were based at Kadena. Closer to home, tactical requirements grew as additional fighter squadrons deployed into the western Pacific to support the South Vietnamese. During a 5-week period in April and May, TAC deployed nine squadrons to the area. Approximately 150 tankers supported these deployments on schedule with no fighter being delayed for lack of fuel.

Once in place, these fighters began combat operations requiring inflight refueling. U-Tapao soon had 45 tankers, but these proved insufficient to keep up with demand. Accordingly, in May and June, 70 additional KC-135's

(1) An F-105 takes on fuel from a KC-135 tanker against the backdrop of rugged mountains at Vietnam. (2) F-105's approach an Air Force tanker's boom for refueling.

deployed to Clark and to three Thai bases—Don Muang, Takhli, and Korat—bringing to 115 the number of tankers supporting tactical operations. The KC-135 force remained at this level until October and November when several tankers were withdrawn from Don Muang, Korat, and Ching Chuan Kang AB (which replaced Clark in August).

In December 1972, when the United States resumed the large-scale bombing of North Vietnam, the tanker force increased again, to approximately 195. Major increases at Kadena supported the growing B-52 flights from Andersen. Other tankers were sent to Takhli and to a new detachment activated at Clark. In the 11-day bombing of Hanoi and Haiphong between 17-28 December, the tankers flew 1,390 sorties and made 4,625 inflight refuelings.

During 1972, the KC-135's flew about 34,700 sorties in Southeast Asia, some 2,700 more than in 1968, the previous high year. Approximately two-thirds supported tactical aircraft operations. The other third were devoted to SAC activities: B-52 bombing missions, reconnaissance flights, radio-relay sorties, and deployment flights to and from operational bases. The 115,272 refuelings (106,913 to fighters) were significantly below the levels of 1968 and 1969 but the fuel offloaded (more than 1.4 billion pounds) was second only to the record-breaking year of 1968.

With the suspension of bombing in North Vietnam and the resumption of peace negotiations, inflight refueling requirements decreased markedly. As a result, in late January 1973 many of the augmentee tankers including those at Clark returned to their home bases. In February, others returned home after being withdrawn from Takhli, Kadena, and Andersen.

The Air Force continued to retain more than 100 KC-135's in the western Pacific until U.S. participation in the war formally ended on 15 August 1973. Approximately 50 were at Kadena, assigned temporarily to the 376th Strategic Wing, which had replaced the 4252d Strategic Wing in early 1970. A similar-sized force was on temporary duty with the 310th Strategic Wing Provisional, organized in June 1972 to handle the increased tactical air refueling mission at U-Tapao and the radio-relay aircraft that had returned in February 1973 after 10 months at Kadena. Several KC-135's remained on alert at Andersen.

During the last months of the war, between 1 January and 15 August 1973, the KC-135's flew 15,603 sorties. Approximately 6,900 supported SAC flights and the remainder tactical aircraft missions. In more than 67,000 refuelings, more than 726,000,000 pounds of fuel were dispensed.

In slightly more than 9 years in and around Southeast Asia, SAC tankers

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(1) Using model aircraft, these four officers demonstrate what may be the first tri-level air refueling in history, during which they saved six Navy aircraft and two Air Force F-104's. They are: (l. to r.) Maj. John H. Casteel, aircraft commander; Capt. Richard L. Trail, co-pilot; Capt. Dean L. Hoar, navigator; and MSgt Nathan C. Campbell, boom operator. (2) A fuel specialist with the 15th Air Base Wing checks a fuel sample for impurities.

An Air Force tanker refuels a flight of four F-105's heading for targets in North Vietnam.

provided almost 9 billion pounds of fuel, flew 194,687 sorties, and made 813,878 refuelings. Impressive as these statistics were, they fail to reflect the KC-135's real contributions to the overall USAF effort in Southeast Asia. Before the war, the KC-135 had demonstrated repeatedly that its availability could reduce by several days the movement of combat aircraft to forward operating locations. Its use for this purpose and in support of fighter and B-52 combat operations was vital to the conduct of the air war.

Not the least of its contributions was in saving fighter aircraft and the lives of their crews. Without the tankers, many fuel-starved fighters would have never returned to their bases. The refueling of these aircraft brought into being a new term, "aircraft save," which soon became common parlance among fighter and tanker crews. Many fighter pilots departed successful hook-ups with a grateful "Thanks, tank, you can count this a save."

While most emergency refuelings involved USAF fighters, there were some with U.S. Navy aircraft. One such occasion on 31 May 1967 over the Gulf of Tonkin turned into perhaps the most complex and spectacular refueling ever accomplished. It started during the routine refueling of two F-104's when the tanker received word to intercept two Navy aircraft almost out of fuel. Periodically refueling the two F-104's that went along to provide MIG cover, the tanker successfully rendezvoused with the two Navy A-3 tankers, one with only 3 minutes of fuel (both had fuel aboard which they could transfer but could not use themselves). After taking on a small amount of fuel from the KC-135 the first Navy tanker pulled away and allowed the second A-3 to hook up. As this tanker took on fuel, two Navy F-8's came into the area for emergency refueling. One was so low on fuel that it could not wait for the A-3 tanker to complete its own refueling from the KC-135. It hooked up to the A-3 and began taking on fuel while the Navy tanker continued to draw from the KC-135. Concurrently with this unprecedented trilevel refueling, the first A-3 serviced the second F-8 and then returned to the KC-135 for additional fuel.

In the midst of this emergency, the KC-135 was informed of two Navy F-4's with insufficient fuel to return to their carrier. After refueling the two F-104's again, the KC-135 rendezvoused with the two F-4's and successfully refueled them. By this time, the KC-135's own fuel supply was so low that it could not return to its home base and had to land at an alternate base in South Vietnam, but not before again refueling the two F-104's. For this amazing series of life-saving refuelings, Maj. John H. Casteel and his crew received the 1967 Mackay Trophy, presented annually for the most meritorious USAF flight of the year.

Chapter XII

Tactical Reconnaissance

Throughout the war the Air Force relied heavily on its tactical reconnaissance force to provide vital target information. Initially, it had two squadrons of RF-101 reconnaissance aircraft in the western Pacific, one based at Misawa AB, Japan, another at Kadena AB, Okinawa. The twin-engine RF-101 Voodoo, which could carry a wide selection of aerial cameras for reconnaissance at all altitudes up to about 50,000 feet, was a proven, dependable aircraft. The Air Force also had available a few bomber, transport, and training aircraft which had been modified to fly reconnaissance missions. It was the RF-101, however, which served as the reconnaissance workhorse in the early years of the war.

The Air Force reacted to a Royal Laotian government request in early 1961 by sending an Air Force SC-47 aircraft with special cameras to photograph Pathet Lao and NVA installations. For almost 3 months it provided the only hard intelligence concerning these hostile forces. On 23 March 1961, however, this first Air Force "reconnaissance" aircraft in Southeast Asia was shot down over the Plain of Jars.

In April another Air Force plane—an RT-33 based at Udorn—resumed the reconnaissance sorties over Laos. Pilots of this aircraft flew over poorly mapped areas devoid of navigational aids or cultural features, often in poor weather, without weapons or fighter escort. Between 24 April and 10 May, when a negotiated ceasefire between the Laotian combatants halted the RT-33 flights, the aircraft brought back tangible evidence of Communist activity in northern Laos. The RT-33 sorties resumed from Don Muang Airport on 4 October, but again were halted on 7 November after the more modern RF-101's arrived in Thailand.

A South Vietnamese invitation to the United States to take part in an October 1961 Saigon air show provided the Air Force its first opportunity to deploy the Voodoo reconnaissance aircraft into Southeast Asia. Four RF-101's and a photo processing unit landed at Tan Son Nhut on 18 October, only to learn the air show had been cancelled. However, disastrous floods in the Mekong River delta provided a reason for the aircraft to remain in South Vietnam for some time. On 23 October the RF-101's flew over the Plain of Jars and photographed Soviet aircraft parachuting supplies to Pathet Lao and North Vietnamese forces at the Tchepone airfield. Other flights brought back additional photographs of Soviet involvement, as well as pilot reports of intensifying enemy AAA fire. On 21 November 1961, after 31 days of recording enemy activities with their cameras, the RF-101's departed Vietnam. They left behind the photo unit to complete processing of the accumulated film.

That same month the first elements of the Farm Gate detachment reaching Bien Hoa AB included among its aircraft four RB-26's. These modified, obsolete light bombers proved to be good reconnaissance platforms. Also, in November 1961, four RF-101's and a photo processing unit were deployed to Don Muang Airport, Thailand, to fly reconnaissance sorties over Laos and South Vietnam. When President Kennedy sent a task force into Thailand on

Airmen technicians unloaded cameras and film from an RF-101 following a reconnaissance mission.

12 May 1962 to counter growing North Vietnamese aggressiveness, the RF-101's were placed under its control. USAF reconnaissance sorties over Laos, however, were intermittently halted because of indecision on the part of RLG officials. On 6 November 1962, after a year of RF-101 operations and more than 1,000 sorties, all reconnaissance over Laos was terminated.

Although the RF-101's and RB-26's were not allowed to fly over Laos, they continued photo missions over South Vietnam. Detouring southward around Cambodia, they photographed the southern portions of South Vietnam on nonstop sorties. To cover the northern provinces of South Vietnam, they had to stage through Tan Son Nhut where exposed film was turned over to the photo processing unit there, cameras were reloaded, and the aircraft refueled for a final sortie enroute back to Don Muang. These lengthy flights were largely eliminated when the reconnaissance task force moved to Tan Son Nhut in mid-December 1962.

As the number of U.S. advisers assigned to the South Vietnamese armed forces increased throughout 1962, the demand for aerial reconnaissance increased. Most were for photos of large areas, which required production of thousands of prints and created a tremendous workload for the small Tan Son Nhut photo unit. Pending construction of a larger facility, six semi-trailer photo vans were airlifted from Europe to South Vietnam to handle the film processing. To man the production unit, the 13th Reconnaissance Technical Squadron was organized at Tan Son Nhut on 18 April 1963.

On 15 April 1963, two RB-57E's were attached to the RF-101 force, bringing into the theater an infrared sensor capability and the first of the new panoramic cameras. Two additional Farm Gate RB-26's were modified at Clark AB for night photography, and two Cessna U-3B's were added in May to serve as couriers for film, prints and intelligence reports to units throughout South Vietnam. The crash of two B-26's early in 1964, caused by structural fatigue, led to the withdrawal of all B-26's and RB-26's from the theater. This loss, however, was somewhat offset by the addition of two RF-101's to the task force.

Yankee Team

After a lapse of 18 months without tactical reconnaissance over Laos, U.S. and Laotian officials could only surmise the strength and disposition of much of the hostile forces in that country. When on 19 May 1964, Premier Souvanna Phouma approved a resumption of reconnaissance sorties over Laos, four RF-101's streaked low across the border to photograph segments of the Ho Chi Minh trail and key military installations on the Plain of Jars. Follow-up low-altitude Air Force and Navy reconnaissance sorties were ordered for the operation, nicknamed Yankee Team. On 21 May the United States announced that the Laotian government had asked for help in collecting information of the disposition of the Pathet Lao and other hostile forces, information that would be presented to the International Control Commission. In justifying the flights, U.S. officials cited repeated Pathet Lao and North Vietnamese violations of the Geneva agreements and Pathet Lao refusal to allow ICC access to its territory.

At the request of Vientiane officials, the northern portion of Laos had been avoided but in November 1964 certain targets were approved for strikes. Pathfinder RF-101's led F-100's to the targets and orbited until the strikes ended and then proceeded to photograph the bomb damage before returning to base.

Because the distance between Saigon and the Laotian target areas limited the photo time of the RF-101's, the

Air Force on 2 April 1965 deployed an RF-101 task force to Udorn. Initially intended for Yankee Team sorties, the force subsequently was authorized to fly over North Vietnam. Intensified enemy antiaircraft defenses and the threat of MIG interceptions for a time required a fighter escort for the RF-101's, a procedure that was dropped in favor of two-ship formations of Voodoos.

When the eastern portion of the Laotian panhandle was designated a separate operational area (Steel Tiger) in April 1965, the reconnaissance aircraft set about photographing roads, trails, and waterways in search of enemy targets. The area was further divided in December when General Westmoreland designated the southern half Tiger Hound and asked for frequent, detailed photography of infiltration targets and the use of infrared sensors to locate enemy bases. Army OV-1 Mohawk reconnaissance aircraft flew at night while Air Force units operated mostly during the day.

In March 1966 the Udorn task force was enlarged by the arrival of the 20th Tactical Reconnaissance Squadron and its 16 RF-101's from Tan Son Nhut. A detachment of 11 RF-4C's arrived in July and was absorbed into the 11th Tactical Reconnaissance Squadron, which deployed to Thailand in November with 10 more RF-4C's. All of the Thai-based reconnaissance units, including a new Reconnaissance Technical Squadron, were assigned to the 432d Tactical Reconnaissance Wing, organized on 18 September 1966.

When the Igloo White electronic sensor system was activated in Laos in 1967, the area where the acoustic and seismic sensors were to be implanted had to be photographed in detail so they could be put into the best locations. Sensor drops were likewise photographed so the exact position of each could be accurately plotted. Each significant signal return required visual or photographic evidence to prove the existence of a valid target before strikes were approved. RC-121 aircraft of the 533d Reconnaissance Wing flew orbits over Laos to relay signals from the sensors to the Thai-based infiltration surveillance center and to collect and analyze the signals as necessary.

North Vietnam

RF-101's were pathfinders for the F-100's taking part in the first Air Force strike against North Vietnam on 8 February 1965, leading the F-100's to the target and then orbiting until the last strike aircraft departed so they could photograph the damage. When the Rolling Thunder operations got under way, reconnaissance aircraft flew with or behind the strike force to photograph bomb damage. Subsequently, a separate reconnaissance program was set up to acquire photos for planning, targeting, and intelligence purposes. The RF-101's, which originally operated out of Tan Son Nhut, later flew almost all of their missions over North Vietnam from Thailand.

Shortly after the first Gulf of Tonkin incident in August 1964, SAC sent its drones to Southeast Asia and flew the first reconnaissance drone sortie in August. Launched from DC-130 aircraft, the strategic reconnaissance drones were intended to satisfy national intelligence requirements but also became a prime source of photos of portions of North Vietnam that were off limits to manned reconnaissance aircraft. SAC U-2 aircraft also began reconnaissance sorties over North Vietnam early in 1965, flying at altitudes well above antiaircraft fire and beyond the reach of enemy MIG's. In April 1965, a U-2 photographed the first SAM site in North Vietnam. Subsequently U-2 sorties monitored the development of additional sites. Because of its ability to fly largely undetected and beyond interceptor reach,

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(1) Capt. Edward M. Greer checks the window glass over one of his aerial cameras before a mission. (2) Airmen load an aerial reconnaissance camera into the nose of an RF-101 at a base in South Vietnam. (3) A sentry guards a DC-130 launch aircraft carrying a remotely piloted vehicle which was employed as a reconnaissance vehicle over enemy territory. (4) These remotely piloted aircraft are launched from the mother ship in the background. (5) Fisheye lens view of Capt. Lawrence L. Champion, Det. 1, 460th Tactical Reconnaissance Wing, in the cockpit of an Air Force RB-57 prior to a mission. (6) An Air Force RB-57 reconnaissance aircraft. (7) Reconnaissance photo showing destruction of a North Vietnamese oil storage area. (8) On mission over North Vietnam, an Air Force pilot from the 432d Tactical Reconnaissance Wing, photographed a surface-to-air missile exploding in front of his RF-101 aircraft. (9) An RF-101 reconnaissance aircraft surprised North Vietnamese gunners out in the open as they sped to man their anti-aircraft positions the DMZ.

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the U-2 could cross borders and surmount defenses almost with impunity, although the arrival of the Soviet SAM's portended a serious challenge.

During the 5-week halt of bombings north of the DMZ in early 1966, USAF reconnaissance over North Vietnam was intensified in an effort to determine what the enemy was doing. The photos obtained showed frantic enemy activity to repair roads, construction of new bridges, and a massive effort to move tons of supplies and equipment into Laos and the DMZ. During the bombing pause, North Vietnamese bumper-to-bumper convoys showed total disdain for the reconnaissance aircraft overhead.

Because of the areas over which they flew, reconnaissance aircraft generally suffered loss rates far higher than the strike aircraft. Thus, an RF-101 photographing an F-105 strike on the Thanh Hoa Bridge on 3 April 1965 was lost to enemy fire, one of the first such losses over the North. An RF-101 on a 26 January 1966 sortie over the Xuan Son Barracks was downed by ground fire, while two RF-101's on a 7 March 1966 mission northwest of Vinh disappeared without a trace. Losses in June 1966 included seven RF-101's, one RF-4C, and one RB-66, all to hostile antiaircraft fire.

In November 1965, two MIG-17's jumped two RF-101's east of Yen Bay, the first encounter with enemy fighters. While one RF-101 accelerated and completed its photo run, the other drew the attackers off before increasing his speed and leaving them behind. Four MIG's attempting another intercept later that month also found themselves outclassed by the speedy reconnaissance planes. It was not until the later models of the MIG showed up that the supersonic RF-101's lost their advantage.

For some time Air Force reconnaissance had revealed the North Vietnamese were dispersing and hiding their petroleum, oils and lubricants, even burying storage tanks in their river dikes. It was not until 29 June 1966, however, that the Air Force was authorized to launch its first strikes against the enemy's vital POL storage system. Once the bombing campaign began, additional RF-101 sorties were needed to photograph the bomb damage and keep abreast of the destruction of the storage facilities.

During 1965-1966 the North Vietnamese began unloading ships at Haiphong harbor at night to avoid Navy surveillance, whereupon the Air Force was assigned the mission of flying a photographic sortie over that busy port. Thus, on 28 February 1966 two Air Force RF-4C's used photoflash cartridges during a low-altitude dash across the busy harbor. This night photography revealed the North Vietnamese engaged in the intensive unloading of anchored ships and streets piled high with cargo that couldn't be moved because of bombed roads and rail lines.

When a U.S. bombing campaign against the rail lines in the North was launched early in 1967, the enemy concentrated antiaircraft weapons at rail yards and along key sidings to try to keep down the damage from American strike planes. The Air Force sent out daytime reconnaissance sorties which were flown at a low enough altitude to identify rolling stock by type and size, while night infrared missions were launched to discover and identify operating locomotives and active yards.

On 10-11 March the Air Force launched its first strike against the Thai Nguyen iron and steel complex, a symbol of North Vietnam's industrial growth. Post-strike reconnaissance photography showed damage to key buildings but analysts could not determine whether the plant was still operational. A low-altitude infrared reconnaissance sortie the following night proved that the coke oven, blast furnace, and power plant were in operation and there was hot slag in the dump area.

In 1967 Air Force RF-101's undertook photo surveillance of all North Vietnamese jet-capable airfields, monitoring the presence of MIG fighters, helicopters, and support aircraft. In September 1967, after a MIG-21 shot down one of the RF-101's, a decision was made to ban the Voodoo from all further missions over North Vietnam. The RF-101 squadron in Thailand was inactivated and replaced by a squadron of RF-4C's. The latter was a multisensor aircraft capable of speeds in excess of Mach 2. It carried a wide assortment of the most modern aerial cameras, side-looking radar, an infrared sensor, sophisticated all-weather navigation equipment, and a 2-man crew. All RF-101's remaining in the theater were redeployed to Tan Son Nhut for use over Laos and South Vietnam. By the end of 1967, only the RF-4C was flying tactical reconnaissance sorties over North Vietnam, augmented by low-altitude drones and U-2's over certain safe areas.

In late November 1967 air strikes against targets near Hanoi led to allegations by Hanoi that the bombing had damaged the Soviet embassy and other buildings in downtown Hanoi, which produced considerable worldwide publicity. In an effort to determine the extent and cause of the damage, special low-level reconnaissance missions were flown over the embassy area, resulting in the loss of two RF-4C's in 2 days.

South Vietnam

Reconnaissance over South Vietnam lacked the significant objectives characteristic of North Vietnam, but in many ways was more diversified. The intense antiaircraft defenses were missing but Viet Cong and NVA conventional weapons could be just as deadly.

In South Vietnam infrared imagery particularly gained popularity with Army units, who used it to find Viet Cong base camps and installations. Photo interpreters gave priority to infrared film, passing significant intelligence to appropriate ground units by telephone or radio, greatly increasing the timeliness of the intelligence and permitting immediate reaction. For example, in April 1965 an RB-57 sortie south of Saigon discovered a well-defended Viet Cong base camp with arms factories, training areas, barracks, and a sampan base. Shortly thereafter, another infrared mission recorded the location of a Viet Cong regiment west of Da Nang. Infrared film also was used to set up an ambush for Viet Cong convoys.

When General Westmoreland was authorized to use B-52's over South Vietnam, tactical reconnaissance crews were given additional responsibilities. It became necessary to photograph each B-52 target box to make certain there were no temples, cultural monuments, and friendly personnel in the area beforehand. After each bombing, the target area had to be photographed again to assess the bomb damage. As the B-52 raids increased, this became a monumental task. In February 1966 the Air Force activated the 460th Tactical Reconnaissance Wing at Tan Son Nhut to manage the growing tactical reconnaissance workload in Southeast Asia. Its initial complement of three flying squadrons, a reconnaissance task force, and several support squadrons made it the largest wing in the war zone. Its seven types of aircraft also made it the most diversified.

One of these was the ageless C-47, which had been loaded with special equipment for radio direction finding to increase its versatility. Thus, on 21 November 1966 an RC-47 of the 360th Reconnaissance Squadron detected the position of a Viet Cong transmitter and passed the information to the appropriate Army unit. A FAC was diverted to the area, spotted an ambush being set up, called for strike aircraft, and had Army helicopters fire into the ambush position to alert an approach-

ing Army convoy. The troops in the convoy ambushed the ambushers. The 360th, manned mostly by field grade veterans of World War II whose average age was well above 40, dubbed themselves "Antique Airlines" in honor of the dependable old RC-47 and the equally aged crews.

To relieve the tactical reconnaissance aircraft from covering larger areas and from the tedium of back-and-forth flight lines, USAF officials submitted several requests for mapping aircraft. There also was a need for cartographic quality photography throughout Southeast Asia, photography which was beyond the capability of the tactical reconnaissance aircraft. In July 1967 three specially equipped RC-130A mapping aircraft arrived in South Vietnam for a short stay that extended into many months as new mapping requirements continued to arise.

In 1967 Marine Corps positions south of the DMZ came under attack by North Vietnamese artillery hidden in the DMZ. Marine counterbattery fire proved ineffective because the enemy gun positions were well concealed. To pinpoint those positions, the Air Force began flying low-altitude reconnaissance missions over the area in September 1967. New high-acuity cameras and special infrared sensors were employed in an RB-57 aircraft to assist in the search, and artillery fire and air strikes were directed against those which were found. Although hostile fire diminished, the exact results of the counterbattery fire and air strikes were difficult to assess.

The year-end truce period in 1967 was followed by intensified reconnaissance activity throughout the war zone, including infiltration routes into South Vietnam and key Viet Cong base areas. Despite the large quantity of photography accumulated, the Allies had few indicators that the North Vietnamese and Viet Cong were about to launch a major offensive throughout South Vietnam. Most attention was focused on an impending threat to the Marine Corps base at Khe Sanh, where General Westmoreland launched Operation Niagara. It involved a concerted intelligence effort to find, identify, and monitor NVA forces gathering in the vicinity of the Marine base. Aerial reconnaissance photos provided much of the required intelligence.

Despite poor weather conditions in the area, the RB-57's special high-acuity cameras quickly photographed all of the ground for 12 miles around Khe Sanh, revealing camouflaged positions, enemy supply dumps, bunkers, and similar intelligence information. Air Force RF-4C's and RF-101's also flew dozens of daily sorties to obtain more detailed photos from which the Marines could plot enemy trenches, gun emplacements, and other positions. Hundreds of sensors implanted around the base were monitored by Air Force EC-121 aircraft, which relayed the signals to the infiltration surveillance center in Thailand for computer processing and evaluation. The results were passed to the Marine defenders at Khe Sanh within minutes.

While much attention was being focused on the siege of Khe Sanh, the enemy launched a massive attack throughout South Vietnam. They assaulted Saigon, five other major cities, and dozens of provincial capitals, towns, villages, and military installations. The 460th Tactical Reconnaissance Wing was soon inundated by a flood of requests for aerial reconnaissance photos to help find enemy units, evaluate the damage to friendly cities and military installations, and determine the status of Allied lines of communication. Two Communist attacks on Tan Son Nhut on 31 January and 18 February, which destroyed eight reconnaissance aircraft and damaged many others, adversely affected the Wing's capability.

The combined demands of Khe Sanh and the enemy's nationwide Tet offensive placed an enormous burden

on the already overextended reconnaissance support units. Seventh Air Force officials sought out every available photo interpreter from subordinate units and put out a call for more. From Air Force units around the world, photo interpreters were soon converging on Tan Son Nhut; the Army also sent every interpreter it could spare. A Niagara Task Force was quickly formed to insure the immediate exploitation of sensor products from the Khe Sanh sorties, provide rapid targeting of enemy positions, and assist in planning effective reconnaissance sorties. When Operation Niagara terminated successfully on 31 March, almost 1,400 reconnaissance sorties had been flown in less than 90 days. During that period Air Force cameras had exposed slightly less than 1 million feet of film, all of which was screened for target information.

The Post-Tet Era

When President Johnson announced that all bombing of North Vietnam "except in the area of the demilitarized zone" would end at 0800 on 1 April 1968, Saigon time, no mention was made of reconnaissance. After an initial period of indecision, U.S. officials also decided to restrict reconnaissance flights to the North Vietnamese panhandle south of Vinh. Photos taken of that area, however, showed that the North Vietnamese were redeploying missiles and antiaircraft guns into the panhandle, where they threatened the large number of reconnaissance and strike aircraft operating in a rather small air space.

Although tactical reconnaissance aircraft no longer flew over the northern portion of North Vietnam, other aircraft—including SR-71's, U-2's, and drones—brought back evidence of enemy efforts to repair and expand vital facilities, including damaged roads and rail lines. At Viet Tri, for example, the North Vietnamese were repairing the thermal power plant and the nearby factories were being readied for production. Within 3 months after the partial bombing halt, 75 percent of North Vietnam's industrial installations were again in operation, its transportation network was carrying more freight than ever before, and all major airfields had been repaired and were being expanded to handle a growing MIG force.

The number of reconnaissance sorties over North Vietnam decreased after 1 April 1968, but there was no comparable decrease elsewhere. Within South Vietnam, enemy forces continued to harass allied lines of communication and military installations as American and South Vietnamese Army units slowly regained control of areas lost during Tet. Because fewer reconnaissance sorties were flown over North Vietnam, however, additional sorties became available for use in South Vietnam. Thus, when the enemy turned his attention once more to the A Shau Valley, frequent Air Force reconnaissance missions helped identify new targets for Army units engaged in Operation Grand Canyon and Buffalo. The week-long siege of the Kham Duc Special Forces camp in early May required a large number of reconnaissance sorties, many of them diverted from other assignments. In the Saigon area, reconnaissance crews continued to monitor enemy efforts to launch a new assault on the city.

In Laos, weather continued to be one of the controlling factors affecting reconnaissance operations. When the good weather returned to Laos in 1968, the Air Force initiated a new interdiction campaign. Selected targets, such as mountain passes, were photographed several times daily so that strike aircraft could keep them closed; roads leading into them were scanned for truck parks and storage areas.

President Johnson on 31 October 1968 ordered an end to all bombing of North Vietnam in order to speed a set-

tlement of the war. American envoys in Paris, however, during their discussions with Hanoi's delegation, declared that the United States intended to continue reconnaissance flights. At first, the North Vietnamese insisted that reconnaissance was an act of war, but they later relented and accepted cessation of "all other activities that involve the use of force." SAC's reconnaissance vehicles continued to photograph North Vietnam as before, but a new tactical reconnaissance program was begun in the lower panhandle to "determine as soon as possible the reaction or intentions of the enemy with regard to a manned tactical reconnaissance program." When the North Vietnamese fired on the test missions, subsequent flights were accompanied by armed escort aircraft; however, two reconnaissance planes and one escort were lost to enemy fire within the first month. By the end of 1969 reconnaissance operations fell into a pattern: SAC's SR-71's covered the heavily defended areas of Hanoi and Haiphong and their environs, drones were used wherever they could be most effective, and the RF-4C's were restricted to the southern portion of the panhandle.

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Reconnaissance Winds Down

Even as reconnaissance operations over North Vietnam continued following the complete bombing halt, the number of sorties decreased significantly towards the end of 1969. The allied ground incursions into Cambodia in 1970, however, led to a surge of reconnaissance activity, particularly infrared missions. The Air Force had sufficient resources on hand to satisfy all requirements. In July the number of sorties decreased after U.S. ground units withdrew.

The first reconnaissance force cut-

back came in March 1970 when an RF-4C squadron redeployed from Tan Son Nhut to Japan. In November the RF-101 squadron at Tan Son Nhut was inactivated, and one of the two RF-4C squadrons at Udorn redeployed to the United States. The departure of the RF-101's brought to an end 9 years of continuous combat operations in Southeast Asia by that aircraft. In August 1971, after flying reconnaissance missions in the theater for more than 8 years, the RB-57's also redeployed to the United States. One of them had accumulated more than 8,000 flying hours. Within a few days, the last RF-4C squadron in South Vietnam also returned to the United States, leaving only one tactical reconnaissance squadron with 24 RF-4C's at Udorn. Stripped of its squadrons, the 460th Tactical Reconnaissance Wing was inactivated on 31 March 1971

In September 1971 tactical reconnaissance flights over areas just north of the DMZ revealed a sharp increase in the number of North Vietnamese AAA weapons and missile sites. When the enemy began firing missiles at the reconnaissance aircraft, Seventh Air Force on 8 November launched protective reaction strikes on the gun positions and SAM sites near the Vinh and Quan Long airfields. A rash of ground attacks against U.S. bases in South Vietnam inspired renewed air strikes against targets in North Vietnam, beginning on 26 December 1971. Reconnaissance sorties were flown to assess bomb damage after each attack. Defense Secretary Melvin Laird charged that Hanoi had violated the understandings associated with the 1968 bombing halt, including the one concerning the U.S.-North Vietnamese agreement that unarmed reconnaissance aircraft did not involve the use of force.

In February 1972 NVA tanks and heavy artillery were photographed just north of the DMZ, and American officials received intelligence that Hanoi was planning another major invasion of South Vietnam. On 30 March the North Vietnamese launched a three-front attack on South Vietnam. The single RF-4C squadron was hard pressed to meet all of its commitments, but the South Vietnamese Air Force helped out wherever possible with its RF-5's.

When a U.S. air strike was directed against the famous Thanh Hoa Bridge on 27 April 1972, two RF-4C's and two F-4 escorts covered the target at high altitude and brought back word that the bridge had finally been dropped into the river after 7 years and hundreds of bombing sorties. Several enemy missiles were launched at the flight during the strike. North Vietnamese intransigence at the Paris peace conference triggered Linebacker II on 19 December 1972, an air offensive against targets in the Hanoi-Haiphong area, which also brought reconnaissance aircraft back to assess bomb damage. Two RF-4C's followed every strike element to photograph the resulting destruction. The film was processed at Udorn and rushed to Tan Son Nhut for exploitation for follow-up bombings. The sorties continued until the signing of the Paris agreements on 27 January 1973, which brought all combat operations over North Vietnam to an end.

Fighting in Laos officially ended on 16 February 1973, but the Air Force continued to fly reconnaissance sorties along lines of communication to maintain current data on enemy AAA positions, truck traffic, and storage areas. The RF-4C's also flew sorties over Cambodia to assess damage from B-52 and tactical aircraft bombing, and a few sorties were flown along the South Vietnamese border where Viet Cong and North Vietnamese forces were concentrated. All USAF operations ended on 15 August 1973. Between early 1961 and the halt of America's longest war, USAF reconnaissance crews had flown almost 650,000 tactical sorties.

(1) An RF-4C reconnaissance crew debarks after returning from a mission, while airmen technicians remvoe the film. (2) A Vietnamese Air Force officer, examining reconnaissance photos at Tan Son Nhut, is assisted by an Air Force officer. (3) Photo interpreters check reconnaissance film for targets selection.


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Chapter XIII

Control of Strike and Defense Forces

As noted earlier, in the fall of 1961 the Air Force deployed a detachment from the 507th Tactical Air Control Group, Shaw AFB, S.C., to Tan Son Nhut, where it established a combat reporting center. Declared operational in October, the center took over responsibility for maintaining the primary control radars and directing air defense operations, i.e., scrambling and directing interceptor aircraft. It also performed routine air traffic control functions. In November 1961 additional elements of the 507th and the 5th Tactical Control Group also arrived in Vietnam. Early in 1962 they assisted in activating the joint USAF-VNAF Air Operations Center at Tan Son Nhut, adjacent to the combat reporting center. Rounding out the initial radar net were two combat reporting posts at Da Nang and Pleiku, each equipped with mobile search and height radars. Air Force personnel ran the Da Nang facility while the VNAF operated the Pleiku unit. The Air Operations Center became the heart of the tactical air control system, enabling air commanders to control and direct their strike forces.

Expanding the Radar Net

To provide coverage of the western air approaches to South Vietnam—from northeastern Cambodia and southern Laos—the Air Force in April 1962 moved a radar emplaced a year earlier at Don Muang to Ubon AB, where it provided a more favorable Thai location for detecting aerial activity in Laos, Cambodia, and South Vietnam. This installation not only greatly improved radar surveillance but also tied the air defense systems of Thailand and South Vietnam into a single coordinated whole. The installations at Tan Son Nhut, Da Nang, Pleiku, and Ubon provided high-altitude (above 5,000 feet) surveillance over South Vietnam. They also possessed a command and control capability and secure teletype circuits to radar and control units throughout South Vietnam and Thailand.

Except for a VNAF reporting post established at Ban Me Thuot in February 1963, the network remained essentially unchanged until April 1964 when more powerful radars were set up on Monkey Mountain near Da Nang and at Can Tho, which strengthened early warning and tactical air control operations. A few months later, the Air Force upgraded its Thai facilities, adding a combat reporting post at Udorn, thereby extending coverage over northeast Thailand and central Laos. The commissioning of several communication and navigation facilities in 1964 also benefited the air defense and tactical control systems.

One of the critical needs that grew out of the expanded forces was to enhance the tactical air control system. Although the network as of mid-1964 performed reasonably well, it became obvious that the ever-increasing military and commercial air traffic would soon overtax the system. In turn, this expansion made it imperative to build a single comprehensive system that could handle all U.S. and allied air operations, including air defense, tactical strikes, and air traffic control.

The flight line and control tower at Tan Son Nhut, 1964. (l. to r.) two RF-101's, six F-102's, and a B-66. ©N.G.S.

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(1) An Air Force mobile air traffic control team directed a C-123 to a safe landing on a small airstrip af Dau Tieng, South Vietnam. (2) A Troposcatter antenna, operated by the 1974th Communication Group, dominates a peaceful swampland scene near Don Muang Royal Thai AB, Thailand. (3) The Air Force Command Post Communications Center, operated by the 1876th Communication Squadron, Tan Son Nhut.

Coincident with the 1965 deployment of additional American forces to the area, the Air Force began to build the Southeast Asia Integrated Tactical Air Control System (SEAITACS). Established over a 2-year period, it consisted of four tactical air control centers (TACC's), two in South Vietnam and two in Thailand. Within South Vietnam, the focal point for all air operations was the TACC-South Sector (SS), which replaced the Air Operations Center at Tan Son Nhut in the summer of 1965. Like the AOC, the TACC-South Sector was manned by U.S. and VNAF personnel. Their job was to direct the air defense effort for South Vietnam, allocate air defense resources, and monitor all air movements within the air defense subsectors of a Mainland SEA Air Defense Region.

Acting for the Seventh Air Force commander in his capacity as Deputy Commander, MACV for Air Operations, TACC-South Sector had virtually complete responsibility for prosecuting the air war in South Vietnam. Air Force officials in the Tan Son Nhut center planned, directed, and coordinated all allied tactical air operations in South Vietnam and achieved a remarkable ability to provide close air support to allied forces. American Army and Marine commanders repeatedly praised the air assistance provided them. For example, following Operation Paul Revere II, a 1st Cavalry Division (Mobile)/ARVN ground operation in the summer of 1966, Maj. Gen. John Norton, USA, wrote to General Momyer to praise "the outstanding combat support received." He noted that tactical air support requests, "both immediate and preplanned, were answered promptly and effectively; in every instance accuracy was excellent and target coverage complete." This letter was only one of many received by Seventh Air Force which acknowledged the contributions not only of USAF strike units but, indirectly, of the tactical air control system.

The TACC-North Sector became operational at Da Nang in November

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1966. Collocated with the combat reporting center at Monkey Mountain, it was responsible for the air defense of northern South Vietnam and for providing surveillance, warning, and limited control of air operations over North Vietnam and Gulf of Tonkin. The Thai-based tactical air control center was at Udorn. It served as an extension of the Seventh Air Force control center, controlling and coordinating USAF strike units in Thailand.

The Udorn facility was designated Alternate TACC-North Sector and—as its name implies—served as the backup to the main center at Da Nang for control of air operations over North Vietnam and Laos. In an emergency, Marine Corps air control radars could take over from the primary centers at Da Nang and Udorn in directing operations over North Vietnam or the Laotian panhandle.

The buildup of tactical air control centers in the mid-1960's was accompanied by a substantial expansion of radar facilities. To strengthen the control system, the Air Force added 9 radars to 12 already in its early warning net. South Vietnam received four, bringing its total to an even dozen. The other five were installed in Thailand, raising the total there to nine. Additional coverage was achieved by tying in the radars of the Marine Corps and the Navy's Carrier Task Force 77.

The Air Force also employed airborne combat command posts as command centers to control interdiction strikes in the Laotian panhandle and Route Package 1 in North Vietnam. These were C-130 aircraft equipped with a removable command communications module. The airborne command team consisted of approximately 12 personnel. Their ability to control air operations was amply demonstrated during the defense of the Marines at Khe Sanh in 1968. During the peak of the strike operations, C-130 command teams controlled approximately 850 aircraft per day.

The EC-121 Task Force

Another major USAF asset which enhanced Air Force operations in Southeast Asia was the ultra-sophisticated, electronic-laden EC-121D aircraft (code name College Eye). In effect a flying radar station and airborne control platform, the EC-121D possessed the AN/APS-95 search radar, IFF/SIF (Identification Friend or Foe/ Selective Identification Feature), interrogation equipment, and a battery of communication gear. It became a key element in enabling successive Seventh Air Force commanders to exercise airborne control over tactical air operations. The range of its radar coverage and tactical air control extended over all of North Vietnam and the Gulf of Tonkin.

EC-121 operations began in Southeast Asia in the spring of 1965, after two F-105's were shot down by enemy MIG's while on strike missions over the North. From this incident—the first in which F-105's were lost in air combat—it became clear that early detection and warning of MIG flight activity were prerequisites to reducing aircraft losses. With the existing surface-based radar net unable to do the job, the Air Force brought in the EC-121's.

The EC-121 task force deployed to Southeast Asia early in 1965. It consisted of 5 aircraft, flight crews, and about 100 support personnel from the Aerospace Defense Command's 552d Airborne Early Warning and Control Wing at McClellan AFB, Calif. Its main support base was in Taiwan, but operations were generally flown from forward bases in South Vietnam or Thailand, originally Tan Son Nhut, later from Ubon, Udorn, and eventually Korat, where the task force finally found an in-theater home in October 1967. It was officially designated Detachment 1 (Rotational), 552d Aircraft Early Warning and Control Wing on 30 October 1968.

In performing what became their primary mission, College Eye airmen stationed themselves over the Gulf of Tonkin about 50 miles from Haiphong Harbor, flew elliptical orbits, and passed on information about North Vietnamese air activity. After Communist China charged in October 1965 and May 1966 that U.S. aircraft had violated its borders, the EC-121's took on the additional task of tracking and warning all American aircraft when they were approaching or appeared to be too close to the Chinese border. For this purpose, task force aircraft flew orbital patterns over Laos near the Plain of Jars.

The EC-121 crews undertook a number of other control duties. For example, from April 1965 to early 1966 and beginning again in late 1967, they controlled four fighters flying protective cover for unarmed support aircraft operating in the Gulf of Tonkin area. The EC-121's also (1) served as an airborne communications relay center through which aircraft returning from their targets could transmit strike results and position reports to the control center at Da Nang; (2) directed operations of fighter escorts, MIG combat patrols, C-130 flareships, and A-26 strike aircraft along the North Vietnamese-Laotian border; (3) provided rescue and navigational assistance in searches for downed pilots; and (4) frequently assisted fighters in finding tankers for emergency refuelings. In 1967 College Eye controllers also began actively directing USAF F-4 fighters to North Vietnamese MIG's.

Paradoxically, the EC-121's were called upon only three times to provide one of its basic services—early warning of enemy air attacks against South Vietnamese ground targets. The first occurred in October 1965 when intelligence reports indicated a possible IL-28 bomber attack on Da Nang. The second—and possibly most serious threat of the entire war—took place early in February 1968 when 4 IL -28's and 13 MIG's penetrated the DMZ. Upon entering the zone, the

fighter escort broke off, some turning toward the Laotian border, the remainder flying out to sea. The four Beagles loitered in the DMZ area for almost an hour, then dropped below radar detection altitudes and departed. The third incident came in mid-June 1968 when an enemy helicopter threat appeared to be building up along the DMZ. In these three instances, night-flying College Eye crews were able to detect them and alert friendly ground forces.

Air Defense

Long before the EC-121's began providing early warning of potential enemy air operations against South Vietnam, the Air Force deployed interceptors to Thailand in 1961 to demonstrate America's resolve to support its SEATO allies and the beleaguered Kingdom of Laos. From that point on during the next several years, the Air Force kept a minimum of four aircraft on alert in Thailand.

In March 1962 USAF interceptors also were sent to South Vietnam after radars detected low-flying, unidentified aircraft along the Cambodian border. At the request of Saigon officials, the Air Force dispatched four F-102's to Vietnam from Clark AB. This deployment inaugurated a year-long series of rotations, with Navy EA-1F all-weather fighters alternating with the F-102's. Because the EA-1F was the slower aircraft, it proved better suited than the F-102 for low-speed, low-level interceptions. The two rotated every 6 weeks to Tan Son Nhut until May 1963, when base overcrowding and the low probability of an enemy air attack ended the deployments. Subsequently, a number of aircraft were kept at their home stations in an on-call status so as to permit a speedy flight to Vietnam if necessary.

During the summer of 1963, Thirteenth Air Force conducted a series of no-notice exercises to test the ability of the F-102's to deploy to Vietnam. They involved brief flights to Tan Son Nhut and Da Nang, which were continued through mid-1964 for training purposes. Occasionally during the early 1960's, allied radars detected unidentified, low-speed, low-altitude tracks in South Vietnam's airspace. They were presumed to be those of Communist aircraft engaged in the resupply of Viet Cong troops during hours of darkness, but some of the unidentified radar tracks also might have been caused by U.S. Army helicopters or even flocks of migratory birds.

Apart from sporadic radar returns and infrequent violations of South Vietnamese air space by Cambodian MIG's, no significant enemy air activity occurred through the 1960's, although the Gulf of Tonkin incidents in August 1964 had significant air defense ramifications. Not knowing whether the North Vietnamese attack signalled the start of a major military campaign, the Air Force quickly reinforced its alert forces. Within a week, 6 F-102's were on alert at Da Nang, 8 F-105's at Korat, and 18 F-100's were available at Da Nang and Takhli to fly escort. Air defense units stayed in a heightened alert status throughout the remainder of 1964.

Estimates of the air threat changed sharply in 1965, particularly in the spring when the North Vietnamese Air Force acquired the Soviet-built light bomber, IL-28 Beagle. For the first time, Hanoi possessed the potential to strike as far south as Saigon and into northeast Thailand. The deployment of larger numbers of American aircraft to a handful of South Vietnamese bases made such fields attractive targets. When the United States initiated air strikes against North Vietnamese military facilities in 1965, the possibility of enemy retaliation in the South obviously increased.

In this regard, the lack of low-altitude radar coverage was a problem. If the enemy chose an attack route

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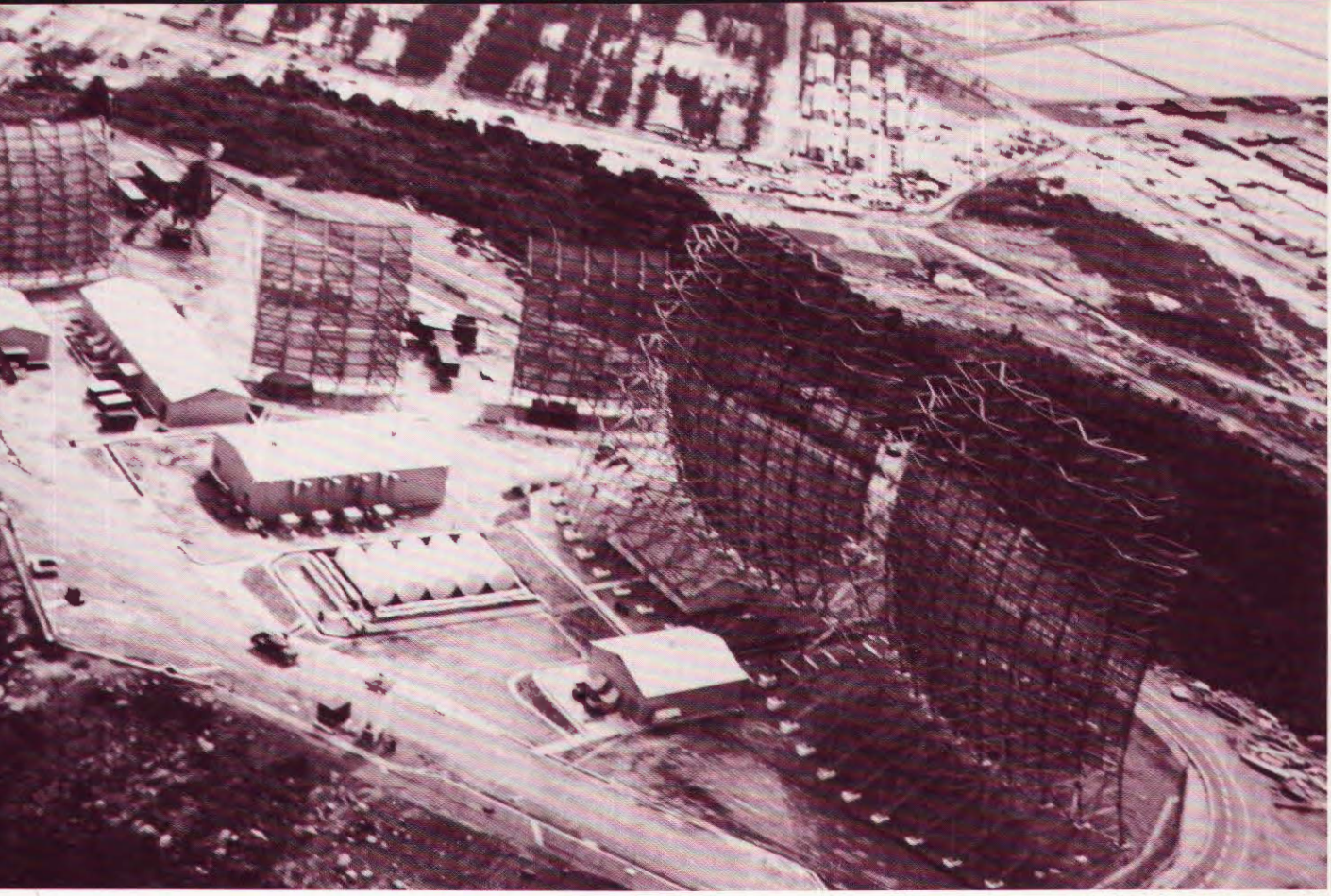
(1) A2C Douglas C. Christensen, seen through the plotting board on the EC-121D aircraft. The boards played a vital role in allowing crewmen to keep track of other aircraft in the area. (2) Control tower and helicopter area at Bien Hoa AB, 1 November 1964. (3) SSgt Eric M. Routkedge, a precision final controller, guides an aircraft to a safe landing during inclement weather at Dan Nang AB. (4) An Air Force F-100 Supersabre turns in making a strafing pass against an enemy force in the Mekong Delta of South Vietnam. (5) Aerial view of the Monkey Mountain radar site overlooking Da Nang AB and the city's harbor. (6) Tactical air navigation (TACAN) and power units were deployed to Binh Thuy AB, Vietnam, in 1965 by the 1st Mobile Communications Group at Clark AB, the Philippines. (7) 1st Lt. Lance D. Scalf, a weapons controller aboard an EC-121 aircraft, plots the locations of U.S. airstrikes over North Vietnam in November 1968. (8) TSgt James E. Johnson, a crewman aboard the EC-121D radar surveillance aircraft, checks his manuals as he prepares for a frequency "peak-up" of delicate equipment.



A view of Air Force tropo-scatter communication antennae at Monkey Mountain, South Vietnam.

which exploited this weakness, the allies would receive little or no warning. It was estimated that Saigon might get an advance notice of 4 minutes; Da Nang, however, would have no more than 1 to 2 minutes to react. Given the closely parked, unreveted aircraft and their proximity to ordnance and POL storage, even one or two enemy aircraft could wreak havoc. One burning aircraft alone could trigger a holocaust under prevailing airfield conditions. Since command and control, radar, and communication systems were equally vulnerable, the creation of an adequate air defense system became a matter of urgency in 1965 and thereafter.

The number of aircraft committed to SEA air defense climbed gradually but steadily. Though still small, the air defense contingent tripled in size over the pre-1965 force. A round-the-clock alert was maintained by 12 F-102's—8 at Tan Son Nhut and 4 at Don Muang. For a period of nearly 6 months between October 1965 and the spring of 1966, F-102's and F-4C's performed alert duty at Da Nang on a 24-hour basis. The assignment of the F-4's marked the first operational use of these aircraft in an air defense role. As the war over North Vietnam intensified, the F-4's strike role took precedence and they were relieved of air defense duty, except during periods of tension when all fighters were alerted on a back-up basis. Beginning in late 1964, the U.S. Army also deployed surface-to-air Hawk missiles to Tan Son Nhut, Bien Hoa, Cam Ranh Bay, and Da Nang to help counter any enemy air attack on allied bases.

By the end of 1966 air defense forces had grown significantly both in South Vietnam and Thailand. At that

In December 1967 a newly modified ground controlled approach radar unit went into operation. The new unit provided controllers with the capability of precision radar approaches on parallel runways at Tuy Hoa AB.

time, 22 F-102's were exclusively deployed for air defense: 12 on alert in South Vietnam (6 at Bien Hoa and 6 at Da Nang) and the other 10 in Thailand (6 at Udorn and 4 at Don Muang). Approximately 14 F-104's based at Udorn also had air defense duties as a secondary mission.

USAF air defense forces in Southeast Asia underwent little change in composition and location during 1967-1968. During those 2 years, the Air Force normally kept a minimum of 14 aircraft on 5-minute alert—4 each at Da Nang, Bien Hoa, and Udorn, and 2 at Don Muang. The remainder of the F-102 force was on 1-hour call. In addition, eight F-4C's stood alert at Cam Ranh Bay—one on a 15-minute basis and four others on 30-minute notice. Another two were on 15-minute alert at Da Nang. The U.S. Navy and Marine Corps augmented these forces by maintaining alert aircraft at all times. Altogether, as many as 200 U.S. aircraft were available for air defense at the peak of the U.S. force buildup.

Air Traffic Control

One of the important functions performed by the allied air control system was that of traffic control. The first USAF team deployed to Southeast Asia for this purpose was an element of the 1st Mobile Communications Group, which arrived in Thailand on 15 February 1961 to assist in providing air route traffic control for the Thai Air Force. Subsequently, other teams deployed to the area to support the 2d Air Division, the Vietnamese Air Force, and other allied forces. In many instances in the early days, 1st Mobile Communications Group teams occupied control towers alongside Thai or Vietnamese personnel to facilitate local traffic handling of joint-usage airfields.

As the air forces in Southeast Asia grew, the problems of air traffic control mounted. During the early 1960's navigation throughout the area was based primarily upon nondirectional radio beacons. Existing fields lacked modern equipment to handle the upsurge in traffic. To help resolve the problem, the Air Force installed mobile radar approach control (RAPCON) units, mobile towers, and navigational aids at key locations. The nondirectional radio beacons were replaced or augmented as rapidly as possible with very high frequency omni-directional radio range equipment, tactical air navigation equipment, or a combination of both. Nondirectional beams at Da Nang, Qui Nhon, Binh Long, and Tan Son Nhut provided reporting and navigational reference points for en-route traffic. An additional beacon was placed on Phu Quoc Island, off South Vietnam's west coast, as a navigational aid for traffic routed around Cambodia—due to Phnom Penh restric-

tions of overflight of its territory.

The Republic of Vietnam, like all nations, exercised sovereign control of its airspace. Its Directorate of Civil Aviation delegated all South Vietnamese airspace control to its Saigon area control center, which in turn delegated authority to ground radar operators, who controlled landing approaches. Operations in subdelegated airspace were governed by letters of agreement between officials of operating facilities and the Saigon area control center. In July 1965 the Directorate formed an air coordinating committee in an effort to achieve closer coordination between civil and military agencies. Represented on this committee were U.S. Air Force, Army, and Marine Corps members and others from the VNAF, MACV, and the U.S. Civil Aviation Assistance Group. The U.S. Air Force and the Directorate of Civil Aviation jointly chaired the committee.

It resolved many problems, but rising air traffic, inexperienced personnel, cumbersome lines of authority, and the need to build an adequate air traffic control structure in the middle of a war complicated its job. A series of meetings was held in 1966 to discuss a variety of current problems, including terminal and enroute traffic control, equipment for navigation aids, point-to-point communications, and personnel training.

One important issue was the blocking or preemption of airspace as a result of impending artillery firing, special air operations, and naval gun fire. For example, when the B-52's began operations in the spring and summer of 1965, the need to block vast amounts of airspace had an unfavorable effect on enroute air traffic control. Navy amphibious operations and U.S. Army artillery fire also required airspace blocks. Naval operations were usually coordinated with the air component commander. In the Central Military District surrounding Saigon, 15 minutes prior to the firing

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(1) An Air Force EC-121 aircraft over South Vietnam. (2) Air Force air traffic controllers, 1877th Communications Squadron, and Vietnamese Air Force trainees, direct air traffic at Bien Hoa AB, South Vietnam. They are: (l. to r.) SSgt William A. Beeton, Jr., A1C Do Dang Thanh, Sgt Robert M. Lennon, and Sgt Phan Cong Tao. (3) 1st Lt. Sa Nguyen, of Saigon, senior VNAF weapons director, receives training on running air defense intercepts of unidentified aircraft. His instructor, 1st Lt. Larry G. Laurendine, served as a weapon instructor.

of artillery or mortar shells, the radar approach control facility at Tan Son Nhut advised all aircraft in the vicinity of the impending operations.

Because of artillery firings and blocked airspace, there were only three altitudes provided for aircraft departures at Tan Son Nhut: 7,000 feet, 9,000 feet, and 11,000 feet. At the same time, traffic was rapidly escalating. The arrival of the summer monsoons also caused difficulties, since precipitation cluttered the radar scopes, often rendering them useless when most needed. With nearly simultaneous operations being carried out by the Air Force, Army, Navy, VNAF, and civilian airlines, air traffic controllers at Bien Hoa, Tan Son Nhut, and Da Nang found themselves each handling more aircraft movements monthly than Chicago's O'Hare International Airport. During 1968 there were 4,779,647 aircraft movements (principally takeoffs and landings) controlled by towers manned partially by USAF personnel assigned to units of the 1964th Communications Group.

A number of steps were taken to maintain air safety. Since controllers of the South Vietnamese Directorate of Civil Aviation needed assistance, a U.S.-Vietnamese letter of agreement raised the status of USAF controllers to advisors with authority to take necessary steps to insure the safety of military flights. Previously, USAF controllers had only manned traffic control positions under the Vietnamese agency. In May 1966 the mobile radar approach facility at Tan Son Nhut became the first in Southeast Asia to receive a modification unit which provided additional surveillance radar scopes. With this equipment, operations at that facility were divided into sectors. During June-July 1966 the radar approach control units at Da Nang and Cam Ranh Bay also were modified. Similar actions were taken at other bases, increasing from three to five the number of control positions at each facility.

In February 1968 PACAF initiated a special project (Commando Indian) to create an air traffic regulatory system to handle heavy traffic between air bases. Under an agreement among the Directorate of Civil Aviation, MACV, and the VNAF, the Air Force created six air traffic regulation centers (ATRC's) as elements of the aircraft control and warning subsystem of the tactical air control system. The centers were located at existing control and reporting centers and posts, with which they were linked internally to enable coordination of data on aircraft movements. The last of these sites became operational in February 1969.

By mid-1969, the air traffic control centers were handling an average of more than 70,000 aircraft operations monthly, accounting for approximately 75 percent of the total traffic at the control and reporting centers and posts, thus permitting the weapon controllers there to concentrate on their primary duty of directing strike aircraft. Because of reduced flying starting in 1971, the weapon controllers were initially trained and then given responsibility for the traffic previously controlled by the ATRC's throughout Vietnam.

Control tower aircraft movements handled by USAF controllers decreased substantially after 1969. As American participation in the war ground down, the Air Force began transferring control towers, direct air support centers, and other communications facilities to the South Vietnamese. A final, orderly phaseout of remaining Air Force communications was carried out in January-March 1973. The 1964th Communications Group, whose mission had been to provide USAF telecommunications and air traffic control in Vietnam, terminated its operations on 23 March 1973. The 1974th Communications Group at Udorn continued to provide these services for USAF units remaining in Thailand.

Chapter XIV

Air Rescue

During the course of the war the Air Force's Air Rescue Service recovered several thousand U.S. and Allied fighting men who went down in jungles, mountains, and waters of Southeast Asia. The first USAF rescue team—three officers and three airmen—arrived in South Vietnam on temporary duty on 10 January 1962. Based at Tan Son Nhut, its mission was to organize a search and rescue (SAR) control center and network throughout the country. In April 1962 the 6-man cadre was designated Detachment 3, Pacific Air Rescue Center. Its first commander arrived on 2 July. The detachment initially had no aircraft and had to rely on U.S. Army advisors to provide their helicopters to assist in air rescue missions. Army personnel subsequently were assigned to the Tan Son Nhut control center and provided liaison between the Air Force and the Army.

In addition to not having its own aircraft, the detachment lacked most of the basic equipment needed for an effective SAR system. For example, in the early days of its operations the SAR center sent requests for help to operational units by bicycle—a method faster and more reliable than trying to use the existing Vietnamese telephone network. Its reliance on the Army and later the U.S. Marines for helicopter support also created problems because they were not configured for rescue missions. For example, in March 1963 an Army OV-1 aircraft went down near the top of a 6,000 foot mountain in II Corps. To reach the site, two Marine UH-34D helicopters attempted to insert a 4-man American-Vietnamese rescue team at the crash site. However, the Marine helicopters did not have a cable long enough to reach the ground through the high jungle canopy. When one descended to the jungle canopy, it suddenly lost power and crashed, killing an ARVN ranger who was on the hoist at the time. The aircrew managed to climb out of the wreckage moments before it erupted into flames. The copilot, however, was severely burned and died during the night. Subsequently, a second Marine helicopter attempting to land a Marine rescue team also lost power and crashed but the only injury was a sprained ankle. Eventually, the bodies of the Army OV-1 pilot, ARVN ranger, and Marine copilot, plus members of the American and Vietnamese rescue teams were extracted by helicopter.

It was clear that specialized aircraft and devices were needed to effectively operate over the jungle and mountainous terrain of Southeast Asia. In the early 1960's the only crash/rescue helicopters in the USAF inventory were the short-range (220 miles) HH-43 Huskies, operated by local base rescue (LBR) units in the United States and overseas. However, the HH-43 was considered inadequate for conditions in Southeast Asia. In June 1963 a more advanced helicopter, the CH-3 single-rotor cargo amphibian, made its first flight. It had a forward speed of about 150 miles per hour, an endurance of 4-1/2 hours, and range of approximately 500 miles. Impressed by its performance in November 1963, the Commander, Air Rescue Service, recommended to Headquarters USAF the purchase of the CH-3 in quantities. He reported that the Service was not equipped to do the job in Southeast Asia and that, by "utter default," Air Force combat crews were "made dependent upon ill-equipped and ill-trained. . .U.S. Army and Marine Corps helicopter resources diverted to accomplish our mission. . .Their no-

Col. Devol Brett, Vice Commander, 12th TFW, was rescued by an HH-3E helicopter from the Gulf of Tonkin in December 1967. His F-4C Phantom was hit by enemy fire while on a strike mission north of the DMZ.

Capt. Leo F. Dusard, downed at sea after suffering an engine failure, climbs into the rescue sling of an HH-43 rescue helicopter after being forced to eject from his F-100 in the Gulf of Tonkin, December 1967.

ble efforts have wrought confusion and even disaster when engaged in some attempts to prosecute Air Rescue Service missions."

In response, Headquarters USAF ordered a number of combat-modified CH-3's. But, pending their manufacture, the Air Force was forced to use the HH-43's. In March 1964 three USAF HH-43 units were transferred from the Philippines and Okinawa to Southeast Asia. In June 1964 the first temporary-duty contingent—two HH-43's and 36 personnel—was sent to Nakhon Phanom, Thailand. That same month the 31st Air Rescue Squadron at Clark deployed two HU-16 amphibian aircraft to Da Nang, South Vietnam, to provide rescue service for U.S. airmen downed in the Gulf of Tonkin. Two HU-16's from the 33d Air Rescue Squadron also were deployed to Korat Air Base, Thailand, to support USAF operations over that country and Laos.

On 20 October 1964 Detachment 4, Pacific Air Rescue Center, which was equipped with three HH-43F helicopters specifically modified for use in the theater, arrived at Bien Hoa, replacing a temporary duty unit deployed there several months before. The modified HH-43's possessed heavy armor plating to protect the crews from hostile ground fire and 250-foot cables to facilitate rescues in high rain forest areas. The unit also had on hand HU-16 amphibian aircraft for use in sea rescue of downed pilots.

By 1 January 1965 five helicopter detachments were operating in the theater—at Bien Hoa and Da Nang, South Vietnam; and at Udorn, Nakhon Phanom, Takhli, and Korat in Thailand. However, only the Udorn and Nakhon Phanom detachments in Thailand operated solely in support of downed airmen. The others performed their normal local base rescue missions. The two detachments in South Vietnam flew aircrew recovery missions, although their "combat-modified" helicopters were extremely limited in range and loitering capability.

In January 1966, the Air Force activated the 3d Aerospace Rescue and Recovery Group at Tan Son Nhut to serve as the primary rescue agency in Southeast Asia. It took over the job of planning, organizing, coordinating, and controlling rescue operations

In February 1968 Capt. Bernard E. Flanagan, an F-100 pilot of the 355th Tactical Fighter Squadron, was shot down while on a mission over South Vietnam. He was picked up within an hour by an HH-3E helicopter of the 3rd Aerospace Rescue and Recovery Group.

from the Joint Search and Rescue Center at Seventh Air Force headquarters, Tan Son Nhut, and coordinating centers at selected operating locations. The group directed the activities of three rescue squadrons, the 37th at Da Nang, the 38th at Tan Son Nhut, and the 39th at Tuy Hoa. Later, the group operated a fourth squadron, the 40th at Udorn. Ten rescue detachments also were based throughout South Vietnam and four in Thailand.

While this dispersion of rescue units facilitated recovery of downed pilots over a wide area, there were many instances when helicopter crews found they were unable to reach grounded airmen due to the limited range of their aircraft. Looking for ways to extend their operations, rescue crews sought out clearings in the jungle for use as forward locations, where they could stockpile fuel and await calls for help many miles and minutes closer to a downed pilot. They also installed extra fuel tanks—initially a 150-gallon container, later as many as four 55-gallon drums—to gain additional operating time. To improve their ability to rescue crews shot down over North Vietnam, ordinarily far beyond their reach, they also stored drums of fuel on mountain tops along the route north, enabling them to leapfrog from one to another.

The SAR Task Force

Other improvisations included employment of a SAR Task Force, or SARTAF. The basic rescue element for aircrew recovery missions after the 1965 force buildup, this task force subsequently developed a rescue formation involving a pair of helicopters, one flying high, the other low. The low aircraft would "go in" to make the recovery, while the high aircraft stood by to lend aid if required. Also, in 1965 rescue crews were provided high-flying USAF fighter cover to ward off MIG attacks. This fighter cover was known both as MIGCAP and Rescue Combat Air Patrol (RESCAP). In August 1965 Air Force A-1E Skyraiders also began escorting the rescue units. Coordination and control of all air elements involved was exercised by a fixed-wing rescue aircraft, itself a part of the SAR Task Force.

Typically, during a recovery operation, two A-1E's flew directly to the general search area and began a hunt

for the downed crew. Two other A-1E's escorted the helicopters to the area, flying above small-arms range. Reaching the target area, they circled until the first two A-1E's contacted the survivor by radio, located him, and determined whether he was in a hostile area. If he was, the fighters and escorting A-1E's attacked with bombs, rockets, and 20-mm cannon fire until the area was "neutralized" sufficiently for a helicopter to go in low for the recovery. The A-1E's orbited nearby but not directly over the downed pilot so as to avoid giving away his position. Although the HH-43's were poorly equipped for this rescue role, USAF crews performed it repeatedly. However, after accelerated tactical strike operations began over both North and South Vietnam, the number of downed airmen rose dramatically. Rescue detachments found they could not keep up with the number of calls for help, and it also became apparent that a more powerful, better-equipped helicopter was essential, especially if they were to operate deep in enemy territory.

In July 1965, the Tactical Air Command—many of whose crews were being shot down in enemy territory—loaned the Air Rescue Service two CH-3 cargo helicopters. However, it was not until November 1965 that there was a major improvement in air rescue capabilities, with the arrival in Southeast Asia of the first six HH-3E's. An updated version of the CH-3, the HH-3E was specifically modified for rescue operations. Its speed, endurance, and ceiling of approximately 10,000 feet were about the same as the CH-3, but auxiliary fuel tanks increased its range to about 640 nautical miles. Operating out of Udorn, Thailand, or Da Nang, South Vietnam, it could reach any point in North Vietnam and return to its home bases. When deployed to a forward location, its extended range enabled rescue crews to deploy near an area of aerial combat, where it could orbit ready for an emergency deep within North Vietnam.

The HH-3E's communication equipment was compatible with all other allied aircraft operating in Southeast Asia, and it possessed an external variable-speed hoist with 240 feet of cable, stressed for 600-pound loads, and able to penetrate the jungle canopy. The new helicopter, along with its less powerful companion, the HH-3C, quickly became known as the Jolly Green Giant.

With these advanced helicopters, rescue crews were able to keep pace with the stepped-up tempo of the air war. Control of operations became more direct and responsive. Communications further improved when Udorn-based C-54's began flying as airborne command posts along the Thai frontier. HU-16 amphibians performed the same communications task over the Gulf of Tonkin. Old, slow, and limited like the CH-54 to low-altitude operations, the HU-16 had been in the inventory since 1949. However, it was able to make water landings in daylight and mild sea conditions and, by the end of 1965, had saved 70 people, 60 of them combat crewmembers.

Beginning in 1966, the amphibious HU-16's and other Air Rescue Services fixed-wing aircraft were replaced by the Lockheed HC-130 Hercules, an all-metal, high-wing, land-based amphibian tailored specifically for the global search and rescue mission. The Air Force contracted for the plane in 1963. With a top speed of approximately 340 knots and a range of more than 4,500 nautical miles, it could land easily on short runways or landing strips such as those usually found in advance-base operations. It obviously could not make vertical recoveries on land or water like the HU-16's, and could not commit its pararescue teams to jungle areas where parachutes would be caught in 150-foot trees or mountain slopes where jagged outcrops could spear a man. But the HC-130 could fly great distances

over the oceans, find its objective with its electronic gear, and linger for a long, long time.

Over land, the HH-3E's began flying an increasing number of recovery missions as more of them entered the inventory. Despite its superiority over the HH-43, however, it still lacked the full capacity to loiter for lengthy periods over hostile territory. This was a serious problem since on deep penetration missions it was often necessary to loiter for a considerable time while escort and strike planes neutralized enemy areas. Also, when carrying a full load of fuel, the helicopter was unable to hover over mountain areas where many downed pilots deliberately guided their parachutes to avoid capture.

Recognizing this dilemma, the Air Rescue Service in 1964 proposed converting the HC-130 into an aerial tanker to provide an air-to-air refueling capability for the HH-3E. On long-range missions, this would enable the HH-3E to provide a complete land or water vertical recovery capability throughout the theater. With refueling, it could perform missions far beyond its normal range, enabling it to participate in extended SAR/recovery operations, to loiter indefinitely, and to return home.

The proposal was approved, and Air Force Systems Command experts immediately began working with the Rescue Service and industry to develop a workable mid-air helicopter refueling capability. A working system was devised and tried experimentally in 1965, was fully tested in 1966, and finally adopted in 1967 as the mainstay of air rescue operations. The first operational use of the aerial refueling technique involved an HH-3E helicopter which was assigned a Gulf of Tonkin orbit mission previously flown by an HU-16. With the help of two mid-air refuelings by an HC-130P, the HH-3E flew the 8-hour mission to successfully demonstrate its improved range and loiter capability. Thereafter, the HC-130/HH-3E team began flying daily operational missions.

Even as this important improvement was made in air rescue capabilities, the Air Force took steps to acquire a more powerful rescue helicopter. The result was the production and deployment in 1967 of the Super Jolly Green Giant—the HH-53B and its more capable sister, the HH-53C. Adapted from a Marine Corps helicopter, these new aircraft began flying rescue missions in late 1967. The HH-53 could carry 38 passengers, or 24 litter patients with 4 attendants, as well as its normal crew of 5. It could carry more than 7 short tons of dead weight, transport the cargo some 258 miles without auxiliary tanks, protect itself with three 7.62-mm miniguns, and fly at a top speed of 195 miles per hour. Besides having a complete air refueling system like the HH-3E, it had automatic flight control and engine anti-icing systems for all-weather flying. Altogether, the HH-53 was the largest, fastest, most powerful heavy-lift helicopter in the Air Force inventory. This team—along with a variety of other support aircraft—played a key role in the dramatic but unsuccessful effort to rescue American prisoners of war in the Son Tay prison camp near Hanoi the night of 20-21 November 1970 (discussed in Chapter IV).

Together with the older HH-3E, they were used extensively in Southeast Asia, while the Air Force continued working to improve their components. Advances were made in communications, navigation equipment, signaling devices used on and from the ground, fuel tanks to prevent explosions, and a fuel-dumping mechanism. In addition, the Air Force worked to develop a ground-fire warning device, a multichannel survival radio, better signals and flares, an improved jungle penetrator, a superior Doppler navigation system, more resistant armor plating, bullet-resistant windshields and sideview panels,

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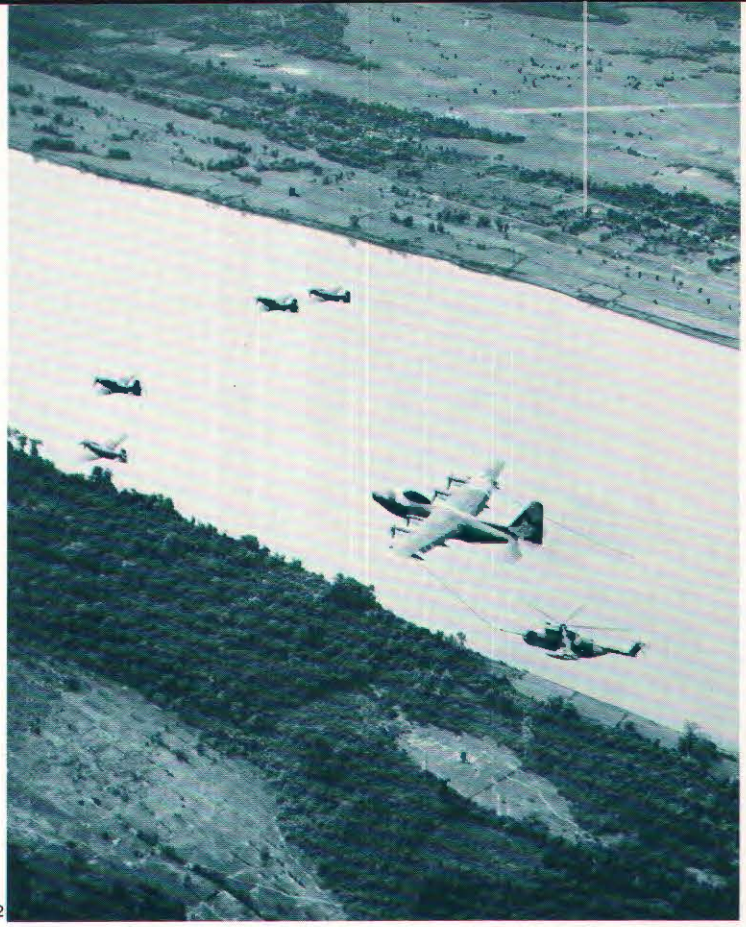

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(1) An Air Force HH-43 helicopter approaches a jungle clearing in South Vietnam's "D" zone to pick up wounded American paratroopers. (2) An HC-130 refuels an HH-3E helicopter heading out on a rescue mission, accompanied by four A-1 Skyraiders to fly cover for the operation. (3) This Air Force painting depicts the rescue of Lt. Ken Thomas, whose plane went down in North Vietnam. (4) A U.S. Air Force gunner in an HH-43 helicopter prepares to give fire support during a 1966 rescue mission over Vietnam. (5) This air rescue crew plucked two Army flyers whose plane went down in South Vietnam. Shown checking map coordinates of the rescue site are (l. to r.): A1C Charles R. Ingulli, Jr., pararescueman; SSgt James Baldwin, flight engineer; and 1st Lt. John F. Kolar, rescue crew commander. (6) Maj. Carl B. Light (3d from l.) thanks an F-4 helicopter team which rescued him from the southern panhandle of North Vietnam in June 1968. The F-4's flew air strikes which enabled the helicopters to make the pickup. Shown (l. to r.): Maj. Don P. Olsen, rescue helicopter pilot; Sgt James A. Bowers, helicopter flight engineer; Lt. Col. Donald R. D'Amico, F-4 pilot and commander of the 480th Tactical Fighter Squadron; and Lt. Col. Charles R. Klinkert, an air rescue pilot. (7) Two A-1H's escort an Air Force HH-3 rescue helicopter during a mission in Southeast Asia. (8) Lt. Col. Robert F. Wilke, and A-1 pilot, 602d Fighter Squadron (Commando), surveys his damaged aircraft which was hit during a rescue mission over North Vietnam.

and electronic countermeasures to confuse enemy radars.

The Problem of Night Rescue

Normally, a survivor's chances of rescue from hostile territory were best within 15 minutes after landing; after 30 minutes, his chances declined sharply. The onset of darkness or bad weather forced suspension of all recovery activity until conditions again permitted a rescue attempt. The lull gave the enemy time to move into an area and capture the downed airman, or worse, to set a trap to blast the rescue helicopter from the skies when it returned in the morning or when the weather cleared.

In 1967, with night rescue growing in importance, the Air Force initiated a 3-year development program to acquire a system which would enable a rescue force to fly after sunset to any geographical point in any kind of weather, avoiding all obstacles. The Air Force also sought a system which would enable rescue crews to "see" with instruments on a moonless, starlit night, locate a downed airman approximately 5 miles away, establish and maintain a safe hover over him, and lift him out without giving away his location or that of the helicopter. These were extraordinarily difficult requirements, which American industry could only partially fill within the time and funds available.

Nevertheless, by March 1971 a limited night recovery system was produced and installed on five HH-53C's which became operational in Southeast Asia. These aircraft contained a low-light-level TV device which enabled the pilot to see on a cabin screen much more than he could out his window with the naked eye. In addition, infrared lights installed externally enabled crewmen equipped with night-vision goggles also to see outside. The aircraft also contained a semi-automatic approach-and-hover system to help the pilot during a pickup. Night rescues with this interim system became possible, but only from lightly defended territory, comparatively flat terrain, and in relatively good weather. Under these conditions it also was necessary for the survivor to have an infrared strobe light and be in an open area where he could be readily seen by a crewman with night-vision goggles.

This air rescue crew during an 11-day period saved 11 men wounded in combat. Shown in front (l. to r.): Maj. Harold Pickering, detachment commander; Sgt James A. Crawford, flight engineer; SSgt William L. Crawford, flight engineer; and Capt. Laurence W. Conover, rescue crew commander. In back row (l. to r.): A1C Ronald E. Sholes, pararescueman: A1C James L. Park, pararescueman; Capt. William J. Haugen, rescue pilot; Capt. Albert E. Tollefesen, rescue pilot; and Sgt Garry G. Harold, pararescueman.

Components under development

A fisheye lens view of A2C Roy E. Kelsey, 38th Aerospace Rescue and Recovery Squadron, who sits on a jungle penetrator as he prepares to be lifted to a hovering HH-43 helicopter during a practice mission in Vietnam.

which could transform this limited system into a full night recovery capability included an improved, virtually automatic Doppler navigation system which would take an aircraft to any point selected by the pilot. Another component was a radar system enabling the pilot to hug the ground at some 200 feet, safe from radar detection, automatically adjusting to the terrain and dodging obstructions. A third device, an electronic location finder (ELF), would enable the crew to pinpoint a survivor's exact position, even when under a jungle canopy, and come to a stable hover directly over it.

In 1973, the first two devices were still in the prototype test stage but the ELF had already been installed on HH-53's. In 1972 the latter device led to at least one rescue during a remarkable armed incursion into North Vietnam, which saved an F-4 crewmember, Capt. Roger C. Locher. His aircraft was shot down in May 1972 by a MIG-21 heat-seeking missile over North Vietnam while he was on his 407th combat mission. After parachuting safely into a valley, he tried without success to contact friendly aircraft by radio. During the next 23 days he hid some 8 miles from the MIG base at Yen Bai, living on fruits, nuts, and berries. He finally made contact with two USAF flights, which triggered a rescue attempt by a task force including HH-53 helicopters, A-1 fighters, an HC-130 command aircraft (which also refueled the helicopters), and F-4 and F-105 air cover. The initial rescue attempt on 1 June was driven off by enemy MIG's. However, the next day, with the help of the ELF, an HH-53 was able to locate him and pull him out with a jungle penetrator. Brought back to his base, Captain Locher declared: "There's no way to express my feelings. It's unbelievable. It's just a miracle."

It was one of many miracles brought about by the determination, endurance, and ingenuity of Air Force rescue crews, development agencies, and American industry. Together, they helped save 3,883 lives between 1964 and mid-August 1973. Of these, 2,807 were U.S. military: 926 Army, 680 Navy, and 1,201 Air Force. The rescuemen also saved 555 allied military men, 476 civilians, and 45 other unidentified persons. They also paid a high price. During the course of the war 71 U.S. rescuemen were killed and 45 aircraft destroyed.