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NATIONAL SECURITY AGENCY
CENTRAL SECURITY SERVICE
FORT GEORGE G. MEADE, MARYLAND 20755-6000

Serial: MDR-54497
28 March 2012

This responds to your request of 27 December 2007 for a declassification review of the document which you described in your letter of that date as follows:

> "SIGINT Applications in U.S. Air Operations, Part One, Collecting the Enemy's Signals, by Thomas N. Thompson, William D. Gerhard and Jesse E. ???. Cryptologic History Series, Southeast Asia, Fort George G. Meade, MD National Security Agency, February 1972."

You received an interim response in 2008 which informed you that the material had been requested in a Freedom of Information Act (FOIA) case and would be held in abeyance until final processing of the document was completed in the FOIA case. This document was recently released in response to a FOIA request on 30 September 2011. If you wish, you may request a re-review of this document as a mandatory declassification request after 30 September 2013.

The material that you requested was recently reviewed and released under the FOIA requirements of Executive Order (E.O.) 13526. Therefore, the material is enclosed and being released to you just as it was released in FOIA Case 8907. We have determined that some of the information in the material requires protection.

Some portions deleted from the document were found to be currently and properly classified in accordance with E.O. 13526. The information denied meets the criteria for classification as set forth in Section 1.4 subparagraph(c) and remains classified TOP SECRET, SECRET and CONFIDENTIAL as provided in Section 1.2 of E.O. 13526. The information is classified because its disclosure could reasonably be expected to cause exceptionally grave damage to the national security. The information is exempt from automatic declassification in accordance with Section 3.3(b)(1) of the E.O. Because the information is currently and properly classified, it is exempt from disclosure pursuant to the first exemption of the FOIA (5 U.S.C. Section 552(b)(1)).

Section 3.5 (f) of E.O. 13526, allows for the protection afforded to information under the provisions of law. Therefore, the names of NSA/CSS employees and

information that would reveal NSA/CSS functions and activities have been protected in accordance with Section 6, Public Law 86-36 (50 U.S. Code 402 note).

In addition, information regarding other individuals has been deleted from the enclosure in accordance with the sixth exemption of the Freedom of Information Act. This exemption protects from disclosure information that would constitute a clearly unwarranted invasion of personal privacy. In balancing the public interest for the information you request against the privacy interests involved, we have determined that the privacy interests sufficiently satisfy the requirements for the application of the sixth exemption.

Sincerely,

Kristina M. Grein

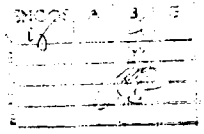
KRISTINA M. GREIN
Chief
Declassification Services

Encl:
a/s

~~TOP SECRET NOFORN~~

SOUTHEAST ASIA

SIGINT APPLICATIONS IN U. S. AIR OPERATIONS



Part One

~~THIS DOCUMENT CONTAINS CODEWORD MATERIAL~~

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CRYPTOLOGIC HISTORY SERIES

SOUTHEAST ASIA

SIGINT Applications in U.S. Air Operations

PART ONE

Collecting the Enemy's Signals

[redacted] AFSS (b)(6)
NSA
William D. Gerhard, NSA USAF

February 1972

SECURITY NOTICE

Although the information contained in this journal ranged in security classification from UNCLASSIFIED to TOP SECRET CODEWORD, the overall security classification assigned to this issue is TOP SECRET UMBRA.

While the TSCW classification by itself requires careful handling, additional caution should be exercised with regard to the present journal and others in the series because of the comprehensive treatment and broad range of the subject matter.

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Southeast Asia

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Foreword

Cryptologic operations in support of U.S. Air Force commanders during the Korean War provided the essential base from which the air-related SIGINT systems employed in Southeast Asia in the 1960's developed. U.S. Air Force commanders in Korea learned to make direct application of SIGINT in their operations. As they did so, SIGINT analysts for the first time worked in the air operations centers themselves to assist in the application of SIGINT.

U.S. Air Force and U.S. Naval Air commanders in Southeast Asia, recalling the Korean War, asked for SIGINT to aid them in planning, conducting, and evaluating air operations, and they wanted timely service. With Korean War and Cuban missile crisis experience behind them, U.S. SIGINT technicians adjusted collection, processing, and reporting tasks to meet these Southeast Asian requirements. Once again, they formed a close relationship with commanders and worked in or near the operations centers of PACAF and Seventh Air Force and Seventh Fleet's attack carriers and special mission ships.

The purpose of this cryptologic history on SIGINT aspects of U.S. air operations, of which this is the first volume, is to establish a record of those SIGINT operations and the use made of SIGINT by the Air Force and the Naval commanders concerned. The documentation will serve, therefore, both the cryptologic agencies and the U.S. Navy and U.S. Air Force as they look ahead to a continued partnership in future air operations.

NOEL GAYLER
Vice Admiral, U.S. Navy
Director, NSA

USAF

Preface

In preparing this initial volume on SIGINT applications in Southeast Asian air operations, the writers used a wide variety of source materials. Noteworthy among these were the unit histories of Air Force Security Service's Pacific Region, documentary materials from Naval Security Group; operational message files, including a major one assembled by Mr. Delmar Lang of NSA; drafts prepared by Mr. James Thompson, B3, before he departed NSA; the technical reports of NSA's technical library; and interviews.

The writers are indebted to many persons for assistance freely given. Direct assistance in one form or another came from [redacted] and LT. Thomas J. Coneeney, USN (NFOIO), also contributed by making several of our accounts more meaningful and accurate. Finally, the writers acknowledge the patient work of [redacted] who typed and corrected their draft manuscripts.

A few source footnotes appear in text, mainly where the material was directly quoted. A fully documented version of this volume is available at NSA for reference. Requests for additional copies of this publication should be addressed to Director, NSA, Fort George G. Meade, Maryland.

The staff assumes sole responsibility for the use made of source materials and of comments offered on the draft manuscripts, as well as for any errors of fact that may appear in this volume.

January 1972

T. N. T
J. M.
W. D. G.

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CHAPTER I

The Setting

The air war over North Vietnam, in one sense, represented a conventional contest of arms between American and communist forces, with most U.S. aircraft and crew losses resulting from North Vietnamese use of AAA. While the air war unfolded day by day, another contest was taking place, however, with equal intensity. This was the struggle for technological electronic supremacy in the skies over North Vietnam. The U.S. had to devise new tactics and equipment to keep its lead over a North Vietnamese air defense system employing increasingly sophisticated bloc country techniques and equipment. On their part, the North Vietnamese attempted to deny the airspace over North Vietnam to U.S. reconnaissance and strike aircraft by employing these advanced systems in conjunction with their conventional air defense forces, adapting equipment and techniques to contest U.S. electronic innovations.

The period of the air war over North Vietnam, March 1965 through October 1968, was one in which the enemy's air defense system became a highly refined, articulated defense mechanism. During this period, with assistance from signal intelligence (SIGINT) agencies, the U.S. kept pace with the successive stages in the development of the enemy air defense organization.

U.S. Forces

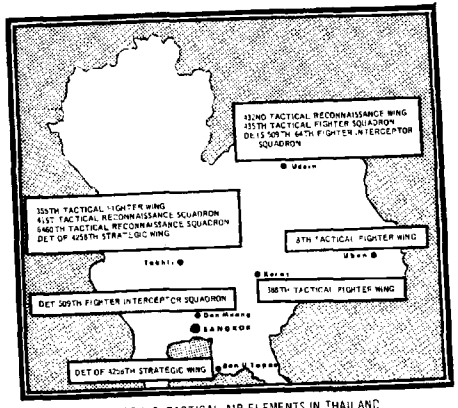
In conducting air operations over North Vietnam, the U.S. Pacific Command (PACOM) in Hawaii exercised control through the Pacific Air Force (PACAF), the Pacific Fleet (PACFLT), and Fleet Marine Forces, Pacific (FMFPAC). Each of these, in turn, had operational forces in the Southeast Asian theater. PACAF's 7th Air Force (2d Air Division until 1 April 1966)*at Tan Son Nhut Air Base (AB) near Saigon; an element of PACFLT's 7th Fleet, Task Force 77 (TF-77), in the Gulf

*This volume will use 7th AF.

of Tonkin; and the 1st Marine Air Wing (MAW) at Da Nang and Chu Lai, South Vietnam, conducted the U.S. air mission against North Vietnam. The Commander-in-Chief, Pacific (CINCPAC), gave 7th Air Force coordination authority for air operations over North Vietnam, and the 7th Fleet kept a liaison officer on duty at Tan Son Nhut for coordination. Military Assistance Command, Vietnam (MACV), not PACOM, controlled through 7th Air Force the strikes of 1st Marine Air Wing which centered on the area immediately north of the DMZ.

Air Force

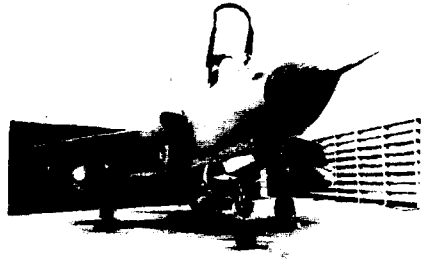
In South Vietnam, 7th Air Force had six tactical fighter wings, three special operations wings, one tactical reconnaissance wing, and various support elements. The fighter wings flew primarily the F-100D's, and F-4's (modifications C to E); the special operations wings flew a wide assortment of aircraft, including the AC-47, AC-119G, A-1, C-123



MAJOR U.S. TACTICAL AIR ELEMENTS IN THAILAND
1967

and others which were adapted for ground support. The tactical reconnaissance wings flew the RB-57E, RF-4C, RF-101, and EC-47. Seventh Air Force wings operated from airfields at Bien Hoa, Cam Ranh Bay, Da Nang, Phan Rang, Phu Cat, Pleiku, Tan Son Nhut, Tuy Hoa and other locations. The Republic of Vietnam Air Force (VNAF), with headquarters at Tan Son Nhut, operated from many of the same airfields with numbered wings at Bien Hoa, Tan Son Nhut, Da Nang, Nha Trang, and Binh Thuy. The South Vietnamese Air Force had three squadrons of A-1 propeller-driven SKY RAIDERS, three squadrons of A-37 subsonic attack jets, and one squadron of F-5 supersonic jet fighters. These forces participated from time to time with U.S. air elements in strikes over North Vietnam.

In Thailand, 7th and 13th Air Forces had numbered fighter wings and squadrons at Korat, Takhli, Ubon, Udorn, Bangkok, and Na Khon Phanom. The squadrons flew F-4's from Korat, Ubon and Udorn and F-105's from Takhli and Korat. Air Force electronic warfare squadrons



USAF F-105 THUNDERCHIEF all-weather fighter-bomber. Note ALQ-87 electronic warfare pod (left wing) and ALQ-71 electronic warfare pod (right wing) positioned outboard of the relatively large fuel tanks. An APR-25 radome is under the nose of the aircraft.

flew EB–66's from Takhli and EC–47's from Na Khon Phanom. Several tactical reconnaissance squadrons at Udorn flew RF–4's.

Strategic Air Command (SAC) also deployed units for operations in Southeast Asia. From Kadena Air Base, Okinawa, U Tapao Air Base, Thailand, and Andersen Air Base, Guam, SAC launched B–52 missions against targets in South Vietnam and along the infiltration corridor in Laos. SAC also conducted U–2 and drone photo/ELINT operations over North Vietnam.*

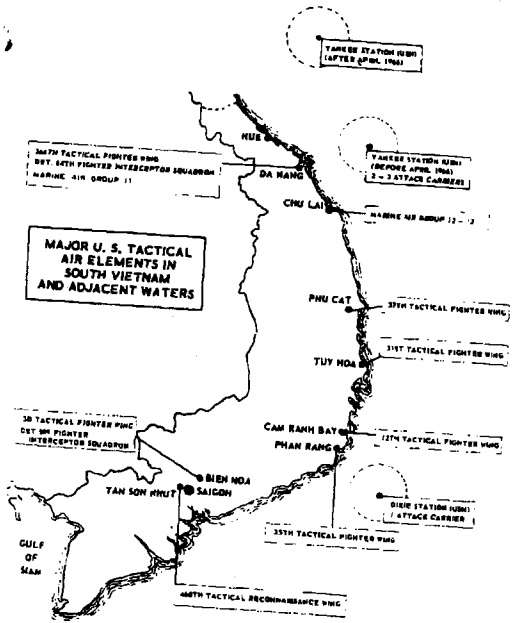
U.S. Navy and Marine Corps

With headquarters at Yokosuka, Japan, 7th Fleet kept its Task Force 77, consisting normally of two or three attack carriers (CVA's), in the vicinity of two designated points adjacent to the Vietnamese mainland. Yankee Station, the point from which the Navy launched its ROLLING THUNDER missions, although not fixed, centered upon 16–00N 110–00E in the offshore waters south of the DMZ prior to April 1966 and thereafter upon 17–30N 108–30E in the waters to the north of the DMZ. Dixie Station was off the Mekong Delta to the south. PACFLT CVA's *Hancock, Constellation, Coral Sea, Ranger, Oriskany, Kitty Hawk, America, Intrepid, Roosevelt, Enterprise, and Forrestal* rotated into and out of the war zone, cruising on either Yankee or Dixie Station for varying periods of time.

Commander, Task Group (CTG) 77.0, a subelement of TF 77, also designated Yankee Team commander, assigned flying times to his CVA's. Yankee Team usually assigned each CVA a 12-hour flying time. If more than two carriers were on station, overlap times were concentrated during daylight hours, but all carriers conducted strike operations 12 hours daily. To prevent CVA's from striking the same target, North Vietnam was divided into sectors with sector assignments made by CTG 77.0 based on time-of-day flying hours. Strike planners on the individual carriers nominated to CTG 77.0 targets and reconnaissance areas within their assigned sectors. If for any reason the nominated targets were not approved, CTG 77.0 assigned other targets.

*See below, p. 14–20.

The CVA's employed a large variety of aircraft for defense of the fleet and for missions over North Vietnam. Attack bombers included the A–4 SKY HAWK, A–6 INTRUDER, A–7 CORSAIR; fighter aircraft included various modifications of the F–4 PHANTOM and the F–8



CRUSADER. Other aircraft such as the E-2A HAWKEYE with its special radar served as early warning platforms for the fleet. Still others such as the RF-8G CRUSADER and RA-5C VIGILANTE carried out reconnaissance missions employing various sensors.

The first Marine Air Wing, under the 3rd Marine Amphibious Force, had major units at Da Nang and Chu Lai, with other forces at Marble Mountain (near Da Nang), Phu Bai, and Dong Ha primarily for ground support. The major units, Marine Air Group (MAG) 11 at Da Nang and MAG's 12 and 13 at Chu Lai, in addition to supporting ground units in South Vietnam, also flew missions over Route Package I in North Vietnam (see illustration, p. 8). Their missions were, for the most part, responsive to MACV strike objectives and were thus distinct from both Navy and Air Force operations over the North.

MAG-11 at Da Nang flew A-6 INTRUDER's and F-4 PHANTOM fighter-bomber aircraft. Its Marine Composite Reconnaissance Squadron One (VMCJ-1) flew reconnaissance and electronic warfare versions of these aircraft, RF-4B's and EA-6A's. MAG-12 flew A-4 SKY HAWKs and MAG-13, F-4's from the air base at Chu Lai.

U.S. Air Operations Over North Vietnam

Before the Gulf of Tonkin incidents in 1964, American air operations consisted only of reconnaissance missions in the Laotian-North Vietnamese border area. The diminutive South Vietnamese Air Force (VNAF), under Air Marshal Nguyen Cao Ky, flew A-1E propeller-driven aircraft from Da Nang with the help and guidance of American advisors, but established rules of engagement at that stage prohibited direct action by U.S. advisors unless provoked by the enemy. The United States launched its first air strikes* against North Vietnam on 5 August 1964 in retaliation for the North Vietnamese PT boat attacks on the U.S. destroyers *Maddox* and *C. Turner Joy* in the Gulf of Tonkin. In

*An air strike is an attack on specific targets by fighter, bomber or attack aircraft on an offensive mission and may consist of several air organizations under a single command in the air. A sortie is "an operational flight by one aircraft." This differs from a "mission" which is "the dispatching of one or more aircraft to accomplish one particular task." (Joint Chiefs of Staff, *Dictionary of United States Military Terms for Joint Usage*. Washington, D.C., U.S. Government Printing Office, 1 January 1968)

this initial air operation, named PIERCE ARROW, U.S. Navy carrier-based pilots flew sorties against North Vietnamese PT boat facilities and support bases.

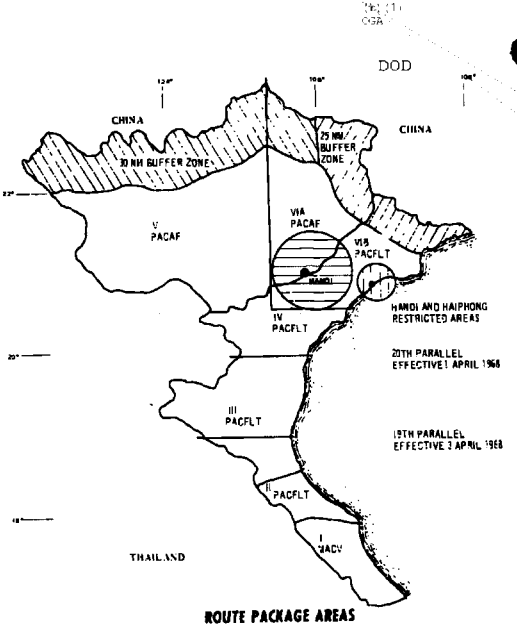
Following PIERCE ARROW, the U.S. did not undertake further air attacks against the north until February 1965. In reaction to Viet Cong attacks on U.S. facilities then taking place in South Vietnam, the President directed the execution of a JCS plan called FLAMING DART authorizing Admiral Sharp to carry out retaliatory strikes. During FLAMING DART operations conducted on 8 and 11 February 1965, U.S. pilots from the attack carriers *Coral Sea* and *Hancock* attacked the North Vietnamese Army barracks and port facilities at Dong Hoi in the North Vietnamese panhandle.

Before the end of February 1965, JCS and civilian officials in Washington prepared a plan for systematic air strikes against North Vietnam called ROLLING THUNDER, a two-part program consisting of air strikes against preselected JCS-designated targets and armed reconnaissance* against both fixed and moving targets. The objectives of the program were to make it as difficult as possible for North Vietnam to continue support of communist forces in South Vietnam and to impose increasingly severe penalties on the north for continuing support to these forces.

The first ROLLING THUNDER operations were to be retaliatory strikes similar to FLAMING DART, but a *coup d'etat* in Saigon and the consequent alert status of the Republic of Vietnam Air Force forced the cancellation of this plan. The first actual strike was ROLLING THUNDER 5, a one-day operation involving 111 U.S. and 19 VNAF aircraft, on 2 March 1965, against a North Vietnamese supply dump and a port complex. ROLLING THUNDER 6 came on 14 March 1965. Programmed air strikes against North Vietnam then continued on an almost daily basis, each having a distinctive number. A numbered ROLLING THUNDER mission referred to a specific class of target; e.g., barracks, supply areas, communications, radar sites, or port facilities. Normally, CINCPAC recommended the mission to the Joint Chiefs of Staff, and either they or the President authorized execution.

*JCS defines *armed reconnaissance* as "a mission with the primary purpose of locating and attacking targets of opportunity . . . and not for the purpose of attacking specific briefed targets."

After the beginning of ROLLING THUNDER, the U.S. commands conducted air strikes only in areas designated specifically for them. PACFLT, PACAF, and MACV assumed responsibility for strikes within the various districts of North Vietnam, or route packages as they were called.



ROUTE PACKAGE AREAS

Originally, each service had three route package areas for a specified time, then rotated responsibility for those areas with the other services. In order to allow the pilots to become more familiar with their target areas, placement of antiaircraft batteries and the like, route package assignment became permanent.

In December 1966 the commanders of 7th Air Force (AF) and TF 77 established procedures for controlling and coordinating their air operations over Laos, South Vietnam, and North Vietnam. The procedures provided, in particular, for exchange of information on all friendly air operations over the Gulf of Tonkin and the adjacent land areas of North Vietnam and for mutual use of radar control facilities. The latter included the Air Force Control and Reporting Center (CRC), nicknamed [redacted] at Monkey Mountain near Da Nang; Air Force's [redacted] Control and Reporting Post (CRP) at Dong Ha near the DMZ; Air Force's Airborne Early Warning and Control aircraft (callsign ETHAN); and Navy's RED CROWN facility on board the Positive Identification and Radar Advisory Zone (PIRAZ) ship stationed in the Gulf of Tonkin.*

The U.S. expanded and contracted the ROLLING THUNDER program in terms of geographic area, authorized targets, and sortie level in accordance with directions from Washington. From March 1965 to 1 April 1968, interrupted by seven truces ranging from 24 hours to a week, the U.S. gradually expanded the area of authorized operations until almost all of North Vietnam was included. The U.S. did not carry out operations along the Chinese Communist border, nor did it strike the Hanoi and Haiphong areas except for specified military and other strategic installations.

On 1 April 1968, President Johnson limited strike operations against North Vietnam to areas below the 20th parallel, and on 3 April further revised the limitation southward to the 19th parallel. On 1 November, he suspended ROLLING THUNDER operations. Air reconnaissance continued, however, without abatement.

* "Memorandum of Operational Procedural Agreement Between Commander, 7th AF, and Commander TF 77," 8 December 1968 (Secret).

USMC Aircraft in SEA

Reconnaissance Programs

Under the control of the Joint Chiefs of Staff and its Joint Reconnaissance Center (JCS/JRC) in Washington, the Strategic Air Command had responsibility for strategic reconnaissance in Southeast Asia. Under the JCS/JRC and CINCPAC direction, PACFLT and PACAF conducted tactical air reconnaissance of direct value to their operations over North Vietnam.

U.S. SIGINT agencies, from the beginning of the Korean conflict, have assisted U.S. military commands in the conduct of air reconnaissance programs. When an enemy air defense system reacted to these operations, SIGINT agencies intercepted communications in order to gauge the target country's reactions to them and to provide U.S. officials with timely intelligence. At times, when hostile action against a reconnaissance mission was evident, tactical controllers were able to avert shootdowns by using SIGINT-derived information and recalling the aircraft before the enemy could make an air interception.

Although SIGINT agencies were primary contributors to the JCS WHITE WOLF advisory warning program, which supported all peripheral airborne reconnaissance worldwide, Southeast Asia was

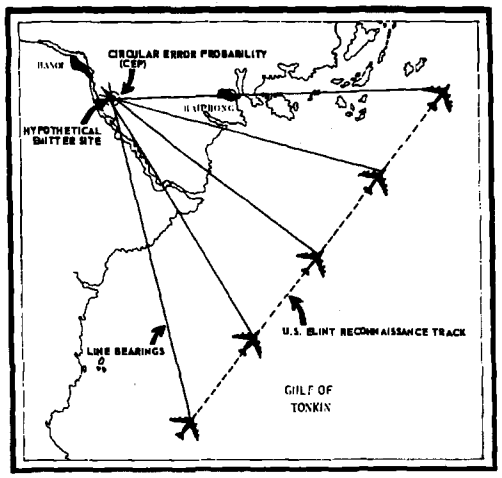
exempt from normal WHITE WOLF procedures. Instead, a modified system was in use for the zone identified as X-ray, including all territory westward from Hainan Island throughout Laos. The modified system applied only to SAC U-2 and drone reconnaissance flights and was separate from threat alerts and border warnings in support of tactical missions over North Vietnam and Laos.

Air Force Security Service's 6924th Security Squadron at Da Nang had advisory warning responsibility for SAC missions in the X-ray area, providing pertinent SIGINT to a SAC single-sideband station near the AFSS compound. The SAC station determined if a warning was required and, if so, passed it to the aircraft. The 6925th Security Group at Clark AB in the Philippines passed WHITE WOLF warnings for reconnaissance flights outside the X-ray area in the normal manner.

SAC, PACFLT, and PACAF reconnaissance missions produced, for the most part, photographic intelligence, communications intelligence (COMINT), and electronic intelligence (ELINT).* ELINT was particularly useful to the Navy and Air Force in the conduct of electronic warfare operations over North Vietnam. Tactical commanders wanted information on the enemy's air defense organization. Was the enemy using a given electronic system? What frequencies were the enemy employing on his radars? Was the enemy preparing to launch missiles at a U.S. flight over Route Package V? Tactical air commanders looked to ELINT for answers to these and many other questions about the enemy's air defense operation.

Air commanders also had a longer-range interest in the weapons systems being introduced into North Vietnam by communist bloc countries. They wanted to know the general technical capabilities of the weapon system and its modus operandi. What was the effective range of the missile and its associated radars? How did the radar signal guide the missile? Was it susceptible to jamming? How reliable was the enemy's radar-controlled AAA? Where was the enemy locating his air defense weapons and radar control facilities? These were only a few of the questions asked of the ELINT specialists.

*ELINT is information obtained by the collection and technical processing of foreign noncommunications electromagnetic radiations from other than atomic or nuclear sources.



LOCATING EMITTERS THROUGH AIRBORNE DIRECTION FINDING

Using receivers for ELINT signals spanning the [redacted] frequency range, service ELINT operators collected radar, missile guidance, navigational (beacon) and other non-communications signals. Of primary importance in the air war were, of course, the electromagnetic radiations of the enemy's radar sets which comprised upwards of 90 percent of the signals recorded.

Since most radar signals of interest were in the very high frequency range and intercept depended largely on being within line of sight of the emitting radars, U.S. ELINT operators on airborne platforms collected these signals. While intercepting the signals, the airborne operators also were able to take successive direction finding bearings along a base line—the path taken by the aircraft—to fix the relative positions of the radars (see illustration above).

Operators and analysts participating in ELINT collection missions normally processed the signals immediately for information of direct use in air operations. They plotted the signals, read out the audio portion of the signals, examined the film which photographically recorded the scope displays to measure pulse rate frequency (PRF) and other characteristics of the signal for identification of the emitter by type. They checked the derived information with that previously held to update their ELINT order of battle (EOB). They then forwarded the ELINT data and pertinent COMINT on prescribed forms together with operational [redacted] the [redacted] further processed the ELINT, issued ELINT reports and continuously maintained for PACOM the ELINT order of battle, then forwarded the basic ELINT data to NSA for further processing and to DIA for incorporation into the worldwide EOB. NSA also acquired ELINT data directly from collectors for updating its ELINT Parameter Listings, the technical guides used for signal identification.

ELINT analysts worked closely with engineers of the three services who designed jamming and other electronic equipment to deny the enemy reliable use of his electronic equipment. Often very precise measurements of emitter signals, such as those obtained on the FAN SONG radar [redacted] in the Gulf of Tonkin during October 1967, were necessary before the U.S. could develop electronic countermeasures (ECM) devices. Examples of the latter were the lock-breaker and gate-stealer jammers employed to confuse reception by enemy antiaircraft radars. COMINT analysts also participated in the development of ECM devices by providing the service R&D agencies, interservice panels, and contractors (Sanders Associates, John Hopkins Applied Physics Laboratory, and others) with insight into the operation of electronically controlled weapon systems based on their COMINT studies.*

*NSA's [redacted] to give only one example, briefed a "SAM Working Group Meeting" at the Air Proving Ground, Eglin AFB, Fla., as early as November 1965 on the COMINT-derived view of NVN's SAM operations. In attendance were representatives of the intelligence community and service R&D agencies such as Army's FSTC, Aberdeen Proving Grounds, and Redstone Arsenal; Navy's STIC; and Air Force's FTD and AFSC.

SAC Reconnaissance

In Southeast Asia, SAC flew U-2's, drones, RB-47's, RC-135's, and the SR-71 on photo reconnaissance and SIGINT missions. As the JCS executive agent for strategic* ELINT operations, SAC undertook major ELINT processing at its Omaha headquarters and also in field locations.

The U-2 Program

On 13 February 1964, SAC began a high-altitude photo reconnaissance and SIGINT program utilizing the U-2 aircraft, the high-altitude—up to 70,000 feet—monoplane with a cruising speed of 460 mph and a range up to 3,000 miles. The first U-2 mission staged from Clark Air Base in the Philippines in a program nicknamed [redacted]** Shortly after the initial February mission, the U-2's began operating out of Bien Hoa AB, RVN, on an almost daily basis—a recorded 1,100 missions from inception of the program to 1 November 1968. Acting on data produced by the U-2 missions and requests received from MACV and others, SAC planned the U-2 missions and, after JCS/JRC approval, forwarded instructions to the field for execution.

During 1964 U-2's ranged over Laos and North Vietnam without restrictions, but following U-2 photographic detection of a SAM (SA-2) installation to the southeast of Hanoi in early April 1965, the JCS directed that U-2 missions be restricted from overflying SAM sites.***

*The distinctions between what is *strategic* and what is *tactical* became, at times, somewhat blurred, and the terms are used here with some reservation. The bombing of NVN was strategic; it supported the region of main confrontation, South Vietnam. Despite SAC's strategic mission and its strategic B-52 bomber force, it was PACFLT and PACAF which carried out the strategic bombing of NVN. SAC's B-52 force, on the other hand, as used in South Vietnam, performed a tactical support mission.

**More recent nicknames: [redacted] 1 October 1967; and [redacted] 1 July 1969.

***JCS 1254-65, 082331Z Apr 65, (TS COMINT Channels Only).

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Strategic Air Command U-2 high altitude photo reconnaissance aircraft staged from Bien Hoa Air Base, South Vietnam, by OL-20, 100th Strategic Reconnaissance Wing. This aircraft also carried a few COMINT receivers.

U-2 routes then became peripheral to the known areas of SAM concentration in NVN. U-2's overflew NVN as far north as the 30 nm. buffer zone along the NVN side of the Sino-NVN border [redacted] With the introduction of the SAC [redacted] program (see p. 19 below) in the spring of 1968, U-2 missions were for the most part over central and southern South Vietnam with a number over Laos west of the NVN panhandle.

While the primary U-2 mission was photo reconnaissance, including photomapping, the U-2 had a secondary SIGINT mission. SAC equipped the U-2's with a series of COMINT-ELINT systems in 1964, each system package designed for a specific kind of collection. The primary COMINT package used early in the program, System III, was for frequency scanning and recording.

After the U-2's photographed the first SAM sites in April 1965, SAC installed another package, System XII, which operated on the same

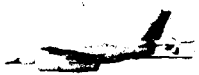
Drone Operations

In August 1964 SAC began another program employing Ryan FIREBEE drones under the codename BLUE SPRINGS.* Initially, SAC employed the drones in reconnaissance over [redacted] and launched

*More recent codenames: BUMBLE BUG on 1 October 1967, BUMPY ACTION 21 February 1968; and BUFFALO HUNTER, 21 February 1970.

them from C-130 aircraft staging from Kadena AB, Okinawa. Following successful experience with Ryan FIREBEE as a reconnaissance platform [redacted] and the introduction of SAM's into NVN, the drone became the primary reconnaissance vehicle over North Vietnam proper and also undertook missions over Laos. The drones had essentially a photo reconnaissance mission, but they served also at times as an ELINT collector and on rare occasions as a jamming platform.

Using DC-130's based at Bien Hoa Air Base in South Vietnam, SAC's 4080th Strategic Wing launched the drones almost daily from over the Gulf of Tonkin or over Laos. After launch, SAC electronic warfare officers aboard the [redacted] to a distance of about 150 miles by using a UHF radio guidance system. Beyond this, orbits were dependent on the drone's self-contained flight programming system.



(b) (1)
(b) (3)-P.L. 86-36
DOD

Recovery of Rvan Drone

SAC used separate models of the [redacted] for high-altitude, long-range missions and for low altitude, relatively short range missions. Model 147T, the high altitude drone with a maximum range of 2200 nautical miles could photograph a strip of land up to 22 miles wide on a 783 mile long track from an altitude of 6,600 to 72,000 ft. In contrast, with a range of 680 nm., the Model 147 SC provided horizon-to-horizon photo coverage of a 155 mile track from 1500 ft. altitude.

In recovering drones, CH-53 helicopters snagged the parachuting vehicles in mid air over the bay adjacent to Da Nang [redacted] In either event, upon return of the drone to Bien Hoa AB, SAC processed the photographic materials and readied the drone for its next mission.

To elicit specific responses from enemy weapon systems, SAC often programmed the drones to fly within the lethal range of the enemy weapon systems. In such cases, other reconnaissance platforms were at hand to measure the enemy responses either for ECM R&D or for targeting the weaponry itself for U.S. strikes.

(b) (1)
USAF

Strategic Air Command's OL-8, 9th Strategic Reconnaissance Wing staged the SR-71 reconnaissance aircraft [redacted] from Kadena Air Base, Okinawa. SAC flew approximately six missions a month over Southeast Asia.

(b) (1)
DOD

ERB-47H Operations

During 1965 and 1966 there was keen interest in obtaining as much knowledge as possible concerning the NVN SA-2 missile. ECM specialists particularly wanted to know about the fusing and guidance signals, for intercept of the latter would lead to U.S. countermeasures either to degrade the missile beacon signal effectiveness in missile tracking from the launch site or to detonate missile warheads prematurely. SAC's ERB-47H ELINT platforms, the best choice at the time for use in an operation to gain intelligence on the fusing signal, were available at Yokota AB, Japan. Retaining Yokota as their base but occasionally staging from Clark AB, Philippines, or Bien Hoa AB, RVN, the ERB-47H's undertook ELINT missions with main emphasis on SA-2 associated signals in the Gulf of Tonkin in a program called [redacted] SAC's Reconnaissance Center at Omaha, Nebraska, processed and evaluated the [redacted] ELINT collected.

Lasting from October 1965 to January 1966 [redacted] also employed two drones (model 147E) equipped with an ELINT collection package to intercept the desired SA-2 signals and a telemetry package to telemeter the signal to an RB-47 in the Gulf of Tonkin. The first mission was on 16 October 1965 and the first successful intercept of the desired signals came on 20 October 1965 during the third mission, even though the drone was shot down by a SAM. The ELINT collected contributed to R&D of ECM devices to counter the effectiveness of the NVN SA-2 missile system.

SR-71 Operations

Beginning in March 1968, SAC employed the Lockheed SR-71 long-range, high-altitude reconnaissance aircraft in a Southeast Asian photo intelligence program called [redacted] distinguishing it from the world-wide SR-71 or [redacted] program. With its permanent

The ERB-47H aircraft had been performing ELINT missions as part of SAC's world-wide [redacted] program. RC-135's replaced the [redacted] ERB-47H aircraft in [redacted] 1967 in a program then called [redacted] and in January 1968, called [redacted] For other SAC RC-135 programs which include COMINT, see Ch.

USAF

KC-135 tanker aircraft refueling the SR-71 reconnaissance aircraft

location at Beale AFB, California. SAC's 9th Strategic Reconnaissance Wing staged [redacted] missions out of Kadena AB, Okinawa, and during the period of the air war averaged about six missions a month.

Flying at Mach 3 speed with an operational ceiling of over 80,000 feet, the SR-71 enjoyed relative immunity from NVN's air defense organization. At 1800 mph it transversed North Vietnam at its widest point of 250 miles (Haiphong to Dien Bien Phu) in slightly more than 8 minutes. For protection, it also carried two ECM packages.

While the primary missions of the SR-71 remained high-altitude photography, at times the SR-71's also carried equipment for collecting [redacted]

*In May of 1969, SR-71's in SEA began carrying electromagnetic packages which permitted satisfactory ELINT collection but failed to provide satisfactory COMINT because of the aircraft's high speed.

Tactical Reconnaissance

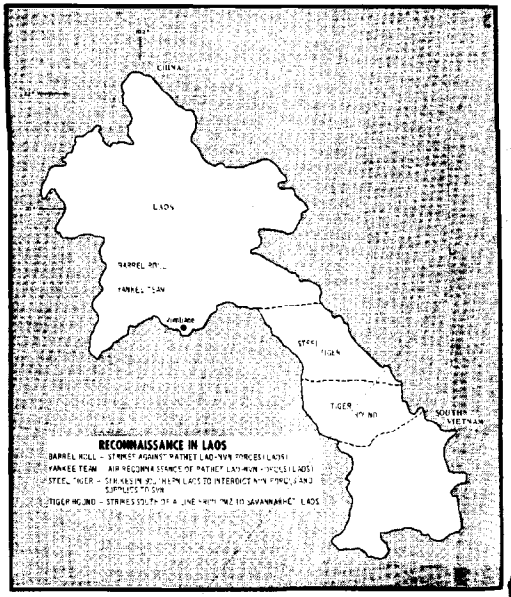
Among the steps approved by President Johnson in March 1964 to deal with the increasing communist threat in Southeast Asia was one which led to tactical photo intelligence and ELINT reconnaissance missions by the U.S. Navy and Air Force first over Laos and later over North Vietnam. After Premier Souvanna Phouma of Laos approved U.S. overflights in mid-May to cope with a threatened communist Pathet Lao capture of northwest Laos, U.S. Navy and Air Force pilots flying EA-3B, EC-121, RA-5B, RA-5C, RF-4B/C, RF-8A, RF-101 and other aircraft began air reconnaissance over Laos in a program called YANKEE TEAM. Using the reconnaissance intelligence passed to them by the United States, Royal Laotian pilots flew offensive strikes against the communist elements.

When not overflying the critical northwest region of Laos, U.S. pilots concentrated on the North Vietnamese infiltration routes in eastern Laos leading from North Vietnam through the Lao panhandle to South Vietnam. After the first shoot-down of a Navy YANKEE TEAM RF-8A in June 1964, to protect further low-level flights, the JCS authorized armed escorts with orders to retaliate.

Regular interdiction of communist troops and supply points in Laos soon followed. With approval from Souvanna Phouma, the U.S. in October 1964 began to check the rate of North Vietnamese infiltration in a program called BARREL ROLL. The Royal Laotian Air Force, flying out of Vientiane, undertook the first BARREL ROLL missions in the Laotian panhandle with U.S. fighter escort. Shortly thereafter, U.S. pilots out of Da Nang flew these missions on their own. After bombing restrictions went into effect in April 1968, photo missions and enemy truck detection in the Laotian corridor commanded particularly high priority.

Through the war years, PACFLT and PACAF under CINCPAC coordination conducted regular airborne photo and ELINT missions over North Vietnam. Many of the later programs— [redacted] COMBAT APPLE, [redacted] etc— included significant COMINT collection in combination with ELINT.*

*For discussion of these platforms, see Chapter 4.



Other platforms such as PACAF's EB–66, primarily intended for [redacted] undertook ELINT collection and direction finding of the radar signals. Six EB–66C aircraft modified for ELINT deployed to SEA in April 1965, about the time SAM installations were first detected by U.S. photo analysts.

The expansion of air defense facilities in North Vietnam created a highly complex electronic environment in which aircraft such as the

EB–66 operated. Some 20 different types of radar emerged, including [redacted] These and other emitters including identification friend or foe (IFF), as well as the radio communications, used up much of the frequency bands, particularly in Route Packages V, VI–A and VI–B. Effective degradation of the widely diversified signals from the various radars required that the EB–66's carry an assortment of [redacted]

Air Force EB–66's were neither sufficient in number nor adequately equipped, however, to provide all the ECM support needed during air strikes. Much of the [redacted] was therefore by Navy EA–1F's and EKA–3B's, and by Marine Corps EF–10B's and EA–6A's. These were equipped with [redacted]

PACAF twin jet subsonic EB–66 DESTROYER with crew of four provided [redacted] support to ROLLING THUNDER operations over North Vietnam. The primary mission of this aircraft in Southeast Asia was [redacted]

CHAPTER II

The North Vietnamese Air Defense System

To counter the U.S. and VNAF air strikes, North Vietnam in cooperation with Communist China developed a formidable air defense organization. North Korea and the Soviet Union also gave tangible assistance in its development and operation. Its area of interest was broad -Hainan Island, much of the Gulf of Tonkin, all of North Vietnam, peripheral regions in Communist China, and a part of Laos.

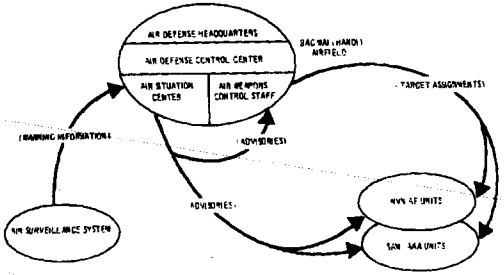
Three distinct elements of the system were an early warning and air surveillance network; an antiaircraft organization with automatic weapons (AW), antiaircraft artillery (AAA), and surface-to-air missile units; and a MIG interceptor force. Of the more than 110,000 North Vietnamese serving the system, about 90 percent were in AW and AAA units. In 1967–68, intelligence sources estimated that North Vietnam had over 150 radar sites in its air surveillance network, 6,500 AAA weapons of 37 mm and larger caliber, 30 to 35 active SA-2 missile sites, 105 MIG-17's, and 22 MIG-21's.

Operating directly under the General Staff of the People's Army of Vietnam (PAVN), the Air Defense Headquarters at Hanoi's Bac Mai Airfield was the senior authority for North Vietnam's air defense operations. In this capacity, it coordinated the operations of the three components for maximum effect against U.S. aircraft and drones. The Air Defense Headquarters worked closely with the North Vietnamese Air Force Headquarters also at Bac Mai, and many of the operations of the two headquarters were integrated. The Air Defense Control Center, heart of the system, had two sections: The Air Situation Center, and Air Weapons Control Staff. The Air Situation Center received and processed air defense data from the NVN and associated Chinese Communist air surveillance networks and issued advisories to components of the air defense system and the Air Weapons Control Staff. With representatives drawn from the NVN Air Force, SAM and AAA units employed as senior controllers for weapon systems, the Air Weapons Control Staff assessed the air situation advisories, or the data plotted

and displayed for them by members of the Air Situation Center, and then assigned targets to subordinate units (see illustration below).

In controlling the air defense organization, the Air Defense Headquarters employed a variety of communications. It depended primarily on radio, but probably also used landlines when these were close to air defense installations.

SIMPLE REPRESENTATION OF NVN'S AIR DEFENSE SYSTEM IN OPERATION

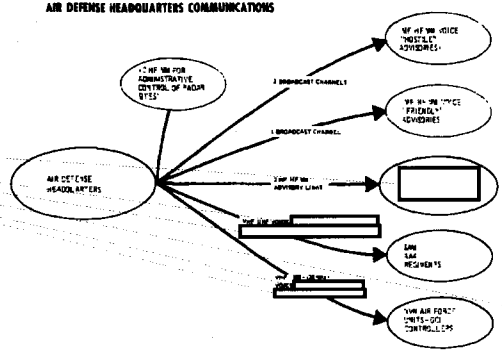


For its advisories, the Air Defense Headquarters used MF/HF voice and manual Morse. The advisories included both "friendly" (NVN) and "hostile" (U.S.–RVN) air defense data. For control of weapons systems, the Air Defense Headquarters also employed single-channel VHF voice and the VHF [redacted] systems in communicating with Ground Controlled Intercept (GCI) staffs at the MIG bases and with SAM and AAA units.

[redacted] North Vietnam's air defense units primarily used the [redacted]

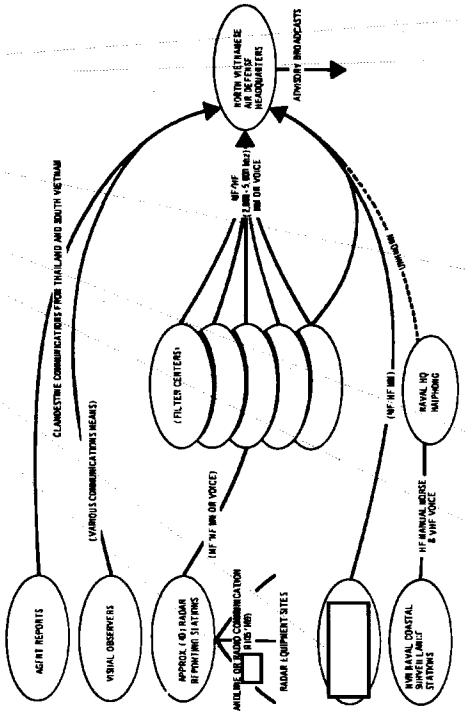
*Source used for the explanation, as given here, is DIA's *North Vietnam Air Defense Command and Control*, FTD-SW-06-4-69-INT, January 1969 (TSCW NOFORN).

AIR DEFENSE HEADQUARTERS COMMUNICATIONS



Soon after the introduction of these systems, an NSA task group including senior NSA specialists Caterino Garofalo, [redacted] and others, helped by SCA technicians working at field sites in Vietnam, recovered these systems sufficiently well for U.S. intercept operators to have some advance knowledge of the frequencies and callsigns enemy communicators would use. The North Vietnamese

(b)(3)-P.L. 86-36



THE NORTH VIETNAMESE AIR DEFENSE SYSTEM

[redacted]

TAREX organization, notably handwritten copies of callsign books taken from an enemy courier in South Vietnam, made possible relatively complete advance knowledge of enemy callsign and frequency usage.

The NVN Air Surveillance Network

Hanoi's Air Defense Control Center depended on a variety of sources for information vital to its early warning reporting of inbound U.S. and VNAF aircraft. These included intelligence from agents in Thailand and South Vietnam, reports from visual observers, and radar tracking data from the Communist Chinese and its own air defense elements.

[redacted]

As U.S. aircraft departed their bases in Thailand, NVN agents near the airbases provided to the Air Defense Headquarters its first warning of these raids by means of clandestine communications. As U.S. aircraft took off from CVA's in the Gulf of Tonkin, the NVN Air Defense Headquarters had early warning [redacted] and from its own radars near the coast line which could paint, for example, targets flying at 30,000 ft. as distant as 150–200 nm.

Radar of Soviet or CHICOM origin was the workhorse of the surveillance system. The NVN air defense force had approximately 150 equipment sites and about 40 radar reporting stations. Radar sites appeared in all major geographic divisions of North Vietnam but were especially concentrated in the Haiphong and Hanoi area. Filter centers screened radar-derived information from the radar stations and contributing sites, each center processing the data of five to nine radar reporting stations and passing the screened information to Air Defense Headquarters by point-to-point and, after February 1968, by broadcast

communications. Known locations of the filter centers were Son La in the northwest and Vinh in the southern region. Tentative locations for other filter centers were Thai Nguyen, 50 miles north of Hanoi; Haiphong; and Nam Dinh, some 50 miles south of Hanoi.

Primary early warning radars employed in the North Vietnamese air surveillance network were the Soviet-designed FLAT FACE, KNIFE REST-B, and BAR LOCK or BIG BAR which constituted over half the approximate 200 radars detected by U.S. intelligence sources. Operated in low pulse rate frequency (PRF), these mobile radars spanned much of the frequency spectrum. KNIFE REST operated in the VHF range (81–91 MHz); FLAT FACE, in the L-band (700–900 MHz); and BAR LOCK/BIG BAR, the S-band (2690–3120 MHz). Technical evaluations of the KNIFE REST assigned it poor ratings for low-altitude coverage but good ratings for medium- and high-altitude target definition. FLAT FACE and BAR LOCK, according to evaluations, offset KNIFE REST's deficiency at low altitudes. Their effective ranges for targets flying at 45,000 ft. varied from 120 to 250 nm. BAR LOCK or BIG BAR radars were in use at GCI stations near MIG air bases.

Dispersed along the coast line of NVN were a number of coastal radar surveillance stations operated by the NVN Navy primarily for early detection of hostile surface craft. The CROSS SLOT radars employed for coastal surveillance were also effective against low-flying inbound aircraft. Of Chinese design [redacted] CROSS SLOT operated in the S-band at low PRF.

The northernmost of the North Vietnamese naval radar stations, those at Tra Ban, Cac Ba, Do Son Point, and Nga Son in the Haiphong area, routinely passed air surveillance data on low flying U.S. aircraft approaching the North Vietnamese mainland to Naval Headquarters, Haiphong, by manual Morse and single channel voice (R-108 transceiver, 28–36 MHz) communications. Although the precise means of communication is unknown,* the Naval Headquarters forwarded the air defense data, it may be presumed, to NVN's Bac Mai Air Defense Headquarters.

*See chart, p. 30.

(b)(1)
(b)(1)-50 USC 403
(b)(3) 18 USC 798
(b)(3) P.L. 86-36

[redacted]

In mid-1968 the Chinese were operating several radar sites in northern NVN [redacted] which contributed data to the NVN Air Defense headquarters.

The Chinese units employed MOON CONE, CROSS LEGS, and KNIFE REST B radars. MOON CONE was a long-range early warning

*See above, p. 28–30

radar of Chinese design which was effective out to 400 nm. CROSS LEGS was an early warning L-band radar used with height-finding radars for ground controlled intercept (GCI) of fighter aircraft. It had a range of 180–230 nm for targets at 45,000 ft.

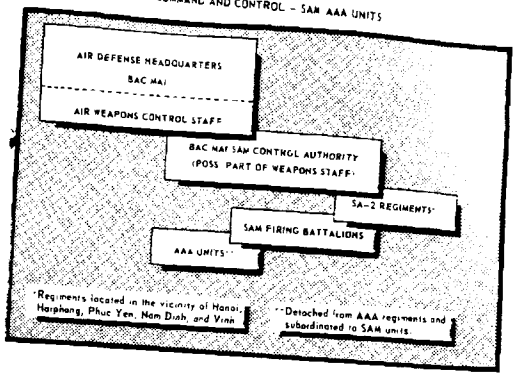
[redacted]

SAM's and AAA

North Vietnam had two major ground organizations for active air defense. One employed the mobile Soviet SA-2 missiles and the other, conventional AAA. The two ground organizations operationally complemented one another. Since SAM's were effective primarily against high-altitude nonmaneuvering targets, U.S. aircraft normally flew at altitudes of 3,000 to 3,500 feet or below which reduced the SAM threat but put them within range of NVN AAA units.* NSA SIGINT studies of U.S. aircraft losses attributable to SAM's during 1966–67 contributed to a continuing evaluation of SAM effectiveness at altitudes under 3,000 ft. In some cases, AAA units assigned to defend SAM installations were under the command of the SAM organization itself.

Both SAM and AAA units were under the ultimate control of the Air Weapons Control Staff, but the degree of control diminished with the distance of the units from Hanoi. Units in the vicinity of Vinh in southern NVN, the DMZ, or the Laotian border had relative autonomy of action because there were few, if any, NVN aircraft in these areas, and the North Vietnamese could assume all observed aircraft to be hostile to them.

*A 1969 North Vietnamese modification of its SAM-related FAN SONG radars to permit faster arming of the missile after launch offset to some extent the ineffectiveness of this air defense system against aircraft at low altitudes.



In the use of the Soviet-supplied SA-2 air defense system, the North Vietnamese have had technical and other assistance from Soviet specialists.

[redacted]

The copy indicated that Soviet advisors had directed SAM operations during the shootdown of a U.S. photoreconnaissance drone near Hanoi. This was the first SIGINT evidence of Soviet SA-2 technicians in NVN. From July 1965 to the end of 1968, Soviet involvement as viewed in SIGINT changed from one of direct participation in SAM operations, including missile launches against U.S. aircraft, to one of advising and training the North Vietnamese.

With locations mostly in the Hanoi-Haiphong corridor, four to six SAM regiments served the air defense headquarters and the senior SAM controller at Bac Mai. Each regiment had four to six subordinate SAM battalions. The typical SA-2 battalion had an assortment of vans for generators and computers, and six launchers, with a GUIDELINE missile loaded on each, and other missiles in reserve. To protect their

SAM Sites in North Vietnam

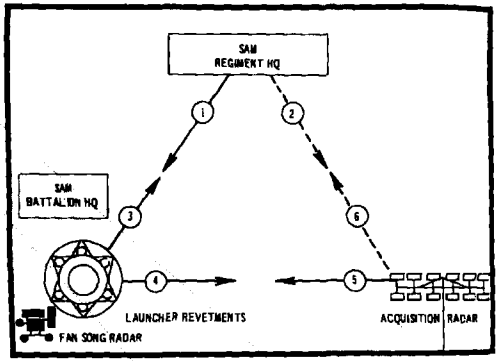
missiles from U.S. air attacks, the North Vietnamese air defense forces rotated the firing units among approximately 300 prepared sites.

During an engagement, regiments assigned targets to their respective battalions, monitored air surveillance communications and the status of their subordinate units, and gave permission to launch missiles or fire AAA. Battalion commanders, on the other hand, chose the method of target tracking and guidance and the number of missiles to be fired.

SAM-Related Communications

In studying the VHF, UHF single channel R-XXX series of Soviet transceivers,

Storage Area for SAM's



NORTH VIETNAMESE SAM REGIMENT COMMUNICATIONS

1 Sends firing orders, administrative, tactical data, via [redacted] Manual Morse (administrative traffic only), low VHF single channel (R105 108. 109) (operational data only), or via landline.

2 Sends search instructions including general azimuth-range data, and requests for tracking data

3 Sends fine grid data, administrative traffic via same means as regimental headquarters. Monitors air surveillance network for warnings on Manual Morse (HF) communications.

4 Sends administrative and miscellaneous traffic including search instructions.

5 Sends fine grid and or range-azimuth data via R1XX and or landline.

6 May send fine grid and/or range-azimuth data via [redacted] Also may broadcast fine grid and/or range-azimuth data to other battalions.

NOTE: Remoted battalion acquisition radar may serve several battalions. Existence of line from remoted radar site to regimental headquarters not confirmed. Traffic may be routed through battalion headquarters rather than point to point.

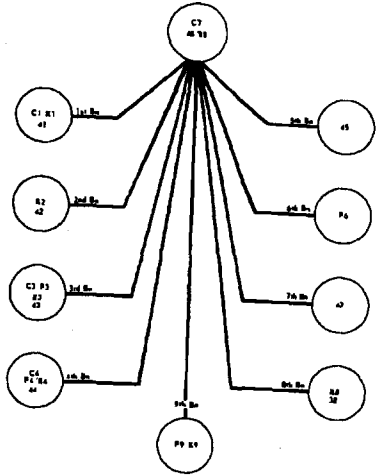
*See above, p. 28.

~~TOP SECRET UMBRA~~

[redacted]

messages [redacted] The contained information on enemy tracking of their own and hostile aircraft over NVN, Laos, and the Gulf of Tonkin, SAM order-of-battle details, tactics for countering U.S. jamming operations, bomb damage and other subjects.

COMMUNICATIONS DIAGRAM OF THE NORTH VIETNAMESE 236TH SAM REGIMENT, PHUC YEN. (Battalion callsigns shown are those used in January 1969)



North Vietnam's AAA and SAM units employed at least three target tracking systems in their communications—one for expressing azimuth and range information; another for expressing relative directional information; and a third, the fine grid locator for indicating target locations within two-by-two kilometer squares.

The first system, primarily for azimuth/range expressions, contained this format:

01	130	045	1210	030	2 F-105
a	b	c	d	e	f

a. Track number
b. Azimuth
c. Range in hundreds of kilometers
d. Time
e. Altitude in hundreds of meters
f. Number and type of aircraft

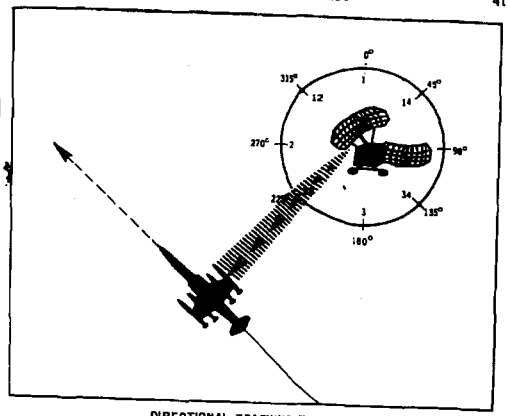
The second, or directional tracking system, depended on numbers to designate the four primary and four secondary points of the compass. In the example shown in p. 41, a hypothetical message, "Nr 32 direction 1 F-105 dist 20 alt 60 heading Nr. 12," reads "S.W. direction, 1 F-105, distance 20 (in kilometers), altitude 60 (hundreds of meters), heading northwest."

[redacted]

To prevent accidental destruction of friendly aircraft, SAM units employed the SCOREBOARD IFF system. Essentially similar to normal radar operations, the IFF system employed beacon signals which were returned by properly keyed transponders on board most of North Vietnam's tactical fighter aircraft.

SAM unit operations depended on two kinds of radar, one for target acquisition and the other for target tracking and missile guidance. The North Vietnamese normally used the Soviet SPOON REST A, a VHF acquisition radar. It provided high-angle, high-altitude coverage of

(b) (3)-50 USC 403
(b) (3)-18 USC 798
(b) (3)-P.L. 86-36



DIRECTIONAL TRACKING SYSTEM
Numbers inside the circle are used for reporting target bearing and heading.

targets out to 110 nautical miles but was ineffective for targets below 1,000 feet. Occasionally, the North Vietnamese employed the FLAT FACE radar (see page 32) for acquisition of low-altitude targets. Acquisition radar such as the SPOON REST and FLAT FACE serve to detect or "acquire" the incoming aircraft at long range and alert the missile control center. The second or target tracking and missile guidance radar follows the aircraft at closer range, continuously determining its position and speed and feeding this information into an electronic computer.

Range and azimuth data produced from SPOON REST tracking were therefore the basis for prepositioning one or more target tracking FAN SONG radars either at the active site or within a 10-mile radius. Operating in low PRF mode [redacted] the FAN SONG was able to track the target when it came within a range of approximately 70 nm. When targets approached to within

(b) (1)
(b) (3)-50 USC 403
(b) (3)-P.L. 86-36

20–30 nm or less, the operators customarily switched the FAN SONG to its high PRF [redacted]. In tracking and scanning, the FAN SONG employed two S-band [redacted] beams, one for azimuth and range, the other for elevation and range. An L-band [redacted] high PRF signal transmitted through a six-foot dish antenna guided, armed and detonated the SA–2. The FAN SONG could track and guide as many as three SA–2 missiles simultaneously at ranges within 32 nautical miles. A beacon transponder (frequency between [redacted] on the missile responded to the FAN SONG in its tracking and guiding. The FAN SONG tracked, accordingly, both the missile and the incoming aircraft up to 80,000 ft. altitude and provided the necessary command information for the L-band control emissions.

After engagement with the target, the SAM unit quickly turned off its radars to avoid a U.S. signal-seeking air-to-ground missile attack. While the FAN SONG radars sometimes operated in a low PRF for firing purposes, SIGINT analysts and Radar Homing and Warning

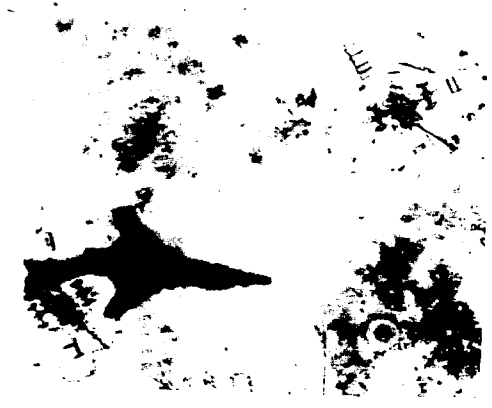
AAA Site

(RHAW) operators regarded the appearance of high PRF as the prime indication of a missile launch.

AAA

From 1965 to the end of 1968, North Vietnam's Air Defense Command acquired from bloc countries a large number of anti-aircraft weapons, 12.7 mm and above. The Air Defense Headquarters deployed its AAA units in all major NVN geographical subdivisions, with particularly heavy concentrations along the coast and the Hanoi-Haiphong corridor.

As did other air defense forces, AAA units received warning data from Air Defense Headquarters broadcasts and contributed data to the overall system. Units employed radar for target acquisition and fire control. For tracking targets within 20 nm and for fire control of 57 mm or larger



AAA Site

AAA weapons, the units had the FIRE CAN radar and its forerunner, the WHIFF. Both emitted signals in the S-band.

Communications between Air Defense Headquarters and AAA regiments probably went by landlines or via SAM unit communications. In inter-unit exchanges the AAA elements used low VHF communications, principally the R109. The low VHF messages related mostly to tracking of hostile aircraft, types of aircraft being tracked, and types of missions flown by the hostiles. Some of the AAA units shared communications facilities with the SAM battalions, and intercept of the common communications links showed a mixture of SAM- and AAA-related information. Intrasite communications between AAA and SAM elements consisted of landline telephone backed up by voice wireless communications.

[redacted]

in February 1966. Thereafter, CHICOM AAA units [redacted] rotated to NVN and its border areas on a six- to eight-month basis. In January 1967, the Chinese Forces, North Vietnam (CFNVN) AAA units were augmented by a CCAF AAA division in the Hanoi area, through which the Nanning-Kunming rail line also passed, and a CCAF AAA unit in the Thai Nguyen area. At the end of 1967 CHICOM AAA units were in the vicinity of Phu Tho and Kep in addition to the locations already noted. These units had separate VHF and low VHF radio communications for coordination and control and also used HF voice to transmit acquisition radar data.

North Vietnam's Tactical Air Force

After 1959, evidence accumulated to show that the North Vietnamese, with Chinese Communist help, were developing the nucleus of a tactical air force, the mainstay of which would be fighter aircraft. In 1961–62, the North Vietnamese actively participated in the air transportation of military cargo to communist elements fighting

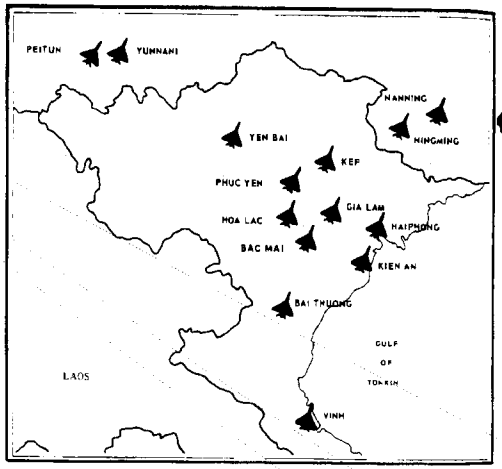
in Laos. In 1962–63 they readied Phuc Yen airfield for military jet aircraft. [redacted] Soviet North Vietnamese student pilots trained in the Soviet Union, and in early summer of 1964 at least 200 of them returned to North Vietnam. In August 1964, just after the Gulf of Tonkin incidents, 36 Chinese MIG–15 FAGOT's and MIG–17 FRESCO's were delivered to Phuc Yen Airfield. Additional airfields became operational as MIG bases in the following years (see map, p.46).

After the introduction of these MIGs, North Vietnam's small air force trained until February 1965 with assistance from Chinese Communist advisors at Phuc Yen Airfield. In May 1965, after the apparent withdrawal of the Chinese advisors, additional and better equipped MIG–17's appeared at Phuc Yen Airfield along with a small number of Soviet instructor pilots. The Russian advisors participated in the daily flight routines and performed check-out missions in the newly arrived aircraft. Engagements with Allied aircraft, however, involved only North Vietnamese pilots; the Russians remained in the background. The number of Soviet advisors noted in SIGINT increased in 1966, and in the last three months of that year twenty Soviet advisors, some of whom were concerned with ground control operations, were at work in North Vietnam.

During September 1965, there was evidence that the North Vietnamese were soon to receive new-generation fighters. Several months later, a Soviet-piloted MIG–21 was operating out of Phuc Yen. North Vietnamese pilots eventually were active in these advanced MIGs, and on 6 February 1966 a North Vietnamese-piloted MIG–21 reacted to a high altitude U.S. reconnaissance aircraft operating over Laos and North Vietnam.

North Korean pilots, first observed in North Vietnam in November 1966, also joined the growing communist air defense force. As shown in SIGINT, for a while North Korean pilots flew MIG–17's in training and area familiarization exercises. As more of their countrymen arrived in January 1967, the Korean pilots, flying primarily out of Kep and occasionally from Phuc Yen on defensive patrols, were soon engaging U.S. aircraft. In August of 1967, the North Koreans began flying MIG–21's out of Phuc Yen and later from Kep. Four months after the

TACTICAL JET AIRFIELDS USED BY NORTH VIETNAM'S AIR FORCE (AS OF JANUARY 1969)



U.S. ceased regular bombing of North Vietnam, in February 1969. North Korea withdrew its formal air support of North Vietnam.

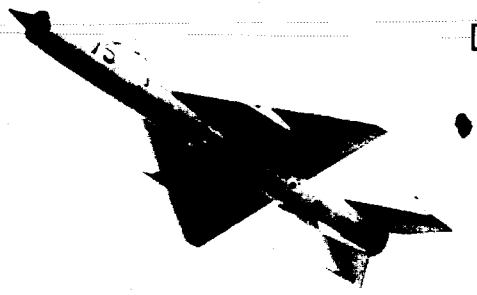
[redacted]

MIG–17's at Phuc Yen

[redacted]

In mid-1968 the North Vietnamese MIG inventory stood at approximately 105 MIG–17's and 22 MIG–21's. [redacted]

North Vietnamese Bomber Aircraft. In addition to its MIG force, North Vietnam had a small light bomber group consisting of eight Soviet-built IL–28 (BEAGLE) twin turbojet aircraft delivered from the



MIG-21 FISHBED Fighter Aircraft of the Type Introduced into North Vietnam

U.S.S.R. to Phuc Yen Airfield in May, 1965.

These medium range aircraft (1,000–1,100 nautical miles one way on 550–600 nautical miles combat radius at a cruise speed of 400 knots constituted the core of North Vietnam's bomber force. While the aircraft were based at Phuc Yen ships of the Seventh Fleet on station off North and South Vietnam, as well as many of the USAF bases in South Vietnam and Thailand, were within range.

But in early 1965 both 7th AF and PACAF, concerned over the possible introduction

tactical aircraft to support NVN units in the intensified ground action then taking place in SVN, still wanted "maximum visibility of all NVN aircraft" from SIGINT agencies.*

While there is considerable evidence of North Vietnamese use of transports in tactical training exercises in NVN, as in the case of the IL-28's, there was little actual tactical use of these aircraft. Major exceptions were a daylight bombing raid by AN-2's in northeastern Laos in January 1968 and a flight of five or six IL-14's to Quang Tri Province, RVN, and the vicinity of A Shau, RVN, in February, probably to drop supplies to North Vietnamese troops. The North Vietnamese also used tactically equipped AN-2/LI-2 aircraft in night missions against surface craft of the South Vietnamese operating off the North Vietnamese coast from time to time. U.S. Navy aircraft occasionally engaged these North Vietnamese aircraft.

IL-28 BEAGLE Bomber

*PACAF msg to Hq. NSAPAC, 11/0650Z Feb 68.

Ground Controlled Intercept (GCI)

A senior GCI controller at Bac Mai Airfield assigned targets to subordinate controllers at GCI stations located in the vicinity of major MIG fields in North Vietnam. Using Hanoi as the center of a zonal defense network, subordinate controllers, and in some cases the senior controller, issued instructions to scramble MIG's when hostile aircraft came within 150 km and high altitude reconnaissance aircraft within 200 km of Hanoi. Using the Air Defense Headquarters advisory broadcast, the senior controller transmitted [redacted] instructions to scramble the MIG's and thereafter [redacted] data giving the zone of the air threat. In addition to the broadcast facility, the senior controller communicated with subordinate GCI controllers [redacted] Use of the same frequency by all GCI controllers ensured, of course, a full exchange of battle information.

The senior controller also had the ability to monitor tactical air engagements and to direct operations from time to time. As viewed in SIGINT, he participated in the control of North Vietnamese Air Force (NVAF) fighters in almost all tactical encounters until July 1967. After that time, subordinate controllers, particularly the one at Vinh who was responsible for the southern area of NVN, assumed increasingly independent control.

GCI controllers at the various MIG bases, including North Koreans at Phuc Yen, Gia Lam, and Kep, and Russians at Phuc Yen, used VHF voice communications to direct the MIG's to the threat area. In addition to navigational data, the controllers passed advisory information concerning the threat aircraft and other potential danger—for example, from their own active SAM/AAA zones. U.S. interception and analysis of these communications normally revealed the nationality of the pilots, identification of the airfield, and often the type of MIG. Intercept of NVN's manual Morse broadcasts provided tracking data on the MIG's and indicated their zone of tactical interest.

To vector his MIG's successfully, the controller depended on his own ground-controlled intercept radars to track both the hostiles and his MIG's. BAR LOCK or BIG BAR radars provided range and azimuth readings with range resolution to 1,200–1,250 feet and azimuth resolution to within 3.5 nautical miles at 250–300 nm. For height finding, he used ROCK CAKE, STONE CAKE or SIDE NET radars. Elevation resolution for these three radars at 50 nm distance was 9,500 ft., 7,500 ft., and 5,000 ft, respectively. The controller was able to discriminate between his own and hostile aircraft by the L-band IFF equipment installed in most MIGs.

[redacted]

Preflight traffic consisted of daily messages providing information on the next day's transport and tactical aircraft activity to air defense and military units. Message texts revealed numbers and types of aircraft, origin of flights, placename passover points, destinations, times, and in some cases arrivals, departures and cancellations of a current day's flights. Preflight information [redacted] constituted one part of the advisory broadcasts from the Air Defense Headquarters at Bac Mai. It also went over separate communications channels to ground authorities in NVN's several military regions. After the curtailment of U.S. bombing missions in 1968, preflight messages no longer appeared in NVN's air defense communications.

Flight service messages dealt with transport activity, air navigational matters, weather, and specialized operations such as paradrop missions and the transfer of aircraft to and from China. [redacted]

Air operations messages conveyed strip alerts including numbers and types of aircraft to be on duty at various airfields for specified times; reports on U.S. aircraft carriers in the Gulf of Tonkin; MIG flight schedules, take offs and landings; status reports for airfields and GCI sites; forewarning information on B-52 strikes; weather reports; and data on fighter, AN-2, and IL-14 operations. [redacted]

Between 1965 and 1969 North Vietnam perfected, therefore, its air defense organization to counter U.S. air strike and reconnaissance missions. It developed procedures for controlling and coordinating the three main components of that organization—the air surveillance network, the AAA/SAM units, and the MIG interceptor force—for maximum effect against the U.S. air operations over North Vietnam. In so doing, it depended on a variety of radio communications in great volume, as noted in these pages, to exercise that control and coordination. To carry out their mission, U.S. SIGINT agencies had first to collect these communications, then process them for intelligence, and finally package the intelligence in a form suitable for immediate use by tactical commanders.*

*There were two primary sources for information contained in this chapter. The first, NSA's *North Vietnam Air Force and Air Defense Organizations*, 2/O/VCK-E R6-69 (April 1969) and its updated version 2/O/VCK-E/R97-70, December 1970 (Secret SPOKE), is a compendium of SIGINT issued by the cryptologic agencies relevant to the development of NVN's Air Force, its operations and training, communist bloc involvement in NVN, communications, and the development of NVN's air surveillance and SAM systems. The second, DIA's *North Vietnam Air Defense Command and Control*, prepared by FTD, USAF, as FTD-SW-06-1-09-INT, 22 January 1969 (TSCW NOFORN), discusses the NVN National Military Relationships, Air Defense Command, Air Warning and Surveillance, Interceptor Aircraft Control, and SAM/AAA and Mixed Weapon Control. Other sources included FICPAC's *Enemy Air and Surface Threat* (July 1968), SCA unit histories, NSA technical reports, SIGINT product, and operational messages.

CHAPTER III

Ground and Surface Collection

Before August 1964, North Vietnam's air defense system was primitive. Its limited inventory of AAA weapons was, for the most part, without radar control. There were no SAM's and no tactical air force. In sampling North Vietnamese communications, U.S. airborne collectors and surface collection sites did not hear the VHF and UHF communications in the volume to be expected if North Vietnam had had in operation a tactical air force and advanced weapons. SIGINT collectors, on the other hand, had no difficulty copying the medium and high frequency communications passed by the relatively unsophisticated air defense elements which the enemy then possessed. AFSS and NAVSECGRU units in mainland Southeast Asia, and to a lesser extent in the Philippine Islands, heard most of these communications without difficulty.

By 1964 SIGINT planners foresaw, however, the need for an expanded collection program for Southeast Asian air-related communications. NSA had already outlined to the chiefs of the SCA's a program including the expanding of collection facilities at Da Nang from 0 to 23 intercept positions and the use of Air Force's Airborne Communications Reconnaissance Program (ACRP) to collect VHF and UHF line-of-sight transmissions. Even before the Gulf of Tonkin incidents, SIGINT planners expected the appearance of VHF and UHF communications as the aftermath of several pre-Tonkin CINCPACOM–NVN conferences on Communist bloc air defense support of North Vietnam.

Adjustments in the Cryptologic Organization

In the Field

In 1964 the cryptologic agencies treated North Vietnamese [redacted] air-related communications as separate problems for analytic processing and reporting purposes. In the field, USA-57 (6925th

Security Group)* at Clark Air Base in the Philippines was separately processing intercept of NVN's air communications, [redacted] and at NSA specialists in NVN air communications were working alongside North Vietnamese ground and naval communications analysts, [redacted] Shortly after the delivery of CHICOM fighters to North Vietnam in August 1964, [redacted] proposed that the processing of North Vietnamese air communications be transferred from Clark AB [redacted] During the next few months, NSA, [redacted] and AFSS discussed the various ramifications of the proposal. Although no one at the time could predict the degree to which the Chinese would become involved in the defense of North Vietnam, the conferences held in 1964 between the North Vietnamese and mainland Chinese had suggested to cryptologic authorities that at least a close defensive alliance was in the making. A bilateral pattern such as previously witnessed in Korea had begun to unfold. In that case, CHICOM and Korean joint use of air communications facilities forced the cryptologic agencies to process the intercepted traffic at one location because separate processing and reporting centers were impractical.

[redacted]

As the North Vietnamese air defense capability has developed during 1964, have been examining with some concern the adequacy of our ability to accomplish authoritative SIGINT reporting in the field on the basis of input from joint DRV and CHICOM air defense activities. The DRV air defense capability appears to be developing as an extension of the CHICOM system and is supported by liaison links connecting Vietnamese with Chinese air defense authorities. Moreover, the geography of the situation reinforces the close inter-

[redacted]

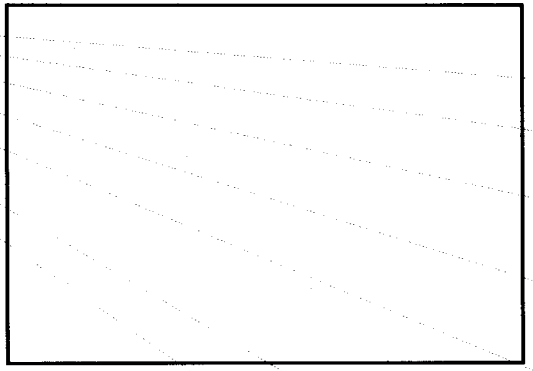
[redacted]

At NSA

[redacted]

*NSA msg, ADP/004, 5 January 1965 (TSCW).

**PACSCTYRGN Msg to USAFSS, OPR 22-9-255, 22 September 1964 (TSCW).



AFSS Ground Collection

Da Nang Air Base

SIGINT planning in 1964 was in sharp contrast to the harsh reality of maintaining the AFSS intercept operation at Da Nang Air Base which had begun in January 1962. The scarcity of intercept in the years 1962 to 1964 made it difficult for AFSS to justify the operation in the face of expanding U.S.-VNAF air operations and the resultant demands by tactical elements for space. Major General John Heatherington,*** Director of Intelligence of the 7th Air Force's predecessor organization at Tan Son Nhut, had become acquainted with the value of tactical COMINT in Korea and insisted that the unit remain operational in case an air war developed in Southeast Asia.

*Chief of the B3 organization to July 1968. After that date Mr. William T. Kvetkas held the position.

**Chief of this organization to September 1965, Mr. James J. Leary; to August 1967, Mr. Robert E. Drake; to November 1969 [redacted] to June 1970, Mr. Lawrence D. Terry, to present, Dr. Don C. Jackson.

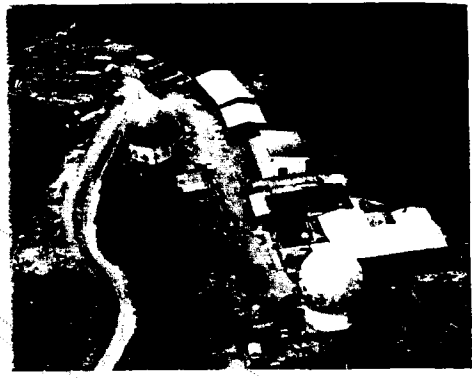
***Also a former commander of AFSS.

(b)(3)-P.L. 86-36

In mid-1964, AFSS had two small ground-based outposts in Southeast Asia, both detachments of the 6925th Security Group headquartered at Clark Air Base in the Philippines. Detachment 2 (USA-32) was at Da Nang Air Base in South Vietnam; [redacted] In October 1965, the Group established Detachment 4 (USA-37J) at Udorn, Thailand.

In mid-1964, USA-32 had eight manual Morse and three radio telephone receivers in operation at its main site on the west side of Da Nang Air Base and atop Monkey Mountain 6 miles northeast of the air base. With the manual Morse receivers it was collecting NVN air defense, civil and military air, and navigational communications [redacted] With the addition of four manual Morse receivers just after the Gulf of Tonkin incidents there was a considerable adjustment upwards in North Vietnamese coverage, particularly of air defense, air force, and air navigational communications. In early 1965, as regular bombing missions over the north began, emphasis shifted to Da Nang as the principal center for ground collection of enemy air and air defense communications. Thereafter, with interruptions from time to time and with changes brought on by new communications developments, USA-32 retained its basic collection mission against North Vietnamese [redacted] air and air defense communications.

While the Da Nang—or main—site was covering HF manual Morse targets, a detachment of USA-32 at Son Tra on Monkey Mountain was intercepting both HF and VHF radio telephone transmissions. Except for interception of [redacted] all the voice targets were in the high frequency band. When enemy communicators switched from manual Morse to voice mode, as they frequently did, Da Nang intercept operators using a KW-26 secure teletype provided tip off to their counterparts on the mountain so that coverage could continue. While this procedure often worked unsatisfactorily, the Monkey Mountain operators were not hearing HF voice consistently. AFSS then conducted an HF voice hearability test at the main site at Da Nang in October 1965 and found that it had better results in intercepting these communications. As a result of the tests,



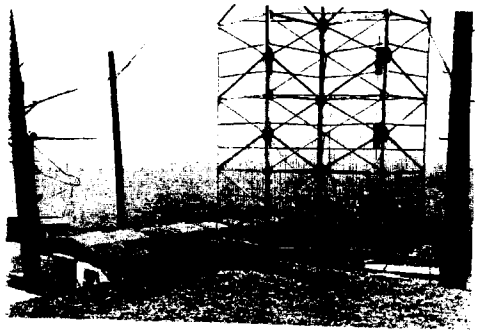
Aerial View, Operations Compound on Monkey Mountain

the main site took over all HF, both Morse and voice, and the mountain team retained the VHF targets.

When North Vietnamese and Chinese Communist collaboration in air defense operations showed up in medium and high frequency Morse communications in September 1964, USA-32 began intercepting regularly this Communist Liaison Air Defense net, emphasizing the Hanoi (Bac Mai) terminal.* Intercept and direction finding identified the links between Hanoi and southern China [redacted] and between Hanoi and southwest China [redacted]

[redacted]

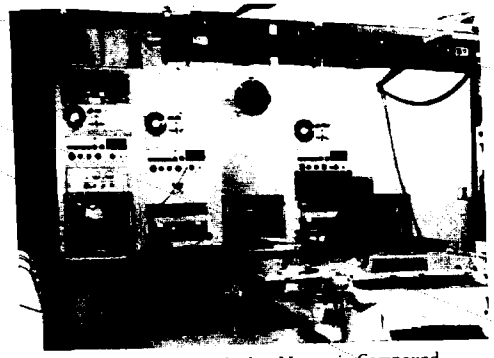
*See discussion, Chapter II, p. 33-34



View from Top of Operations Buildings, Monkey Mountain

Almost from the time that intercept operations began at Da Nang, opinions varied on Da Nang versus Phu Bai as intercept site locations. Phu Bai was the location of the Army Security Agency's intercept station, USM-808, some 60 miles north of Da Nang. In late 1964 when Lt. Gen. Gordon A. Blake, DIRNSA, visited Southeast Asia, several members of his party felt that Phu Bai would provide a better intercept environment than the Da Nang area for the AFSS mission. Since there was no data by which to compare the relative merits of the HF intercept from Da Nang Air Base with that from Phu Bai, AFSS conducted limited hearability tests of the same HF communications at both locations. ASAPAC accomodated three AFSS intercept operators at Phu Bai who copied [redacted] HF Morse and voice targets for about 6 weeks while other AFSS operators duplicated the test at Da Nang. Test results showed that the two sites were equal in HF collection. Collection of air-associated HF communications continued, therefore, from Da Nang

[redacted]



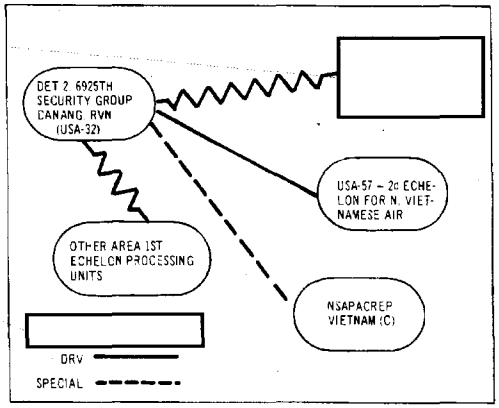
Intercept Room 2, Monkey Mountain Compound

[redacted]

USA–32 helped in shaping its own collection mission by issuing the traditional Position Effectiveness Reports (POEREP) whenever in-station review showed that a given assignment was unproductive. In view of the successful airborne collection of VHF communications in 1968, it issued, for example, a POEREP with the objective of shutting down all but one of the VHF receivers on Monkey Mountain. NSA concurred in the proposal.

*When the 6922nd Security Wing moved to Clark AB on 1 July 1965, Detachment 2 of the 6925th Security Group became Detachment 2 of the 6922 SW. Later, on 1 October 1965, the detachment acquired the designation 6924th Security Squadron without change in its subordination to the 6922nd Security Wing. Throughout these changes, the SIGINT designator USA–32 remained constant.

PROCESSING CHANNELS (Prior to April 1965)



[redacted]

In the latter half of 1965, USA–32 expanded its collection of weather communications* and in the same period began receiving in considerable volume North Vietnamese [redacted] voice communications which were being intercepted by Air Force and Navy collection platforms over the Gulf of Tonkin.

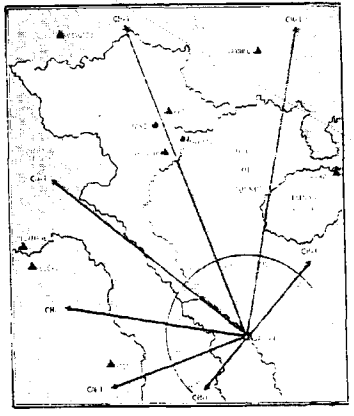
The additional collection compounded the processing task at Da Nang, and the unit had to devise means to cope with a mushrooming traffic volume. Since USA–32 had no weather analysts, Morse intercept

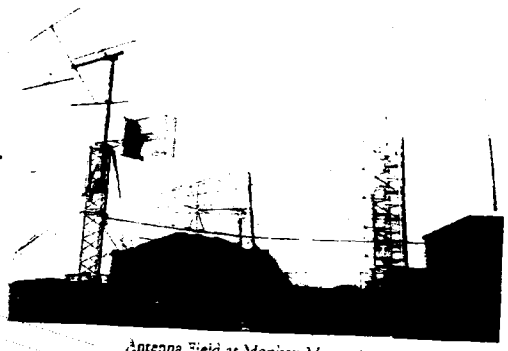
*Often referred to as "Special Weather Intelligence" (SWI) to obscure its COMINT origin.

operators processed the weather traffic for several months until experienced weather analysts arrived. USA-32 was also unprepared for the increase [redacted] since it had only three transcribing positions [redacted] loaned equipment to the Da Nang unit in October to provide temporary relief until the equipment problem could be resolved.

There was, however, a more persistent obstacle. The unit could solve its equipment problems, but transcription and translation of the voluminous Vietnamese plain language [redacted] intercept constituted a formidable problem. [redacted] qualified transcribers and translators for Vietnamese communications were not available in the cryptologic community. Of the 14 Vietnamese linguists assigned to the

ANTENNA ORIENTATION AT DA NANG
(1967-1969)





Antenna Field at Monkey Mountain

unit, only four were experienced in [redacted] communications, and three of them were already assigned to duty on board the ACRP platforms. Despite local training to qualify more people, there was no immediate solution. In October 1965 [redacted] helped by transcribing the single channel voice being collected by the airborne platforms, and in November eight airborne-qualified linguists arrived at Da Nang.

Beginning on 1 December 1965, the AFSS squadron employed four Vietnamese nationals under Project DANCER. In this program selected members of the Army of the Republic of Vietnam (ARVN) transcribed [redacted] voice recordings and other voice materials for the Army Security Agency, the USMC 1st Radio Battalion and AFSS. American linguists translated and further processed the transcripts produced. NSA stipulated that the program could be applied only when the workload, either by reason of volume or language complexity, was [illegible] beyond the ability of U.S. SIGINT specialists. Even with increased numbers of DANCER specialists, the AFSS unit had difficulty in coping with the volume, the unprocessed tapes accruing at the rate of 50 a day at the end of 1966. DANCER assignees continued

to work at Da Nang until the spring of 1968 when [redacted] replaced the squadron as the [redacted] voice processing center and they were no longer needed.

In consonance with the cryptologic community resource expansion plan for Southeast Asia* and the continued importance of air and air defense communications, USA-32 expanded its collection program once again and in mid-December 1965 placed in operation 24 full-time intercept receivers. Collection then exceeded 500 daily hours of coverage (DHOC) on some [redacted] communications targets—[redacted] 26 NVN, two CHICOM-NVN liaison, and one Laotian weather.

In late January 1966, the SILVER DAWN ACRP intercepted for the first time NVN's [redacted] signals from a newly activated SAM regiment near Hanoi. Early collection of this signal consisted of 20 reels a day for the processing group at Da Nang. [redacted] collection did not decrease, however, as might have been expected, with the appearance of [redacted] communications, and the shortage of linguists at the unit became even more acute.

Operations Building at Da Nang

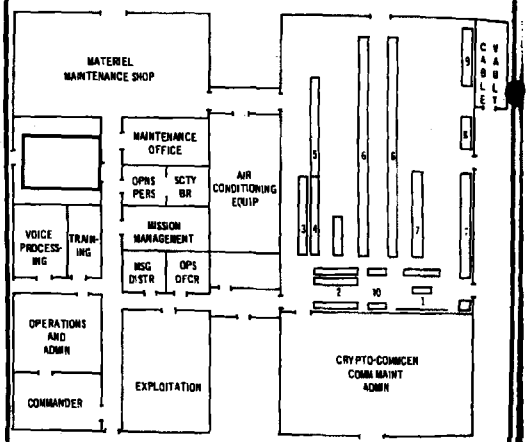
*See *In the Shadow of War*, pp. 133–134, for discussion.

**See Ch. 2 above, p. 26–27.

By mid-1967 AFSS had completed about 70 percent of the work on a new communications-operations building for USA-32, and after five years of operating from an ever expanding trailer van and Quonset hut facility the unit was looking forward to occupying its new air-conditioned building. But on 15 July 1967, Da Nang Air Base sustained a mortar and rocket attack, and the secondary explosions from a nearby bomb dump destroyed or severely damaged much of the USA-32 operational and billeting facilities. Notwithstanding the extent of the damage, all intercept positions in this instance were operational within three and a half hours following the attack, and the essential communications circuitry was back in use shortly thereafter. The squadron had to cope, however, with an eight-month delay in occupying the new building which had to be disassembled and reconstructed. Following an assessment of the damage by the 6922nd Security Wing and others and in view of subsequent rocket attacks in the Da Nang area, NSA transferred the North Vietnamese military air mission to Detachment 4, 6922nd Security Wing, (USA-29) at Udorn in December 1967. A few months later, when it became clear that USA-32 had to process the

Operations Building at Da Nang After Rocket Attack

6924TH SECURITY SQDN COMMUNICATIONS – OPERATIONS BUILDING (1968)



North Vietnamese air-related communications, particularly from flight service facilities, to provide timely tip-offs of aircraft movements in North Vietnam to U.S. air commanders, USA–32 soon acquired the air mission once again.

~~TOP SECRET UMBRA~~

Later attacks on Da Nang Air Base and vicinity by the Vietnamese Communists in 1968, particularly those during the Tet Offensives, was to diminish but not shut down the intercept operation of USA–32 (see chart, below).

Effect of Rocket Attacks on USA–32's Intercept Operation (1968)

Date	*Targets at or Near Da Nang Air Base*	*Total Time of Mission Loss (hours)*
3 Jan	Da Nang AB	30.0
7 Jan	3nm WNW of USA–32	12.0
30 Jan	Da Nang AB	32.0
31 Jan	Marble Mtn	4.0
1 Feb	Da Nang AB	30.0
3 Feb	Da Nang AB	4.0
6 Feb	4nm SW	12.0
6 Feb	6nm S	12.0
24 Feb	Da Nang AB	12.0
25 Feb	Marble Mtn	6.0
4 Mar	2nm SSW	10.0
4 Mar	Marble Mtn	2.0
3 Apr	Hill 55 6nm S	6.0
5 May	Da Nang AB	28.0
5 May	6nm SE	4.0
8 May	1 Corps Hq	49.5
9 May	Da Nang AB	9.5
11 May	Da Nang AB	9.5
12 May	Marble Mtn	15.5
13 May	4nm WNW	19.2
21 May	2nm WNW	5.8
22 May	4nm WNW	5.8
29 May	Da Nang AB	9.6
14 Jun	3nm WNW	5.8
15 Jun	3nm WNW	5.8
27 Jun	Marble Mtn	5.8

An accidental fire at the base ammunition and bomb storage area in April 1969 seriously damaged the USA–32 operations building. Statistical records showing loss of intercept in the second half of 1968 were among those destroyed by the 6924th Security Squadron in the emergency destruction of classified materials at the time of the disaster.

In mid-1968, with the scaling down of bombing missions over the north, USA-32 had 25 manual Morse and six radio telephone receivers in operation at its main site and on Monkey Mountain. The mission then consisted of [redacted] 31 North Vietnamese targets, and one link of the CHICOM-NVN Air Defense liaison net. Remaining much the same as it had been in previous years, the coverage included communications passed by [redacted] North Vietnamese weather, air defense, military air, navigational air, AAA, and tactical fighter organizations.

Thailand Operations

[redacted]

The signing of the Thai-U.S. base rights agreement in January 1967 cleared the way for a major ASA-AFSS SIGINT site at Udorn [redacted] An Army SIGINT unit, originally

designated USM-627J and later as USM-7, hosted the AFSS contingent at Udorn. The AFSS unit (USA-37J at first, and USA-29 after November 1967) became operational at Udorn in May 1965. By the end of June the unit was operating two radiotelephone and five manual Morse positions under NSA [redacted] technical control.

[redacted]

Udorn: Old Facility: Tent Camp and Operations Center in Vans, 1966

Udorn – FY 67: Operations Building

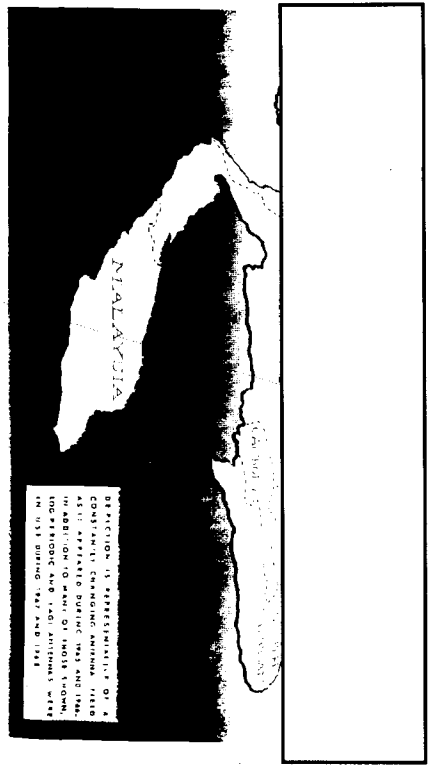
Initial antenna construction at Udorn completed during the summer of 1965 permitted the AFSS detachment there and ASA to extend intercept coverage [redacted]

[redacted] SIGINT planners wanted eventually a circularly disposed antenna array (CDAA) at Udorn. But during the period of the air war over North Vietnam they adjusted the antenna field shown on p 70 to satisfy collection requirements placed on them.

Much of the mission of the Udorn unit was developmental. It copied and developed a number of unidentified [redacted]

[redacted]

**See above, p. 30-31



ANTENNA FIELD AT UDORN

Collection search and development missions frequently fail, of course, to detect the suspected target communications and USA-29 search missions for North Vietnamese VHF voice communications, CFNVN AAA communications in the VHF range, and others failed to produce positive results.

There were, on the other hand, successful developmental missions. In assisting other Southeast Asian SIGINT units in locating CHICOM AAA installations in North Vietnam, the Udorn unit identified, for example, [redacted] In the second half of 1967, it successfully developed HF voice communications for a number of CFNVN AAA acquisition radar facilities.

In 1967 USA-29 shared in the collection responsibility for North Vietnamese Air Force and air navigational communications. It also achieved its full growth in that year with respect to operational positions. Eighteen manual Morse, one HF-VHF RT, and three HF RT receivers were in use. In 1968, a realignment of AFSS assets within the theater brought about a reduced mission for the Udorn unit. By 30 June 1968 only 12 manual Morse and three RT positions were in operation. These reductions were attributable primarily to newly imposed restrictions on tactical air operations over NVN and the resultant reduction in tracking by the North Vietnamese [redacted] air defense elements.

In addition to the intercept of [redacted] NVN communications by USA-32 and USA-29, other AFSS units contributed to the collection mission. After the 6922nd Security Wing (USA-57) established its headquarters at Clark AB in 1965, it participated with its Udorn and Da Nang detachments in the collection of North Vietnamese communications as the 6925th Security Group had done before it. From Clark, USA-57 collected selected North Vietnamese weather, civil air, and air defense communications. In addition, it shared with USA-32 coverage responsibility for the NVN-CHICOM liaison net and also [redacted] A detachment of the 6922nd [redacted] included CFNVN communications [redacted]

Naval Security Group Surface Collection

Naval Security Group (NAVSECGRU) direct support units, or supplemental radio detachments (SUPRAD's)*, had collection gear which varied in accordance with the missions of the supported ships. Five separate SUPRAD equipment configurations served the needs of the 7th Fleet for SIGINT service aboard the flag ship, on TF-77 attack carriers on Yankee station, and on its Positive Identification and Radar Advisory Zone (PIRAZ) and search and rescue (SAR) ships in the Gulf of Tonkin. In addition to being equipped for the secure handling of SIGINT data (KW-7, -26, -37 and KL-47), the SUPRAD on board each ship was suitably fitted to intercept the MF and HF communications passed to and from the North Vietnamese Air Defense headquarters. (See chart, p. 28, 30).

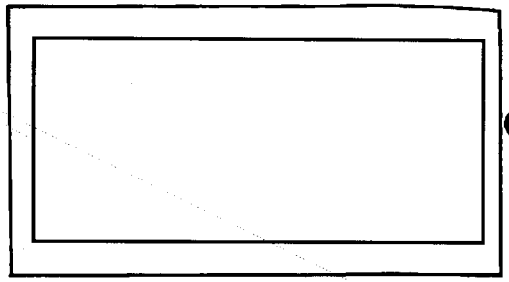
With occasional exceptions, SUPRAD's did not hear North Vietnamese communications in the upper frequency ranges because they were beyond line of sight. They concentrated, instead, on the MF and HF transmissions and were able to turn this intercept to good advantage. The SUPRAD aboard the 7th Fleet's northern SAR destroyer concentrated, for example, on the manual Morse communications of motor patrol boats, Swatow** class vessels, and other small craft constituting the NVN Navy and representing a threat to downed U.S. pilots. It also followed closely the MF and HF radar tracking messages passed by NVN [redacted] air defense units. In its capacity as the final authority for identifying all aircraft flying toward 7th Fleet positions in the Gulf, the SUPRAD on the PIRAZ ship also emphasized interception of enemy radar tracking messages for comparison with U.S. radar intelligence (RADINT).

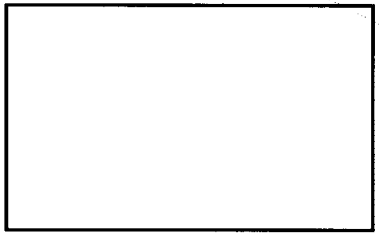
SUPRAD's on board the attack carriers had a primary responsibility to protect their ships and, by extension, the carrier aircraft. Detachment SIGINT crews emphasized, accordingly, all intercept which enabled responsible staff members to follow the course of action through U.S. RADINT and through intercepted MF and HF communications

*For discussion, see *In the Shadow of War*, pp. 50-52

**This diesel-powered craft, approximately 100 feet in length and capable of speeds up to 28 knots, had 37-mm for general and anti-aircraft use but no torpedoes.

STANDARD AIRCRAFT CARRIER SUPRAD CONFIGURATION

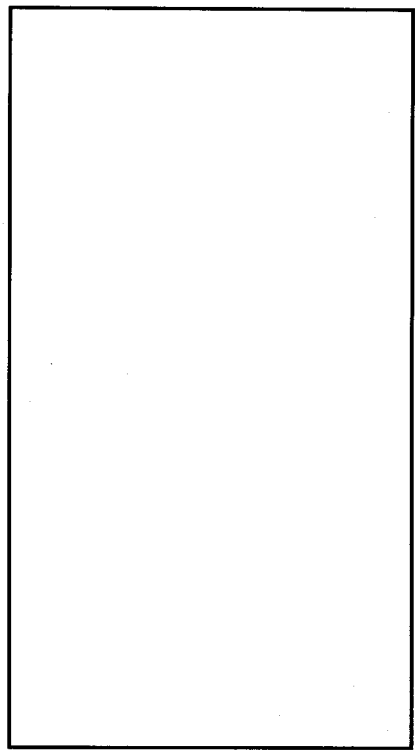




mirroring the tracking by the enemy's air surveillance network. The SUPRAD communicated with the CVA's combat information center and flag war room by secure sound-powered telephone. On the CVA's *Kitty Hawk* and *Enterprise*, there were special intelligence secure rooms next to the flag war rooms which were connected with the SUPRAD by secure telephone and pneumatic tube.

NAVSECGRU's intercept site at Phu Bai, RVN (USN–27J, later USN–842) and USA–32 at Da Nang monitored many of the same

SUPRAD CONFIGURATIONS



(b)(1)
(b)(3)-50 USC 403
(b)(3)-18 USC 798
(b)(3) P.L. 86-36

~~TOP SECRET UMBRA~~

MF/HF communications copied by the SUPRAD crews. After the establishment of direct COMINT traffic circuits between these stations and the Navy broadcast facility at San Miguel, Philippines (USN-27), the SUPRAD's received the COMINT produced at the shore-based sites via San Miguel.

[redacted]

*For tests made prior to August 1964, see *In the Shadow of War*, pp. 58–[illegible].

**On a seasonal basis and as a result of electromagnetic phenomena in the [illegible] layer of the atmosphere, this program made possible some collection of UHF and [illegible] VHF signals (between [redacted] far beyond normal intercept range. BLOUSE receivers were also in place at USM-808, Phu Bai, and at other locations.

(b)(1)
(b)(3)-50 USC 403

~~TOP SECRET UMBRA~~

~~TOP SECRET UMBRA~~

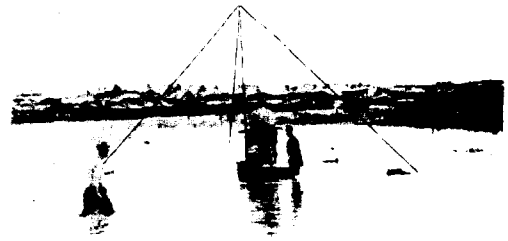
[redacted]

Hill 180, Phu Bai [redacted] Antenna

~~TOP SECRET UMBRA~~

Outside View [redacted] Collection Site at Virginnie Hill

Radio Relay on Hill 180, 1966



USN–414J at Dong Ha Under Trying Circumstances (November, 1966)

CHAPTER IV

Airborne Collection

As the North Vietnamese acquired sophisticated arms following the Gulf of Tonkin incidents, they began to use a variety of VHF and UHF communications systems which, for the most part, could be copied by U.S. ground or surface collectors only within line-of-sight distance (50 to 70 miles) of the transmitters. Accordingly, to intercept these VHF and UHF signals the United States placed its main reliance on airborne collection platforms which could intercept them from a distance of 200 to 300 miles. Approximately 90 percent of the North Vietnamese air defense VHF and UHF communications intercepted was by airborne collection platforms.

Both Navy and Air Force airborne platforms with SIGINT missions had operated in Southeast Asia prior to the 1964 Gulf of Tonkin incidents. During the earlier period interest was primarily in [redacted] but other collection targets in North Vietnam, Laos, and Cambodia also commanded attention. Unlike missions flown in other areas, there were few VHF and UHF communications to intercept. [redacted] the Air Force C–130 (QUEEN BEE DELTA) airborne collection reconnaissance program (ACRP) registered, for example, only a 3.2 percent intercept effectiveness during its July 1964 missions in Southeast Asia. [redacted]

Airborne intercept platforms still provided the only reliable means of

sustained collection of VHF, UHF, and other electromagnetic emissions organic to an enemy's air and air defense structure.

The airborne collection program had its beginning in the early 1950's when the Air Force first employed airborne collection for close support purposes [redacted] In the ensuing years Air Force operational commands together with USAFSS not only developed a practicable basis for an airborne collection program but continuously improved the capability of the platforms involved.

Other agencies soon became interested in this collection method. As a natural consequence, the Air Force airborne SIGINT program evolved from a limited direct support function to one in support of broader national interests. In its new capacity, the ACRP platforms remained under Air Force management while NSA provided collection guidance and technical support. During this period CNO and SAC also instituted airborne SIGINT collection programs in direct support roles.

Air Force Platforms

In 1958, Headquarters, USAF approved the initial allocation of C–130A aircraft to AFSS to replace the RB–50's [redacted]

[redacted]

The C–130 Program in Southeast Asia

[redacted]

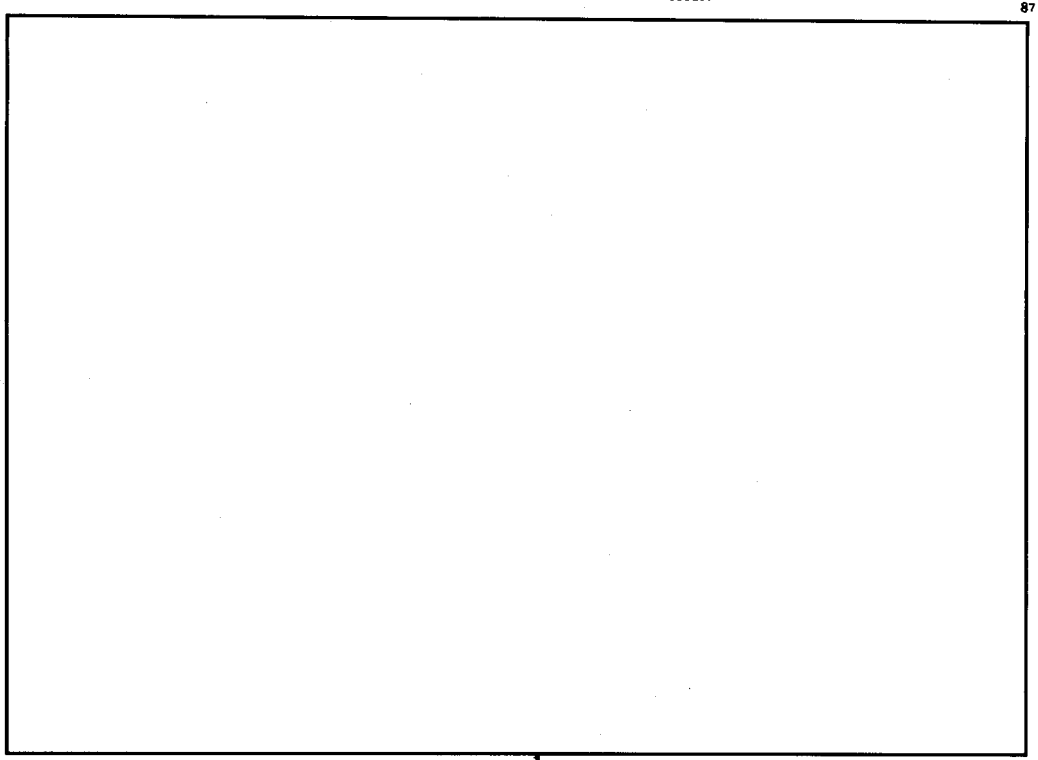
[redacted]

Air Force C–130 ACRP's operated in Southeast Asia under various cover names, appearing first [redacted] as QUEEN BEE CHARLIE in March 1964. They were permanently assigned during July 1964 as QUEEN BEE DELTA, then changed to SILVER DAWN in the fall of 1965 following the shoot-down and capture of an American pilot flying escort for the ACRP when he inadvertently strayed over Hainan Island. In February 1967 the C–130's were again redesignated, this time to COMMANDO LANCE.

The number of C–130's shuttling to and from Southeast Asia increased with the tempo of the air war. In November 1964 Lt. Gen. Gordon A. Blake, Director of NSA, outlined to the Secretary of Defense the ACRP requirements established following a joint NSA/DIA airborne SIGINT collection resources study. Included were requirements for more ACRP missions and a new orbit in the Gulf of Tonkin—a minimum of 13 six-hour missions each month over both the Gulf [redacted] totaling 156 hours on the two orbits.

After the onset of ROLLING THUNDER in March of 1965, 7th Air Force also asked for more ACRP coverage. With JCS authorization, the Air Force assigned two additional C–130's to operations in Southeast Asia in the fall of 1965, bringing the total number of C–130's in Southeast Asia at any one time to four. Since the aircraft rotated [redacted] on a biweekly basis for servicing, several additional aircraft were

[redacted]



necessary in the program to keep the four C-130's operational in Southeast Asia at any given time.

Orbits and Staging. [redacted] The focal point for initial processing of North Vietnamese [redacted] was USA-32 at Da Nang. [redacted] The introduction of tactical fighter aircraft at Phuc Yen in August 1964 and the appearance of sophisticated air defense weaponry in the months to follow created an operational requirement for initial processing of ACRP and ground site intercept at USA-32.

NSA and Security Service officials considered two possible options: move the entire project [redacted] to Da Nang to give the platform's COMINT crew direct access to the USA-32 operations complex for processing the mission take; or develop a drop-off procedure at Da Nang to permit immediate processing and reporting by QUEEN BEE DELTA COMINT operators and USA-32 analysts working together. CINCPAC ruled out the first option because of crowded conditions at Da Nang—lack of hardstand space, maintenance facilities, billeting and logistics. Security Service had to accept for some time the less desirable alternative notwithstanding the possibility that crowded air traffic patterns or inclement weather might prevent landings at Da Nang Air Base to drop off the SIGINT materials collected.

[redacted]

[redacted]

[redacted] With CINCPAC approval, the 41st Air Division finally moved the four ACRP platforms to Da Nang.

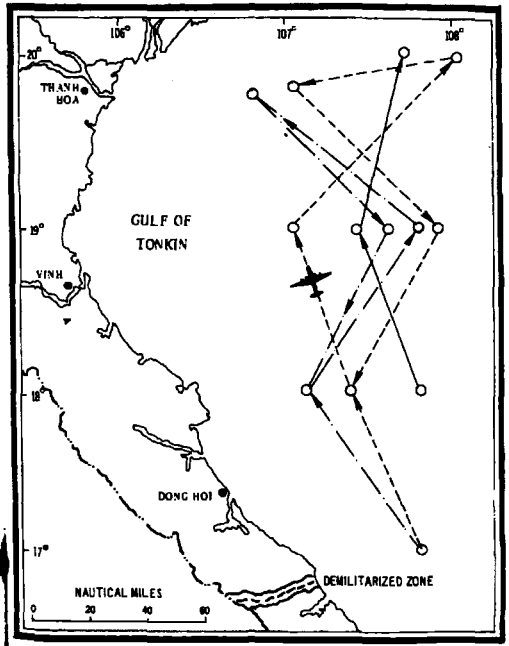
[redacted]

The four ACRP aircraft then staged from Da Nang until a rocket attack in mid-July 1967 forced their relocation to Cam Ranh Bay to the south of Da Nang.

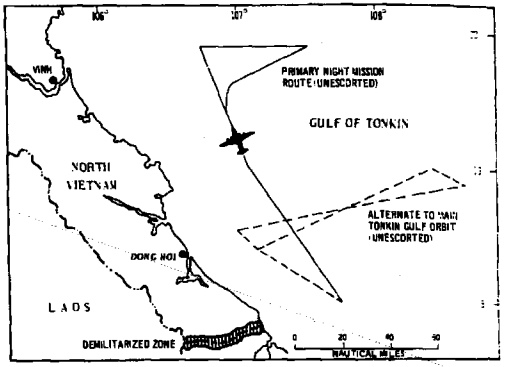
Orbits in the Gulf of Tonkin Adding to the many arguments for basing the ACRP aircraft at Da Nang was the growing pressure from 1964 on to fly missions northward into the Gulf of Tonkin to areas abeam of the Hanoi-Haiphong complex. The C–130's had flown orbits over the Gulf north of the 17th parallel on flights to and from SEA to obtain SIGINT related to SAC drone and U–2 missions and Navy and Air Force ELINT operations. But the requirement was for routes reaching 180 miles farther north to assure collection of VHF and UHF air defense signals. Both PACSCTYRGN and the 6925th Security Group at Clark AB, however, viewed the suggested new orbit in the Gulf with reservations. The Region felt that the proposed flight path constituted an attack heading which violated CINCPAC directives and blind spots in the platform's antenna system might preclude its detection of a reacting enemy aircraft entering the ACRP's orbit.

The 6925th Security Group was particularly reluctant to accept the new orbit. Each change of flight routes seemed to place the platform closer to the target. Group officials believed that, if this trend continued, it might result in the loss or damage to the platforms and the loss of crews. They were equally apprehensive about the build-up of AAA defenses in the Gulf peripheral areas and the distinct possibility that SAM's soon would appear in the North Vietnamese arsenal.

Despite these considerations, the Region pointed out to the Group that each orbit in the theater had the approval of the theater commander, the Joint Chiefs and the Joint Reconnaissance Center in Washington only after an exhaustive evaluation of all factors, political and military, bearing on the safety of the aircraft. In every situation, the importance of the potential intelligence had to outweigh the risks. In any event, SAC and Navy had flown ELINT missions in the Gulf of Tonkin for some time without difficulty. On 20 September 1965, CINCPAC authorized PACAF to begin C–130B SIGINT collection operations over the gulf. Several days later the Joint Chiefs of Staff authorized a fighter CAP for all COMINT and ELINT platforms over the Gulf of Tonkin, and the ACRP platforms began their collection missions over the Gulf. JCS also established during late 1965 and in the summer of 1966 routes on which



REPRESENTATIVE U.S.A.F. C-130 AIRBORNE COMMUNICATIONS RECONNAISSANCE ORBITS (1965 – 1968)



REPRESENTATIVE U.S.A.F. C-130 ACRP ORBITS — 1965 1968

the ACRP could operate without escort, one serving as an alternate to the main Tonkin orbit and the other for night missions.*

The RC-135 Reconnaissance Platform

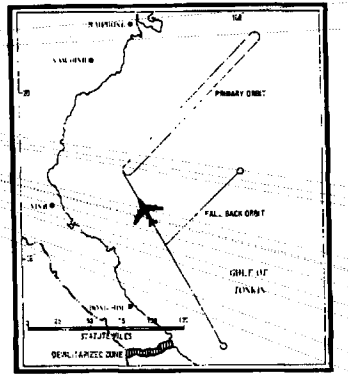
An NSA/DIA review of airborne SIGINT collection, meanwhile, had firmly established the need for additional ACRP aircraft in SEA and had led to the programming of six RC-135 aircraft with SAC flight crews and ELINT specialists and AFSS COMINT operators. A conference at Headquarters USAFSS resulted in decisions to replace the SILVER DAWN C-130B's with RC-135M's and to create a new squadron under PACSCTYRGN's 6922nd Security Wing to fly the missions.*

*CINCPAC msg, 142330Z Feb 66 (TS COMINT Channels Only).

Maintenance Compartment Aboard the COMBAT APPLE RC-135M Aircraft

Crew

U. S. A. F. RC – 135 COMBAT APPLE PRIMARY TRACK – 1968



Normal missions included 13 orbits on the primary track. Fall-back orbits were usually flown only in the absence of fighter cover.

[redacted] In March 1967 USAF assigned the name COMBAT APPLE to the RC–135 program planned for SEA.

[redacted]

[redacted] on Tonkin Gulf missions. SAC crews normally consisted of an aircraft commander, pilot, two navigators and two electronic warfare officers (EWO's). The aircraft commander controlled the aircraft while the Security Service airborne mission supervisor (AMS) controlled the SIGINT crew in its technical operations. The AMS could also hold the aircraft on any desired portion of an orbit in the furtherance of his mission if no mechanical problems or external threats caused the mission to be aborted.

[redacted]

In phasing down the C–130 program in the last half of 1967, [redacted] returned two of the aircraft [redacted] before the end of the year. Two aircraft remained at Cam Ranh Bay. Meanwhile, the [redacted] flew C–130 night missions over the Gulf, leaving the day orbits to the [redacted] RC–135's. Throughout 1968, [redacted] continued to fly the C–130's on six-to seven-hour COMMANDO LANCE night missions from Cam Ranh Bay. On 31 December 1967 [redacted] flew its last regular mission in Southeast Asia. [redacted] then accepted responsibility for the SEA ACRP (COMBAT APPLE/COMMANDO LANCE) the next day. [redacted] continued, however, to provide maintenance technicians for the C–130's.

Although the RC–135's COMINT and communications equipment was essentially the same as that carried by the C–130B's, the RC–135 proved superior to the C–130B on other grounds. It was able to remain on orbit 12 and a half hours in contrast to the six- to nine-hour missions of the C–130B. Its 200 mph greater cruising speed (500 mph) was a significant safety factor. The RC–135's greater cruising altitude (30–45,000 ft.) also enhanced the platform's intercept capability within its VHF/UHF range [redacted] Since it carried SAC ELINT equipment (see illustration, p. 98), analysts were able to take advantage of the special opportunity for deriving intelligence when COMINT and ELINT are collected simultaneously.

(b)(1)
OGA

USAF RC-135M "COMBAT APPLE" ACRP

As the COMBAT APPLE program developed, missions averaged 18 and a half hours from take-off to landing. Including all necessary pre-mission and post-mission briefings and debriefings, its crews devoted an average of 25 and a half hours to each mission.

Results achieved during 1968 were representative of the RC-135 collection. In that period, COMBAT APPLE produced 25,000 hours of intercept, more than two thirds of which was voice and the remainder manual Morse and other signals. Voice collection included recorded VHF tactical communications, and low VHF (R1XX) traffic. After preliminary processing, sent the transcripts to NSA and other concerned Pacific SIGINT units.

As in the case of the C-130's, NSA tasked the RC-135's with intercept missions. To mention a few typical assignments, on 11 January 1968 received tasking on Russian shipping in the vicinity of Haiphong. Any time U.S. strike aircraft were operating in the Haiphong area, the ACRP was to give (Russian Shipping) top priority. On 15 January tasked to intercept for 30 days communications on frequency on which were appearing callwords "CHUNG-DAO" and "CHUNG-TO" related to air movements within North Vietnam. On 11 March the ACRP was to give North Korean (KORCOM) communications in the range special emphasis when KORCOM MIG's were active on tactical facilities. These low VHF communications at the time were revealing the possible expansion of North Korean tracking of ingressing U.S. strike aircraft. Tasking such as this updated the ACRP mission and led to specific responses to requirements for current intelligence.

The proximity of and the mixture of ELINT and COMINT positions on board COMBAT APPLE aircraft facilitated *interaction*, or the correlation of COMINT and ELINT. The COMINT operators were ready for interaction tasks as the EWO's came on watch. When COMINT revealed GCI activity directed against U.S. strike aircraft, the AMS tipped off the EWO who searched for AAI (Airborne Aid to Intercept) and IFF signals. When COMINT reflected SAM activity, the AMS tipped off the EWO who searched for acquisition and

Collection Position Aboard COMBAT APPLE (AMS Position Looking Forward)

guidance radar signals. In the mutual exchange, the EWO advised the AMS when he intercepted signals associated with MIG fighter aircraft. The AMS then ensured that enemy tactical control frequencies were under surveillance for voice transmissions associated with the air activity. Likewise, when the EWO located an active SAM-associated radar, he tipped off the AMS who attempted to intercept the associated command and control voice communications.

The 1 April 1968 restriction of air operations above the 20th parallel and ordnance delivery above the 19th parallel initially brought SAC Reconnaissance Center (SACRECONCEN) and 7th Air Force constraints on operation of the RC-135 which had been flying as far north as 20 degrees 30 minutes north. SAC first restricted the RC-135 from areas within 12 nautical miles of Ile Bac Long VI (20-08N 107-43E) and then stipulated that COMBAT APPLE fly only on its fallback

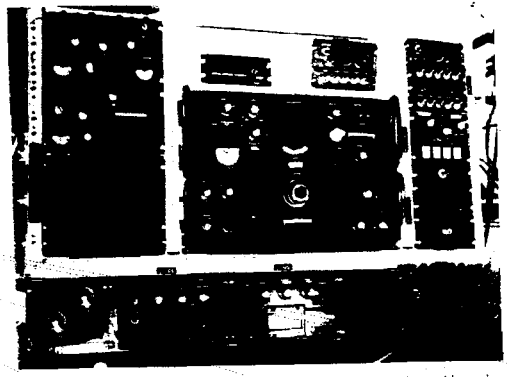
orbit. Seventh Air Force restricted the RC-135 to the area below 19 degrees 30 minutes north. JCS then relaxed the restrictions and permitted COMBAT APPLE to fly its normal orbit with the northernmost leg adjusted to the 20th parallel.

The bombing restrictions also brought a major change in the collection priorities of the ACRP. With scaled down U.S. air strikes, the enemy had the opportunity to move men and supplies more readily to the south. NSA Director Lt. General Marshall S. Carter notified Security Service, therefore, that the ACRP would emphasize collection of the communications of NVN's General Directorate Rear Services (GDRS), the organization responsible for moving men and supplies over the long infiltration routes. When President Johnson ordered a bombing halt on 1 November 1968 restricting the U.S. to unarmed reconnaissance and search and rescue operations, GDRS became the primary concern of the airborne platforms.

Among the various airborne collection programs employed in Southeast Asia between 1967 and 1969 were two that, owing to the special nature of their mission, stood apart from the others. The first to arrive in the theater in August 1967 was the SAC aircraft. This was an EC-121K specially designed to function as an airborne extension of the 7th Air Force Tactical Air Control Center, Northern Sector (TACC-NS), on Monkey Mountain. Its primary purpose was to exercise control of and provide a MIG warning source for ROLLING THUNDER aircraft over enemy territory. Its limited COMINT mission was secondary.

equipment consisted of communications intercept, recording, and electronic signal sensor and display devices, including the U.S. Navy-developed BRIGAND* (see p. 108 below) which was intended to operate in a primarily passive role. The BRIGAND position afforded the tactical controller a passive means of maintaining a constant watch over the relative positions of strike or reconnaissance aircraft and any enemy aircraft that were also being tracked by the victim radar. The inclusion of a tactical air coordinator position and display facilities

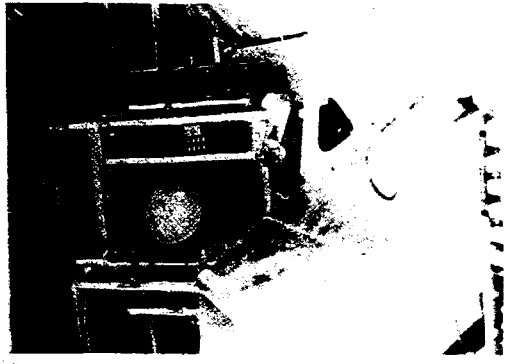
*Bi-static Radar Intelligence Generation and Analysis Development.



The Airborne Mission Supervisor's (AMS) Position Aboard [redacted]

provided [redacted] with the desired tactical control capability. The AFSS site at Da Nang provided technical support to the RIVET TOP program.

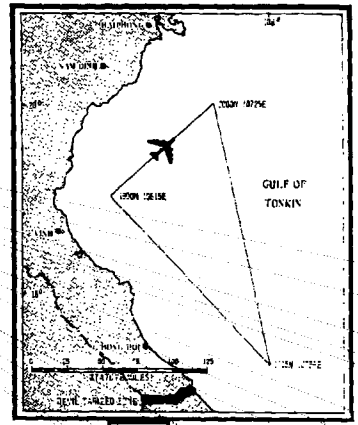
SAC and 7th Air Force tested [redacted] in Indochina between August and December 1967, and while this platform was successful in many respects, especially as a source of MIG warnings, it fell short of the mark in others. One shortcoming was that, since the BRIGAND system operated only against circular scan radars, the emissions of the vertical-horizontal scan FAN SONG radar, the heart of the North Vietnamese SA-2 guidance system, were not susceptible to its exploitation. The [redacted] emitter locator system (ELS) had the primary objective of locating SAM sites, but during the test period, although numerous SAM-associated FAN SONG radar signals were detected, [redacted] was able to plot only a small fraction of them successfully. Hardware and computer software failures plagued the system. Despite its problems, the



TAC Coordinator's Plotting Board With AFSS Positions in Background Aboard the [redacted] EC-121K Aircraft

[redacted] thought very highly of [redacted] ELINT collection.

By December 1967 both PACAF and 7th Air Force officials concluded that, although the platform met many of its objectives, being particularly well suited to its anti-MIG role, it had not performed as well as it should have in Southeast Asia. During a briefing of General John D. Ryan, CINCPACAF, Maj. Gen. Albert W. Schinz, Commander of the Tactical Air Warning Center, recommended that [redacted] be returned to the United States for refitting and return to Indochina. He did not recommend a follow-on program, but in view of its success as a MIG warning source, suggested that the program be retained until an alternate airborne platform could carry on its MIG detection and warning activity. General Ryan agreed. Meanwhile, the Air Force Chief of Staff had extended the [redacted] program in Southeast Asia with the stipulation that PACAF and 7th Air Force release the aircraft as soon as another platform, [redacted] or some other equivalent, could be made ready.



U S A F [redacted] ORBIT AREA - 1967 - 68

As a result of the projected phase-out of [redacted] General Ryan recommended modification of the [redacted] platforms to achieve a comparable interception and threat warning capability. Employing Air Defense Command EC-121D/K aircraft [redacted] was a program for extending the range of U.S. radar surveillance through use of airborne radars and for relaying radio communications of the Air Force tactical controllers on Monkey Mountain.

Air Force technicians modified the [redacted] platforms to permit use of quick-disconnect SIGINT components (called [redacted] which could be moved from aircraft to aircraft. This ensured three positions on station at all times. Two crews of four linguists each

The EC-121 [redacted] Aircraft

from the [redacted] handled all intercept and related communications on board.

The first [redacted] mission to stage from [redacted] was in May 1968. Normally [redacted] missions placed it in the desired orbit area during both the morning and afternoon ROLLING THUNDER missions. Between these times the aircraft landed at Da Nang for refueling. Over-all mission time was 14 hours.

Navy Platforms [redacted]

Operated by Fleet Air Reconnaissance Squadron One [redacted] Navy platforms [redacted] had flown [redacted] on aperiodic missions in Southeast Asia beginning in September 1963; [redacted] during the first QUEEN BEE CHARLIE operations in that area, but neither [redacted] undertook a full-time mission in Southeast Asia until October 1965. At that time, CINCPAC directed that two five-hour [redacted] missions be performed daily in the Gulf of Tonkin to provide direct tactical

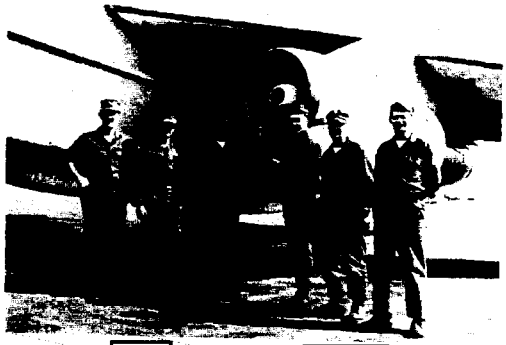
USN [redacted] EC-121M Platform

electronic warfare and threat warning support to TF-77 and other United States forces conducting combat operations against NVN.*

Announced by CINCPACFLT** the original plan called for the deployment of four [redacted] and several [redacted] platforms [redacted] to Southeast Asia under the direction of COMSEVENTHFLT. The [redacted] EC-121M's were to operate from Da Nang, the [redacted] EA-3B's from TF-77 aircraft carriers. As it turned out, virtually all Navy COMINT-ELINT aircraft staged from Da Nang—two [redacted] aircraft through 1966 and four thereafter. [redacted] did not operate from the carriers because of weight factors and the adverse effects of carrier landings and catapult launches on its specialized electronic equipment, but served rather as a land-based back-up platform for [redacted]. The [redacted] EA-3B originally had only ELINT positions, but eventually carried a

*Para. 1a, Appendix I, Annex B, COMSEVENTHFLT Op Ord. No. 310-67

**CINCPACFLT msg, 020406Z Oct 65, S/COMINT Channels Only



[redacted] EA3B PR-10 [redacted]

Left to Right: Lcdr L.H. Olmer, CT2 W.F. Erhardt, CT3 S.P. Renken, CT3 J.P. Judice, Ltjg R.A. Cavaluchi, Ltjg S.M. Byrnes

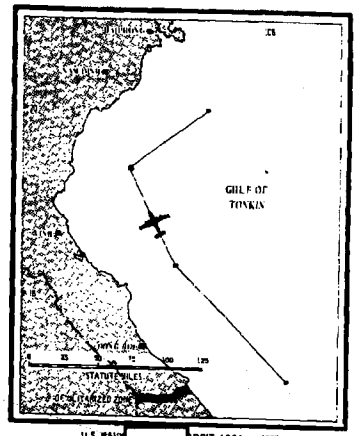
USN [redacted] EA-3B Platform

many as four COMINT positions in addition to the one or more ELINT positions.

Initially, PACFLT asked for airborne collection in SEA for a 60-day test period. After evaluating the test results, PACFLT continued [redacted] operations on an indefinite basis.

[redacted]

[redacted]



[redacted]

The 6924th Security Squadron provided operating space and ground support in its compound at Da Nang for rapid processing and reporting of [redacted] COMINT take. The Squadron also provided pre-mission briefings for its own ACRP and the [redacted] crews. These centered on a day-by-day updating of the technical information on target communications. Of particular importance were the initial indications of new communications activity.

While at Da Nang the Navy crews flew daily missions, processing their material after they landed. They usually remained at Da Nang for a minimum of 30 days, then rotated to the Philippines for two weeks during which COMINT and ELINT operators served as instructors for replacement personnel scheduled to join the program.

[redacted] ECM–121M [redacted] Crew

The [redacted] program suffered a temporary set-back in mid-July 1967 when, during a rocket attack on Da Nang Air Base, two of the EC–121M's were hit. One which sustained light damage was repaired at Da Nang and continued in operation. The squadron returned the second aircraft [redacted] for extensive repairs. Meanwhile, to sustain the [redacted] program at an adequate level, [redacted] used a similar platform [redacted]

REPRESENTATIVE [redacted] AIRCRAFT CONFIGURATION*

*Unlike other airborne collection platforms [redacted] was not the result of a formal systems research, development, test and evaluation program. [redacted] successful configuration resulted, instead, from the resourcefulness of naval technicians working in the field. Configuration of the assigned EC–121's, therefore, varied slightly from plane to plane. In November 1965 Navy technicians installed additional COMINT positions to increase VHF/UHF collection.

MANAGEMENT COMPLEXITY

Duplicative Intercept

Airborne collection required extensive cooperation on the part of numerous agencies. Air Force commands such as ADC, PACAF, SAC, and TAC provided airframes, flight crews, electronic warfare officers, and ground maintenance of airframe-associated equipment. AFSS provided operators and technicians to man and maintain the COMINT equipment on board. DIRNSA exercised operational control over the airborne COMINT collection programs of USAF. NSA and [redacted] as indicated previously, tasked the Air Force platforms with intercept missions. Conversely, CINCPACFLT exercised operational control of Navy airborne collection platforms. PACFLT's [redacted] operated and maintained the aircraft while NAVSECGRU personnel manned the COMINT equipment.

Essentially, the difference between the two airborne collection systems was that the principal Air Force platforms and ground units operated

under national controls—NSA, DIA, [redacted] and AFSS—and responded to the national intelligence tasking system. By contrast, the Navy platforms and detachments afloat operated in direct support of 7th Fleet and responded to Navy requirements for tactical intelligence. The distinction was, however, not always hard and fast. Navy platforms supported all U.S. aircraft over North Vietnam just as the Air Force platforms provided direct support to both TF-77 and Air Force commands. The split tasking did result in duplicated interception of line-of-sight transmissions and a subsequent compounding of processing problems at USA-32, the center for much of the initial processing of NVN air and air defense communications. After the initiation of COMBAT APPLE processing at [redacted] AFSS sought and received NSA approval for USA-32 to forward [redacted] tapes [redacted] as one step to avoid duplicate processing. Although there were disagreements on this subject, similar tasking of the various collection programs was necessary because of the immediate applications of the derived SIGINT in Navy and Air Force operations.

Platform Control

National control over the Air Force collection program did not go unchallenged. In the spring of 1965, Maj. Gen. Joseph H. Moore, Commander, 7th Air Force, asked without success for frag order authority for the QUEEN BEE DELTA C-130 collection program. Direct support with emphasis on fast delivery of warning information to Air Force and Navy tactical elements was a major concern: [redacted] SIGINT was the wellspring of that warning service. Placing the ACRP in a direct support category, 7th Air Force reasoned, would lead more quickly to that objective. Had General Moore's request been approved by PACAF and other authorities, the ACRP in SEA would have become operationally subordinate to his command.

While 7th Air Force was to contest the basic control arrangements at a later time during the development of specific SIGINT warning programs, it failed to gain direct control over the ACRP. Despite the issue of control, the national mission of the ACRP included specific support to 7th Air Force. The 6922nd SW Operations Order 100-65 set forth in unequivocal terms the need "to satisfy requirements of the

Commander, Second Air Division /Seventh Air Force/, by providing timely warning of Communist air actions confirmed or suspected to be directed against airborne U.S./Allied aircraft or against installations in the RVN or Thailand which accommodate U.S. and/or Allied forces."

Combat Air Patrol (CAP)

The JCS and CINCPAC requirement for fighter CAP on all close-in SEA missions constituted a major management problem in the operation of the ACRP, not only for the SIGINT operators but also for the commands which provided fighter escorts. [redacted] 7th Air Force was providing fighter CAP in the Gulf of Tonkin for the C-130 platforms and for the 7th Air Force's BIG EYE, a low altitude radar surveillance and tactical control EC-121 aircraft. Seventh Air Force allocated eight fighters and five supporting tanker aircraft to CAP in the Gulf: [redacted]

Interruption of the intercept program because of frequent loss of fighter CAP was a serious problem for AFSS. Platforms frequently had to hold below the 19th parallel in the Gulf until fighters arrived. In December 1966 when 7th Air Force was providing only two F-104's for fighter cover instead of the usual four, ACRP aircraft had to remain below 19 degrees north latitude each time the fighters refueled: [redacted] If fighter escorts were lost during operations on [redacted] orbit, CINCPAC required the C-130's to return to base rather than fly on alternate and safer orbits. Important intercept and operational continuity were at stake. Following a discussion of this subject between NSA's Mr. Benson K. Buffham and Brig. Gen. Rockley Triantafellu at PACAF in late 1966, NSAPAC documented these losses for PACAF.

There were, however, steps which brought partial relief. In August 1966, the JCS approved unescorted missions on the Tonkin route during hours of darkness and in September authorized an alternative Tonkin route on which the ACRP's could fly without escort (see chart, p. 92). In

*See above, p. 92.

April 1967 the JCS authorized the ACRP to stay on the northern leg of its Tonkin orbit [redacted] while escorting fighter aircraft were refueling. If U.S. aircraft aborted or required more than 30 minutes for refueling, or if intelligence showed unidentified aircraft on a heading toward the ACRP, the C-130's had to move to the alternate route. In July 1967, Navy F-4D's replaced the USAF F-104's as fighter CAP in Gulf of Tonkin. Thereafter, because refueling of the F-4D's on board the carriers normally took more than 30 minutes, the ACRP's were spending a large part of their time on the alternate orbit.

Use of the alternate routes degraded the ability of the ACRP to do its job. The airborne operators could hear NVN [redacted] communications on the northern segments of the Tonkin orbit but failed to hear them satisfactorily on the southern segments and on the alternate routes. On 15 February 1967 strike aircraft reported "SAM's everywhere," but because there was no CAP the ACRP was not in position to hear reflections of the SAM activity. [redacted]

[redacted]

Fighter CAP was to remain a major problem for some time. In the last half of 1967, [redacted] and the Navy for Gulf of Tonkin orbits. Fires on board the USS *Forrestal* and USS *Oriskany* further reduced CAP time and correspondingly impaired ACRP productivity, the major part of each mission being spent on fall back orbits.

Despite the many operational and technical problems encountered, U.S. SIGINT agencies succeeded in intercepting the enemy's air and air defense communications. The large volume of communications intercepted made possible the production of COMINT of direct value to U.S. air commanders in the planning of their operations, in the conduct of those operations over the north, and in later evaluation of those operations. The various applications of SIGINT will comprise the subjects of volumes to follow in the Southeast Asian Cryptologic History Series.

Mission	*Take-off and Landing (Z)*	*Intercept and Remarks*
8F027	29/1910 to 30/1400	Altitude: 35M Takeoff delayed 25 mins due to minor maintenance problems. Morse: M1 – 12.5 hrs Low VHF R/T: W R108 – 2.5 hrs V R108 – 0.1 hrs V R105 – 0.5 hrs R R108 – 0.2 hrs VHF R/T: W – 2.3 hrs K – 0.7 hrs V – 4.9 hrs [redacted] In-flight deviations to planned flight route: Lost fighter cover at 2244Z and proceeded to point Golf Dog. Regained fighter cover at 2348Z and proceeded to point Golf Bravo. Lost fighter cover at 0206Z, proceeded from Golf Charlie to Golf Dog. Regained fighter cover at 0409Z, proceeded from point Golf Echo to Golf Bravo. Lost fighter cover again at 0935Z, proceeded from Golf Bravo to Golf Echo.

Log for ACRP mission on 29–30 September 1967. Comments on loss of CAP such as these were typical.

List of Abbreviations

AAI	Airborne Aid to Intercept
AB	Air Base
ACRP	Airborne Communications Reconnaissance Program
AMS	Airborne Mission Supervisor
AW	Automatic Weapons
BRIGAND	Bi-static Radar Intelligence Generation and Analysis Development
CAP	Combat Air Patrol
CCAF	Chinese Communist Air Force
CDAA	Circularly-Disposed Antenna Array
CFNVN	Chinese Forces North Vietnam
CMA	Collection Management Authority
CNO	Chief of Naval Operations
CRC	Control and Reporting Center
CRP	Control and Reporting Post
CTG	Commander, Task Group
DIRNSA	Director, National Security Agency
ECM	Electronic Countermeasures
ELS	Emitter Locator System
EOB	Electronic Order-of-Battle
EW	Electronic Warfare
EWO	Electronic Warfare Officer
FICPAC	Fleet Intelligence Center Pacific
FMFPAC	Fleet Marine Forces, Pacific
GCI	Ground Controlled Intercept
GDRS	General Directorate of Rear Services
IFF	Identification Friend or Foe
JRC	Joint Reconnaissance Center
[redacted]	
MAF	Marine Amphibious Forces
MAG	Marine Air Group
MAW	Marine Air Wing
NVN	North Vietnam(ese)

PACAF	Pacific Air Force
PACFLT	Pacific Fleet
PACOM	Pacific Command
PACSCTYRGN	Pacific Security Region
PAVN	People's Army of Vietnam
[redacted]	
PIRAZ	Positive Identification and Radar Advisory Zone
PPI	Planned Position Indicator
PPS	Pulses Per Second
PRF	Pulse Repetition Frequency
R1XX	Low VHF single channel Soviet transceiver
RADAR	Radio Detection and Ranging
RADINT	Radar Intelligence
RHAW	RADAR Homing and Warning
RVN	Republic of Vietnam
SAC	Strategic Air Command
SACRECONCEN	Strategic Air Command Reconnaissance Center
SAM	Surface-to-Air Missile
SAR	Search and Rescue
SEA	Southeast Asia
SUPRAD	Supplemental Radio Detachment
SWI	Special Weather Intelligence
TACC-NS	Tactical Air Control Center—Northern Sector
TAREX	Target Exploitation
VMCJ-1	Marine Composite Reconnaissance Squadron—One
VNAF	Republic of Vietnam's Air Force

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