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PROJECT
Contemporary
Historical
Examination of
Current
Operations
REPORT

THE ROLE OF USAF GUNSHIPS IN SEASIA (U)

V. 1

30 AUGUST 1969

HQ PACAF

Directorate, Tactical Evaluation
CHECO Division

Prepared by:

MAJOR RICHARD F. KOTT

Project CHECO 7th AF, DOAC

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PROJECT CHECO REPORTS

The counterinsurgency and unconventional warfare environment of Southeast Asia has resulted in the employment of USAF airpower to meet a multitude of requirements. The varied applications of airpower have involved the full spectrum of USAF aerospace vehicles, support equipment, and manpower. As a result, there has been an accumulation of operational data and experiences that, as a priority, must be collected, documented, and analyzed as to current and future impact upon USAF policies, concepts, and doctrine.

Fortunately, the value of collecting and documenting our SEA experiences was recognized at an early date. In 1962, Hq USAF directed CINCPACAF to establish an activity that would be primarily responsive to Air Staff requirements and direction, and would provide timely and analytical studies of USAF combat operations in SEA.

Project CHECO, an acronym for Contemporary Historical Examination of Current Operations, was established to meet this Air Staff requirement. Managed by Hq PACAF, with elements at Hq 7AF and 7AF/13AF, Project CHECO provides a scholarly, "on-going" historical examination, documentation, and reporting on USAF policies, concepts, and doctrine in PACOM. This CHECO report is part of the overall documentation and examination which is being accomplished. Along with the other CHECO publications, this is an authentic source for an assessment of the effectiveness of USAF airpower in PACOM.

Milton B Adams

MILTON B. ADAMS, Major General, USAF
Chief of Staff

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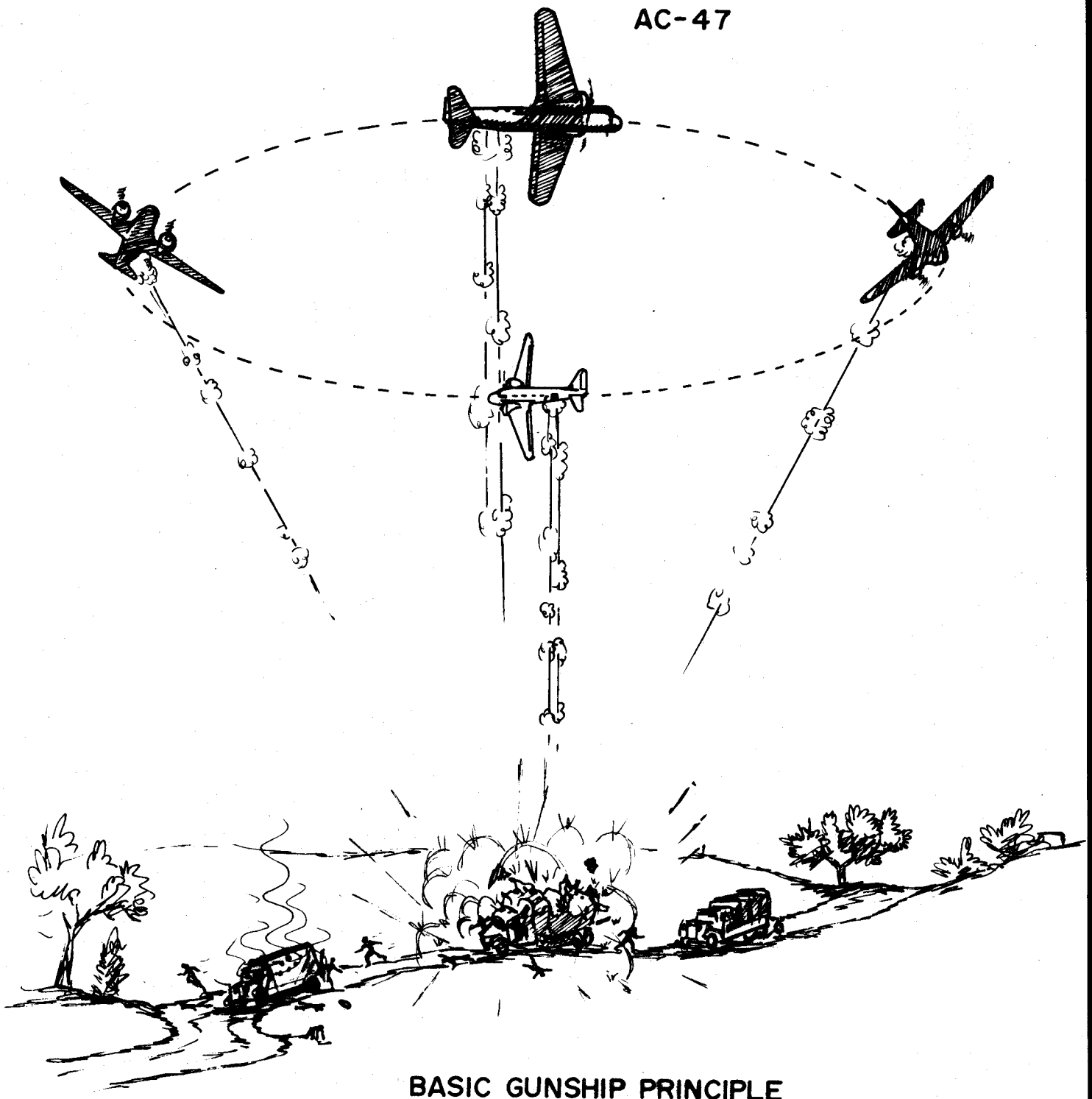
FOREWORD

Gunship activity in Southeast Asia in 1965 and the first half of 1966 was recorded in two CHECO reports.[1/] Another CHECO report, "Night Close Air Support in RVN," published in 1967, devoted considerable space to the use of the gunship from its inception through 1966.[2/] These document the impact of this weapon system on the war and the persistent high-level interest in its progress and development.

"The Role of Gunships in SEA" is a continuation of these reports, recounting typical activities and effectiveness of each gunship type: the Spooky, known for its role in close air support; the Shadow, functioning in armed reconnaissance; and the Spectre, recognized for its action in interdiction. This report also describes the gunship/fighter escort concept, a major tactical development in air-to-ground combat.



BASIC GUNSHIP PRINCIPLE

FIGURE 1

CHAPTER I

THE MIXED GUNSHIP FORCE

The fixed-wing side-firing USAF gunship was a new weapon introduced into Southeast Asia (SEA) in late 1964. The concept was tested in combat, proved successful, and by 1969, a family of gunships had evolved:

Gunship I - AC-47 Spooky
Gunship II - AC-130A Spectre
Gunship III - AC-119G/K Shadow/Stinger

The years 1965 and 1966 were essentially a time of experimentation and "wait and see." By 1967, there was little doubt that the gunship had already won a place in military aviation for conflicts similar to the Southeast Asia situation. Able to concentrate and sustain enormous firepower on a target with devastating accuracy, the gunship was respected and feared by the enemy. But in spite of its apparent success, there was apprehension over continued development. The predictable nature of the gunship attack, i.e., the left-hand orbit, the relatively low altitude and airspeed equated to vulnerability and raised serious questions concerning survivability. As a result, gunship development proceeded cautiously.

Gunship Chronology

In mid-1967, the Gunship II weapon system was installed in the C-130A aircraft; the prototype entered SEA in September 1967 for combat evaluation. The introduction of a second type of gunship was the beginning of a "mixed force" suitable for varied roles. Figure 2 provides a chronology of the mixed force in Southeast Asia.[1/]

Roles and Missions

The gunship roles and missions grew as did the gunship force. By 1969, the mixed, predominately night fighting force, was truly multi-mission capable. Parameters of the gunship force were: 2/

Local Base Defense/Hamlet Defense

- Sustained intense attack.
- Provide illumination.
- Fire support.
- Enemy pursuit.
- Battlefield information to defenders.

Support for the Army

- Fire support for fixed positions.
- Fire support for mobile forces in contact.
- Fire support for guerrilla/counter-guerrilla teams.
- Illumination.
- Forward observer for artillery.
- Battlefield information for friendlies.
- Top cover for assault.
- Top cover for helicopter assaults.

Day/Night/Weather Interdiction*

- Must operate in less than high-threat areas.
- Best hunting at night.
- Targets: trucks, sampans, storage areas, bivouac, etc.
- Work with road watch teams.
- Teamed with FACs and escorts.
- Totally self-contained day/night attack capability.

Armed Reconnaissance and Harassment

- Patrol for enemy activity.
- Close coordination and accurate navigation required.
- Effective utilization of intelligence data.
- Targets: troops, sampans, buildings, supply dumps, etc.

Hunter-Killer

- Detect and identify targets.
- Act as airborne artillery spotter.
- Direct other aircraft to targets.

*Day and night weather were minimal capabilities; gunships normally were not used in daylight nor bad weather conditions.

MIXED FORCE GUNSHIP CHRONOLOGY IN SEA

GUNSHIP I	Dec 64 to Jun 65	AC-47 Combat Evaluation in SEA
	Aug 65 -	First AC-47 Operational Squadron Established in SEA
GUNSHIP II	Sep 67 to Dec 67	First AC-130A Combat Evaluation in SEA
	Feb 68 to May 68	Second AC-130A Combat Evaluation in SEA
	Aug 69 -	First AC-130A Operational Squadron Established in SEA
GUNSHIP III	Dec 68 -	First AC-119G Operational Squadron Established in SEA
	Oct 69	First AC-119K Operational Squadron Established in SEA
	Jan 70	Deployment Completed
GUNSHIP I VNAF	Jul 69 -	First AC-47 Operational Squadron Established in SEA

FIGURE 2

. Illuminate target area.
. Provide suppressive fire cover for other attack aircraft.
. Provide top cover for helicopter assaults.
. Provide top cover and on-scene commander for air rescue.
. Platform for future laser designations.

Appendix I contains briefs of the components and characteristics of each of the gunships, and Figure 3 lists each gunship in the mixed force in ascending order of sophistication, from the less endowed AC-47 to the very advanced AC-130. In comparing mission effectiveness, Figure 3 reveals that each gunship evolution, readily apparent in Appendix I, carries with it not only greater capability but improved effectiveness as well.

Mixed Force Discussion

In mid-1967, an Air Staff board recommended that the C-119K be identified as the AC-47 follow-on replacement gunship. The Secretary of the Air Force (SECAF) concurred, stipulating the G model. The K model was to be considered only if larger payload packages might prove useful and feasible. Seventh Air Force objected on the premise that maintenance and logistics problems alone for "yet another obsolete system" weighed heavily against the C-119G. In addition, 7AF believed the C-119 would be a mere substitution for the AC-47--probably a regression in performance.[3/]

In June 1967, Lt. Gen. William W. Momyer, Commander of 7AF, advised Gen. John D. Ryan, Commander-in-Chief of the Pacific Air Forces (CINCPACAF):[4/]

> *"I am aware of the rationale advanced for the use of the C-119, including availability, cost, and minimum impact on the airlift mission. However, the C-130 has much to recommend it: four engine survivability; a relatively low-time airframe; greater speed, altitude, and loiter time; and growth potential which the C-119 does not have."*

The question of a follow-on replacement for the Spooky remained open at the end of 1967.

In the interim, the Secretary of the Air Force proposed to employ a mixed gunship force instead of a follow-on replacement only: that force would consist of 6 AC-130s, 22 AC-119s, and 32 AC-47s. The SECAF envisaged separate missions and tactical requirements for the AC-47 and AC-130 gunships. But 7AF viewed the requirements differently and stated there were at least two basic gunship missions which required identical capabilities, namely: (1) day/night, all-weather delivery of firepower in support of ground forces or installations under attack; and (2) day/night all-weather interdiction. To accomplish the two missions, 7AF listed two characteristics of the AC-130 which it considered mandatory, along with reasons for requiring them:[5/]

SPEED

Rapid reaction;
Area coverage;
Minimum exposure.

SENSORS

Locate objects;
Locate friendly or enemy positions;
Deliver accurate firepower in close proximity to friendlies;
Payload for devastating firepower;
Sensor devices and armor plating.

Since the AC-47 did not possess all of these capabilities, Seventh Air Force did not consider the mixed gunship force valid. It further argued that the mixed force would have several disadvantages:[6/]

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MISSION EFFECTIVENESS
MISSIONS

	LOCAL BASE DEFENSE	HAMLET DEFENSE	ARMY SUPPORT	DAY/NIGHT ALL WEATHER INTERDICTION	ARMED RECCE & HARASSMENT	HUNTER/ KILLER
AC-130	****	****	****	***	****	****
AC-119K	***	***	***	**	****	***
AC-119G	**	*	*		**	*
AC-47	**	*	*			*

LEGEND

* - Degree of Mission Effectiveness.
Qualitative Judgment - Based on: firepower, aircraft capability and degree of sophistication.
Source - (C) Briefing, 7AF, DPLG, "Ans to SAF's 20 Dec 68 Memo and ASD Position on Eval of Gunship", Dec 68.

FIGURE 3

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> Total gunship force would increase present 32 UE aircraft to 60 (6 AC-130, 22 AC-119, 32 AC-47). This would result in a sharp increase in maintenance and operating personnel over current program...limitations.
>
> Major construction would be necessary to billet increased personnel and provide additional apron space and maintenance facilities for AC-119 aircraft.
>
> The AC-119 would not possess enough increased capability over the AC-47 to warrant sharp increases in personnel and construction costs.
>
> Exceptionally high maintenance and supply support costs experienced with C-119s make it an unfavorable aircraft for SEA operation.

Nonetheless, by mid-April 1968, a mixed gunship force of 32 AC-47s, 32 AC-119G/K, and 8 AC-130s (72 gunships) was programmed into the SEA inventory, and the Aerospace Systems Division (ASD) was studying costs to provide 7AF with a 208-gunship force of C-130, C-119, and C-97 aircraft.[7/] This study reportedly resulted from three questions of SECAF. What is the best truck killer? What is the best base defense aircraft? What is the best post/outpost defense aircraft? To all three questions, gunship aircraft was the answer given.[8/]

On the basis of its evaluation of the AC-47 performance since 1965 and the AC-130 prototype operations in the Republic of Vietnam (RVN) and Laos, 7AF considered the programmed gunship force of 72 aircraft satisfactory to perform the roles mentioned by the Secretary.[9/] Seventh Air Force repeated the disadvantages of a mixed force, pointing out that the enemy defenses for RVN-bound truck traffic in the STEEL TIGER and TIGER HOUND areas of Laos were such that only AC-130 gunships had a reasonable chance for survival.[10/] It anticipated that improved truck-killing munitions would soon become available which would increase the truck-killing capability of fighter and attack aircraft. With

that increased capability, it would not need an extensive gunship buildup for the out-country war; no more than 8 to 12 AC-130s based in Thailand would be useful.[11/] Seventh Air Force stated that the C-119G and C-97 were unsuitable. The C-119G lacked sufficient sensors, firepower, and single engine performance for mountainous areas. Further, the C-119 would first need to be tested for compatibility with the gunship systems. The C-97 was likewise unsuitable in terms of maneuverability, climb performance, maintainability, logistics, and base support requirements.[12/]

The AC-47 was considered as having performed well in its original concept of employment, that is, as a "ready response or airborne alert aircraft in support of base defense security forces or Army ground units."

But for its expanding requirements, Seventh Air Force recommended the Spooky be replaced on a one-for-two basis by the AC-130 aircraft or on a one-for-one basis by the AC-119K, a trade-off that would provide improved gunship capability. The significant in-country requirement in early 1968 was primarily the support of base defense security forces, special forces, Civilian Irregular Defense Group (CIDG) units, or regular ground forces.[13/]

To illustrate the need for the improved gunship mission performance of the AC-119K and the AC-130 over the AC-47, Seventh Air Force listed fire support requirements of the various ground units in South Vietnam:[14/]

U.S. Special Force Units, I, II, III, IV Corps	86
CIDG Units	36
Major AF Bases	10

Orbital patterns had been established to cover those fire support requirements, but the enemy learned quickly. Well-timed attacks by the enemy drew the Spooky assets to the limits of an area of support, leaving no gunship support for units located at the opposite extreme of the area. The higher performance of the Shadow K or the Spectre would clearly improve response time and enhance support coverage.[15/]

At length, CINCPACAF and the Commander, 7AF, decided to trade off AC-47s on a one-for-one basis for the AC-119G/Ks.[16/] The MACV Commander, Gen. Creighton W. Abrams, Jr., concurred.[17/] Apprised of the concerted opinion of 7AF, CINCPACAF, and MACV, the Chief of Staff, U.S. Air Force (CSAF) nevertheless stated he did not support the trade-off, and that "all possibilities should be exhausted before AC-47/AC-119 one-for-one trade-off is considered."[18/]

The resolution of the trade-off question was found in the Air Force Advisory Group (AFGP) recommendation and request for the AC-47s to join the Vietnamese Air Force in their configuration as gunships. In December 1968, Gen. George S. Brown, Commander, 7AF, directed a study be made about the transfer of AC-47s to the VNAF at an early date; he wanted the study based on an "optimum schedule from the VNAF side, even though it results in some degradation of the Seventh Air Force capabilities."[19/] The study revealed that the VNAF had both the desire and the capability to accept the AC-47s in a reasonable time.[20/]

By 2 July 1969, the VNAF accepted the first five AC-47 gunships of the 16 that were to be delivered to form a RVN "Fire Dragon" gunship squadron.[21/] The transfer of the sixteenth and final AC-47 was accomplished on 20 August 1969,

and the first VNAF squadron (417th Combat Squadron) of gunships was complete.[22] This action reduced by one-half the USAF AC-47 strength, but by this time, the Shadow Gs had proved to be an effective weapon. The initial evaluation report and its validation was completed by 24 March 1969 with the verdict--successful.[23]

The mixed gunship force began to function not only in the use of different aircraft, but also in its coordinated use under different flags. As an evolution of the original Spooky gunship, the AC-130A was capable of all the Spooky and Shadow roles and more. Since its assignment to the 16th Special Operations Squadron (SOS) at Ubon, Thailand, the Spectre had won the reputation of being "the most effective system deployed in destroying trucks."[24]

The question of follow-on gunships for a time carried the connotation of replacement as well as evolution; later it came to suggest a family of weapons consisting of several aircraft types. Factors such as varying speed, effective slant range, and armor helped answer the questions of vulnerability and survivability. Gunships could be matched to the particular enemy threat, tactic, or capability in any given engagement.

The idea that gunships would be part of a new class of airborne weapons was again raised in July 1969 when the Undersecretary of the Air Force, John L. McLucas, in a memo to the SECAF, called for the conversion of more existing aircraft into gunships with greater sensor and weapon capability. He spoke, for example, of the possibility of re-engining the C-97 with turboprop engines, noting that the aircraft had been flown only 15 percent of its useful life.[25]

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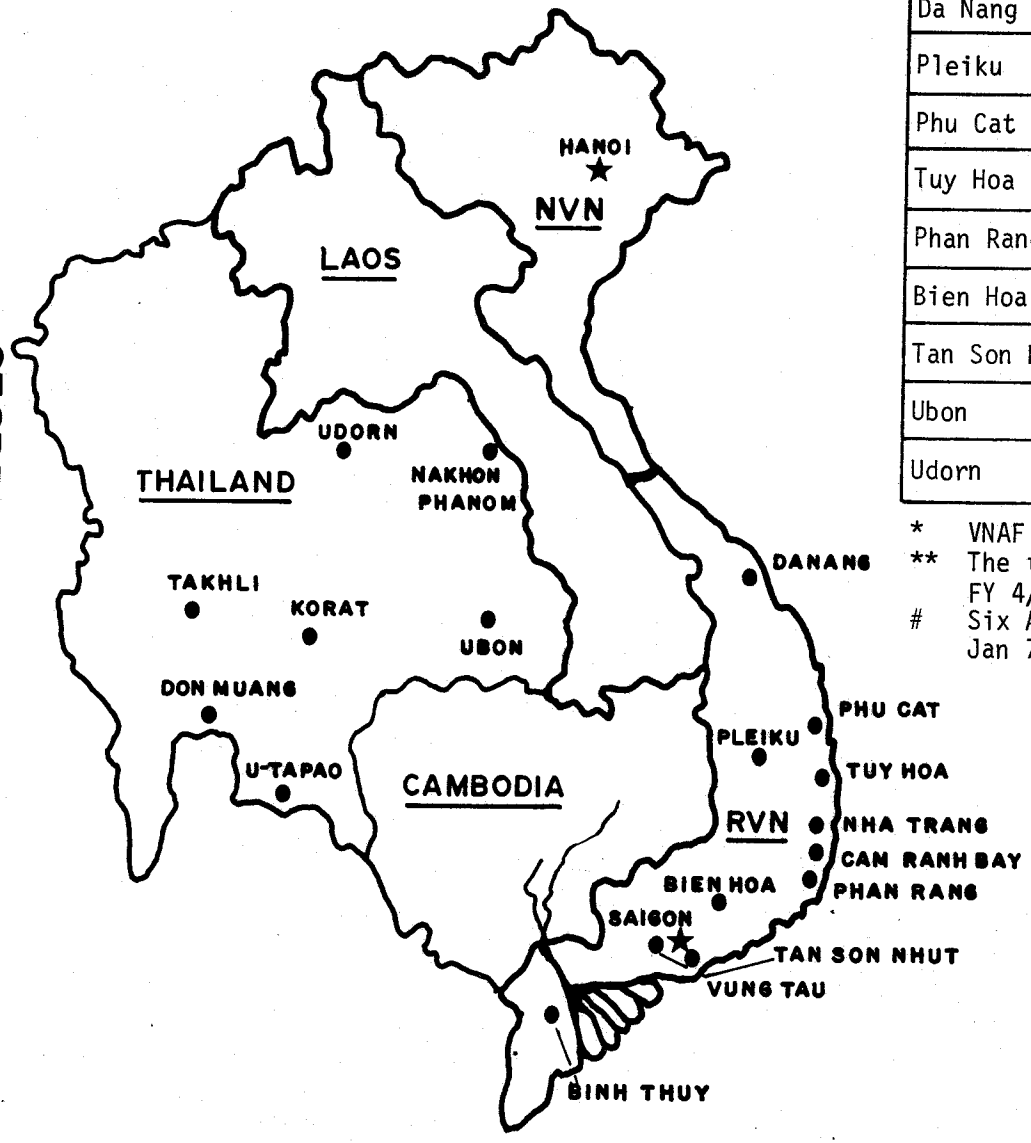

BASE	AC-47	AC-119G	AC-119K	AC-130
Da Nang	4		6	
Pleiku	3			
Phu Cat			6#	
Tuy Hoa		7		
Phan Rang	4	5	6	
Bien Hoa	3			
Tan Son Nhut	15*	5		
Ubon				6
Udorn	3**			

* VNAF gunships

** The three AC-47s at Udorn will be retained until FY 4/70 to support BARREL ROLL operations.

\# Six AC-119Ks were programmed for assignment here in Jan 70.

GUNSHIP DISPERSAL IN SEA

November 1969

FIGURE 4

SECRET

In November 1969, the possessed mixed force in RVN numbered 14 AC-47, 17 AC-119G USAF, and 12 AC-119Ks (USAF), as well as 15 AC-47 VNAF gunships. Of the 14 AC-47A assigned in RVN, 3 were TDY in Thailand. Also, 6 AC-130A USAF aircraft were assigned in Thailand. (Fig. 4.)

CHAPTER II

EMPLOYMENT OF GUNSHIPS IN SEA

The gunship was a versatile weapon uniquely adapted to the combat environment in SEA. The air war cannot be adequately described without including its exploits and accomplishments. In many instances, gunships were integral to certain operations, in others, crucial to the successful outcome of an engagement.

Organization

Gunships were employed in combat operations in Southeast Asia within the organizational framework of the 14th Special Operations Wing (SOW) and the 8th Tactical Fighter Wing (TFW). Under Seventh Air Force, the 14th SOW, formerly the 14th Air Commando Wing (ACW), presided over the evaluation, acquisition, and growth of all gunships operating in SEA, both in South Vietnam (in-country) and neighboring areas (out-country).[1/] On 31 October 1968, however, the AC-130 gunship mission was transferred from the 14th SOW to the 8th TFW.[2/] The transfer was based primarily on the "headroom" problem in the Republic of Vietnam at a time when additional spaces for aircrew members and support personnel were unavailable. This organizational change placed the gunships under the purview of the 7AF/13AF, directly involving the 13AF in gunship activities.[3/] Organization and geographic dispersal of the gunship capability in SEA in late 1969 are illustrated in Figure 5.

Control and Fragging

Figure 6 shows how the gunships were scheduled (fragged) for in-country

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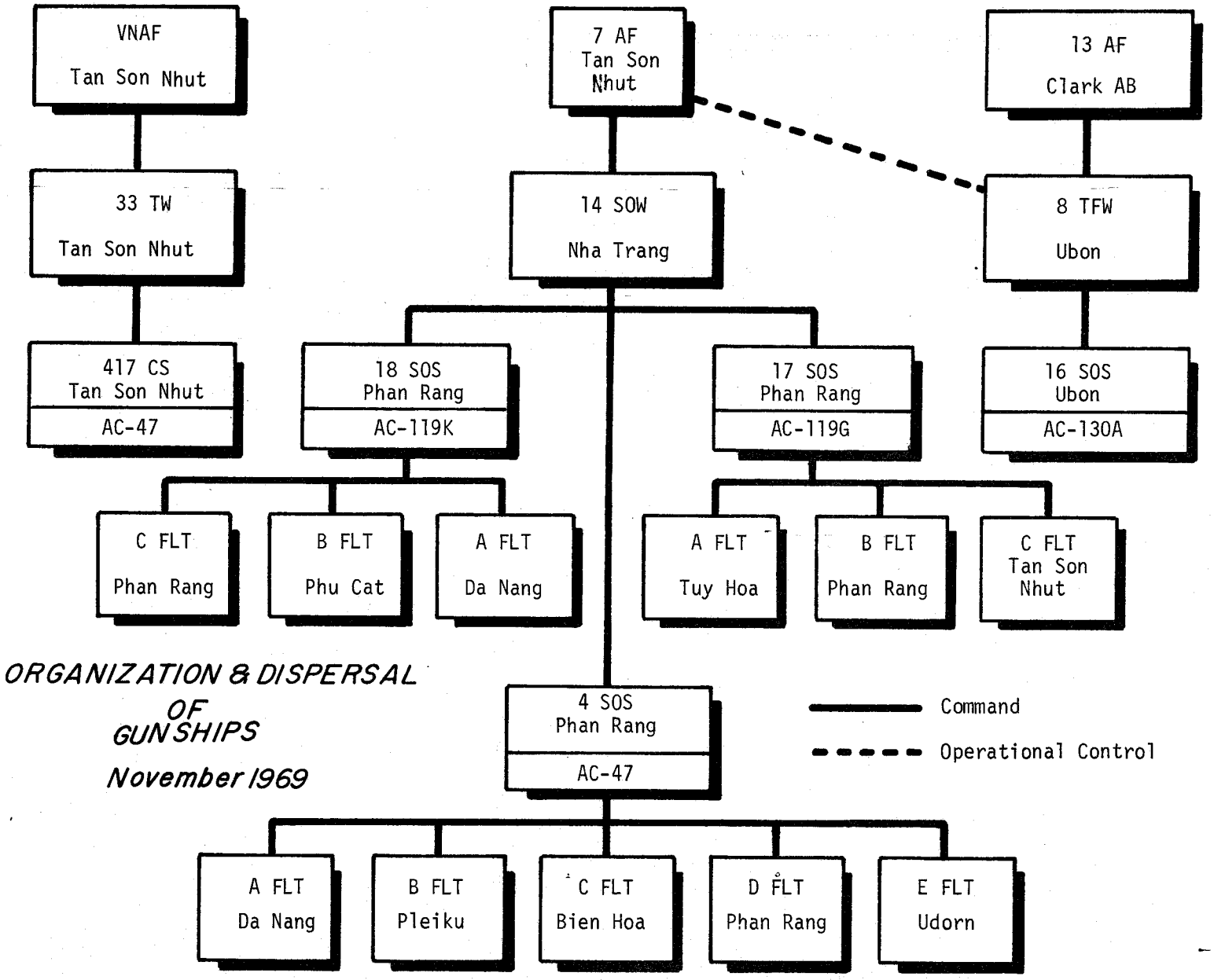

ORGANIZATION & DISPERSAL OF GUNSHIPS

November 1969

FIGURE 5

NOTE: 1. VNAF and USAF gunship effort in-country coordinated in 7AF TACC.
2. USAF gunship effort out-country coordinated in 7AF Command Center (BLUE CHIP).

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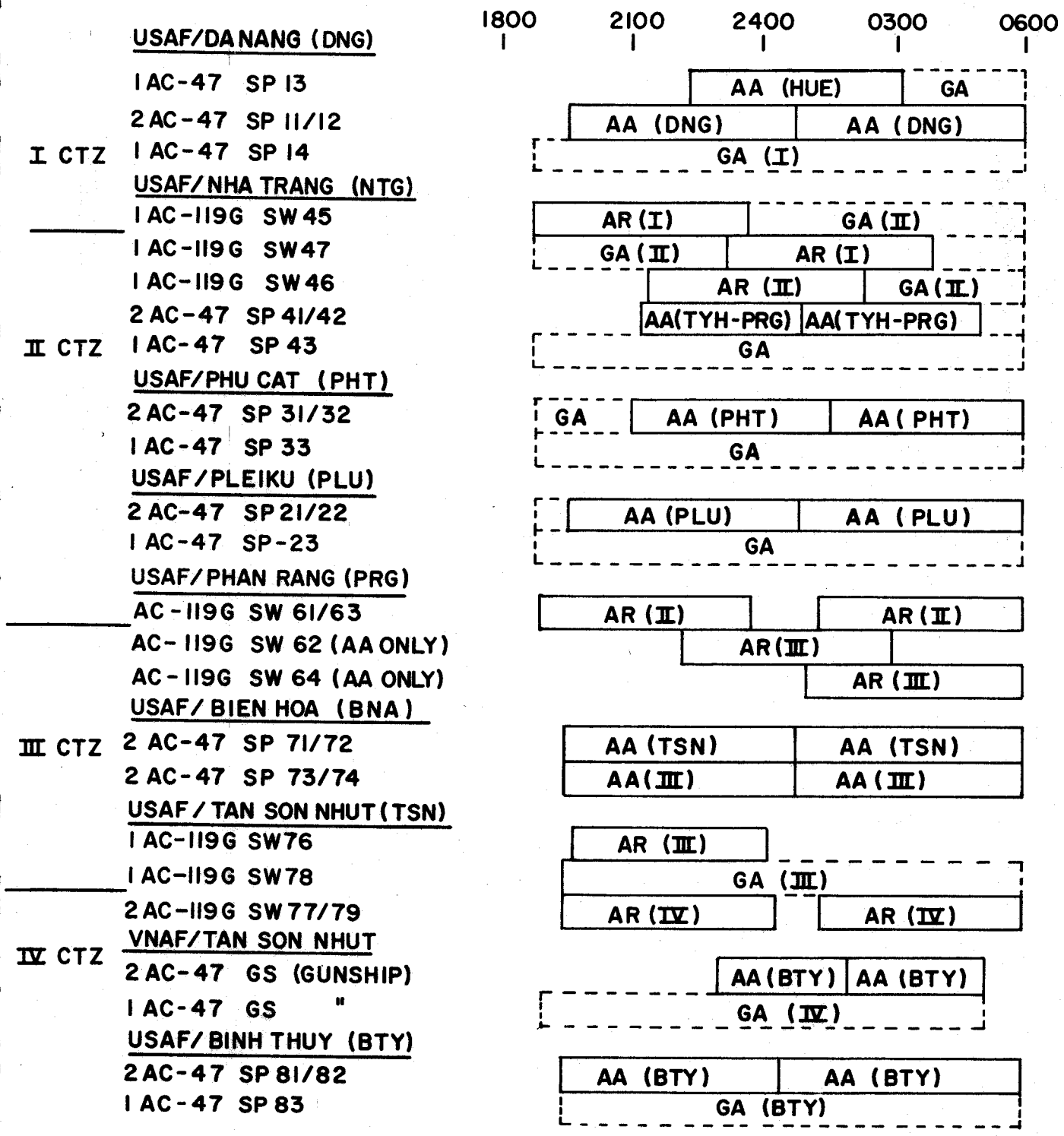
GUNSHIP FRAGS



SP- SPOOKY
SW- SHADOW
AA - AIRBORNE ALERT
AR - ARMED RECCE

GA- GROUND ALERT
GS- GUNSHIP

FIGURE 6

~~SECRET~~

airborne and ground alert in May 1969. All gunships were employed under the direct operational control of the Tactical Air Control Center (TACC) which exerted its control through the Direct Air Support Centers (DASCs) of each Army of Republic of Vietnam (ARVN) corps (Fig. 7). The DASCs were authorized divert and scramble authority to facilitate a faster response to operational requests, though TACC retained veto power. The gunship alert schedule (frag) was published periodically by the Special Operations Branch of the TACC, and was readily adjustable to changing threat situations. There was close coordination with the 14th SOW and the VNAF before any frag change.[4/]

A typical gunship fire support in-country mission began with a request from a friendly unit. The request was directed to the DASC through U.S. Army or ARVN channels. It was granted or denied on the basis of a list of priorities, troops-in-contact being first on the list. Upon approval, a gunship was directed to the target area and contact was established with the ground commander while en route. At this initial contact, the gunship received the following:[5/]

- UTM coordinates and the target.
- UTM coordinates of friendly positions.
- Status of friendly artillery.
- A description of the target so the pilot could locate it visually.
- Type of support desired (flares or firepower).

Upon arrival at the target, the gunship established contact with the engaged ground unit, from which still more information was received before the gunship could fire. If tactically feasible, the friendly position was clearly

marked. If not, it had to be marked in the most accurate manner possible through the use of reference points clearly identifiable from the air such as strobe light, fire arrows, flares, or comparable devices. The enemy position was usually marked by tracer pyrotechnics, white phosphorous, or ground flares. Through use of reference points and "talking in" adjustments, the ground unit relayed additional enemy information such as probable enemy routes of approach and withdrawal. Also, the presence and location of friendly artillery fire and maximum ordinates of this fire above the terrain were essential information for the gunships.[6/] Having received clearance to fire from both the ground commander and the DASC, the gunship usually fired a short burst from one of its guns to confirm it was on target and to minimize the risk of Short Rounds, i.e., hitting friendly units.

The mini-guns of the gunships were most effective against troops in the open. They could saturate a tree line or any other open target. The pilot normally fired within 200 meters of friendly troops but when necessary, he could work as close as 100 meters and closer if the ground commander assumed responsibility for Short Rounds. In some cases, crews have worked "on the wire" and on occasion within a friendly position itself.[7/] One such example occurred in the dark early morning hours of 7 August 1969 when the small CIDG outpost of My Loc, located about eight miles west of Nha Trang AB, RVN, came under VC attack. A Spooky gunship was in the vicinity and arrived at the scene quickly. The aircraft commander later described what followed:[8/]

> *"When I arrived there, the outpost had already been breached. There was the possibility that all its defenders were dead. Within 10 minutes, I was cleared for free fire on the camp itself. This broke*

GEOGRAPHY OF CONTROL

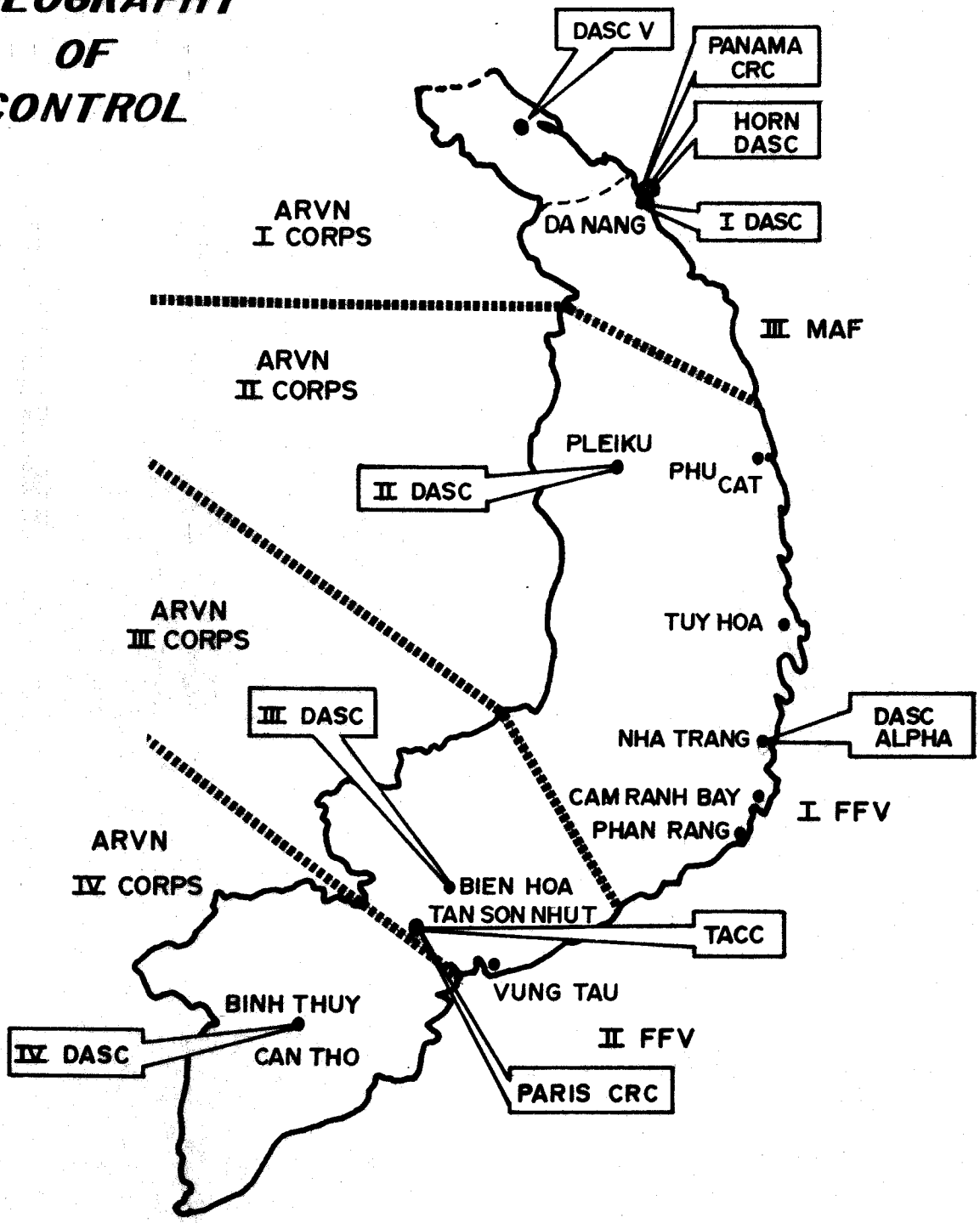


FIGURE 7

the attack; had I been there sooner the attack would have been broken sooner--it's as simple as that. I learned later that the VC had already destroyed two bunkers and there was only one remaining, where the surviving personnel were huddled. This was a typical battle or support mission for us. During the engagement, 65,000 rounds were fired by two Spookies. The enemy in a situation like that simply can't hide from the Spooky; the enemy is saturated with our firepower."

Spooky Employment

In October 1966 in an area approximately 40 miles south-southwest of Da Nang, at Nong Son, AC-47s supported Vietnamese forces during a four-day engagement. The situation presented a classical example of gunship support. Two ARVN battalions requested air support. During the day, Air Force and Marine tactical aircraft hit enemy positions, and at night, the Spooky provided both illumination and firepower. During the four days, the Spooky gunships dropped 585 flares and expended 87,000 rounds of ammunition. The senior U.S. Army advisor to the ARVN 51st Regiment, credited the night gunship support with a major share of the success of the operation: 9/

"Without doubt the AC-47 saved two ARVN battalions from complete annihilation during the period 17-20 October. Their action prevented a Communist overrun and contributed to the maximum KBA."

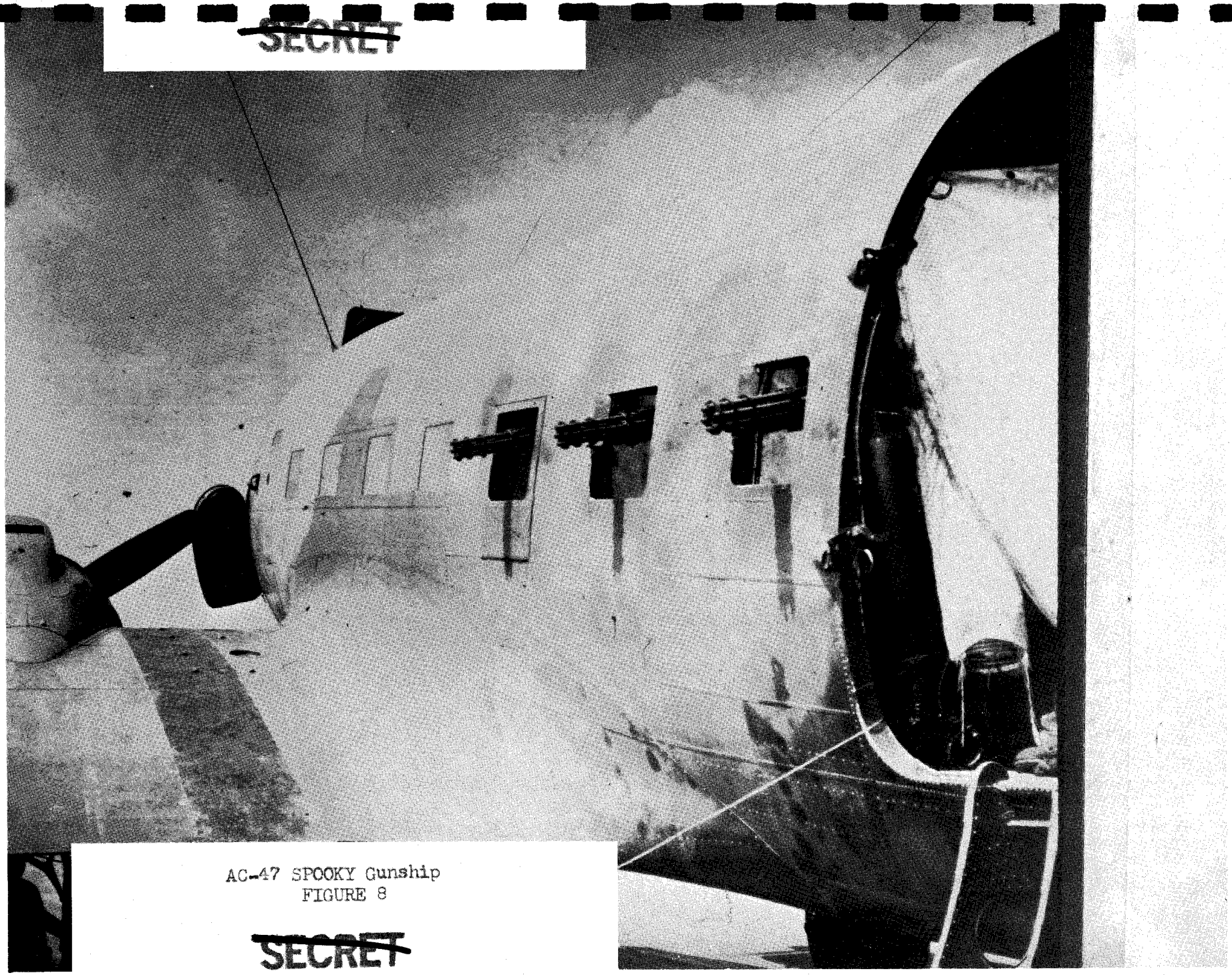
In another instance, the Spooky rose to its own defense when its operating location at Binh Thuy AB, RVN, came under attack on 24 December 1966 by 75-mm recoilless rifle fire. The enemy was surprised to receive Dragonship gunfire on target within minutes after the first round was fired. This very fast reaction prevented major damage to the base. During that night, the AC-47s flew seven sorties, expending 37,555 rounds of ammunition and dropping

276 flares. The combined defenses of U.S. Air Force and Army units caused the attack to fail but gunship support was signaled out as a decisive factor by the Binh Thuy Air Base Commander:[10/]

> *"It is understood from clandestine information sources, that the devastating and accurate firepower of the AC-47 aircraft resulted in several Viet Cong dead and wounded and completely demoralized not only the recoilless rifle crews, but an ambush squad that was in position to ambush friendly forces."*

Another example of air base defense took place on the night of 3 January 1968 when Da Nang AB came under a 122-mm rocket attack in the early morning hours. In a barrage lasting 10 minutes, the enemy lobbed approximately 45 rounds onto the base. An AC-47 on combat air patrol (CAP) over the base spotted the launch sites as the rockets were being fired. After dropping flares, the crew began firing their mini-guns into the positions which were about six miles southwest of the base. The quick action by the gunship crew was credited with shortening the attack and limiting damage to the base.[11/]

Most often the Spooky gunship flew defensive missions of fixed friendly positions. On occasion, its ability to concentrate firepower was used on other targets. One such mission occurred on 1 March 1968, when two AC-47 gunships from Nha Trang worked together with U.S. and Vietnamese naval units to locate and destroy a 700-ton enemy vessel that was attempting to deliver arms and munitions. The gunships fired more than 38,000 rounds into the ship and nearby enemy shore positions. One of the Spooky Commanders, described the action:[12/]



AC-47 SPOOKY Gunship
FIGURE 8

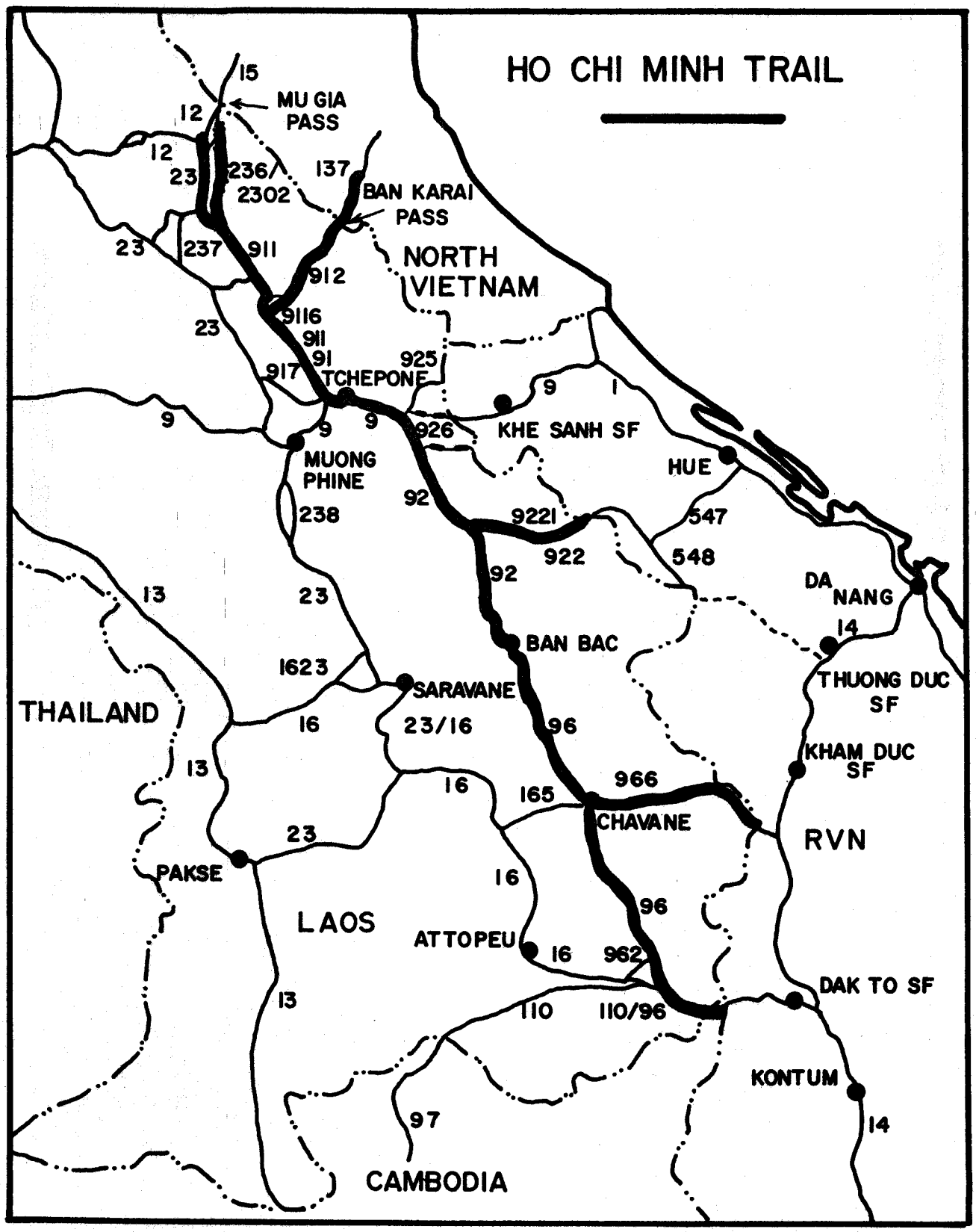

HO CHI MINH TRAIL
MU GIA PASS
BAN KARAI PASS
NORTH VIETNAM
TCHEPONE
KHE SANH SF
HUE
MUONG PHINE
BAN BAC
DA NANG
THUONG DUC SF
KHAM DUC SF
SARAVANE
CHAVANE
RVN
THAILAND
PAKSE
LAOS
ATTOPEU
DAK TO SF
KONTUM
CAMBODIA
15
12
12
23
236/
2302
137
23
237
911
912
23
9116
911
91
917
925
9
1
9
9
9
926
92
9221
922
92
547
548
13
23
14
1623
16
23/16
96
13
16
165
966
23
16
96
16
962
13
110
110/96
97

FIGURE 9

"We had been firing on the ship and it had run aground about 20 yards from shore, a cove about 20-km NNE of Nha Trang in the Khanh Hoa Province. It began burning. In a few minutes, the intensity of the fire had greatly increased. Then it just blew up. It was a spectacular explosion. A fire-ball went 1,000 feet into the air. It was obviously a load of munitions. There was one large explosion and then numerous smaller explosions."

As the first of the gunships, the AC-47 was in many respects the test vehicle. These examples are a small but characteristic sample of Spooky accomplishments in South Vietnam. In late December 1965, the Spooky entered the out-country war flying in the STEEL TIGER area of Laos. The missions in this area were new and two-fold: first, the responsibility of reconnoitering the Ho Chi Minh trail (Fig. 9); and second, to assist in the interdiction of trail traffic by controlling strikes by other aircraft and striking with the AC-47 itself.[13/]

In many respects, the efforts of the AC-47 in this new role were considered excellent. The out-country missions began on 17 December 1965 and were ended on 20 July 1966. Despite the difficulties and limitations of a small calibre weapon, 243 enemy trucks were destroyed or damaged during that time.[14/] This record was achieved by an average of 10 aircraft and 13 crews operating out of Da Nang, Pleiku, and Ubon. In less than a six-month period, the gunships involved in the night interdiction missions sustained combat losses of 4 aircraft and 27 combat crew personnel. None of the aircraft or crews were recovered. If projected through a 12-month period, these losses would have reflected an 80 percent loss of aircraft and 6.5 percent combat attrition of personnel. This loss rate was considered unacceptable by 7AF and the AC-47s were

withdrawn from the out-country missions.[15/]

The Laos experience of the AC-47 expanded understanding of the scope of gunship capabilities and limitations. The adverse operating factors in this environment explained the withdrawal decision and provided references for future gunship development in design and tactics:[16/]

- Slow speed of the aircraft.
- The type of predictable attack maneuver employed.
- The inability to effectively take evasive action.
- Mobility to operate safely in mountainous terrain.
- Combat exposure time for crews (approximately 800 hours of night combat per crew in a 12-month period).

In 1969, the Spooky returned to Laos, this time for use in a defensive mission rather than interdiction. Between 1 January and 15 May 1969, Royal Laotian forces lost 34 major operational or support bases (Lima Sites) in northern Laos (BARREL ROLL). (Fig. 10.)[17/] This marked a critical turn for the worse in the Laotian war. Planners sought ways to neutralize the increased North Vietnamese and Pathet Lao pressures advanced toward the pro-government Meo strongholds around the Plaine des Jarres. With the Government forces becoming fragmented, Prime Minister Souvanna Phouma acted to avert a crisis and ordered a counter-offensive to retake lost ground. Maj. Gen. Vang Pao, the Meo Commander of Military Region (MR) II, (Fig. 11) launched a "successful counter-offensive which made substantial gains of territory and captured several thousand tons of enemy supplies, including twelve 37-mm antiaircraft guns."[18/]

Prior to his skillful counteroffensive in March 1969, Gen. Vang Pao met

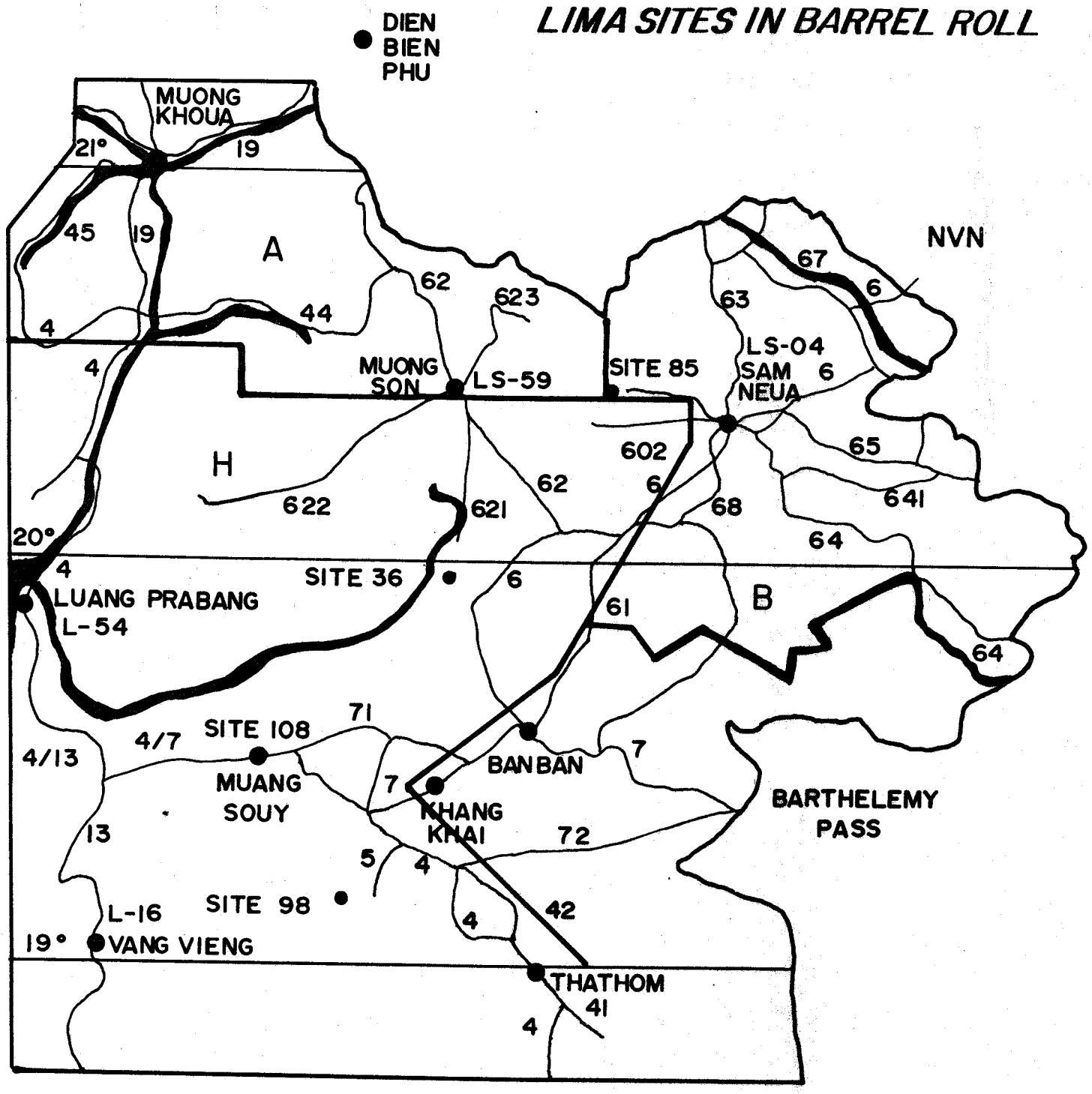

LIMA SITES IN BARREL ROLL
DIEN BIEN PHU
MUONG KHOUA
21°
19
45
19
A
4
44
62
623
4
MUONG SON
LS-59
SITE 85
NVN
67
6
63
LS-04
SAM NEUA
6
H
602
65
62
6
622
621
68
641
20°
64
4
SITE 36
6
LUANG PRABANG
L-54
61
B
64
71
SITE 108
4/7
4/13
BANBAN
7
MUANG SOUY
7
KHANG KHAI
BARTHELEMY PASS
13
72
5
4
L-16
SITE 98
42
4
19°
VANG VIENG
THATHOM
41
4

FIGURE 1C

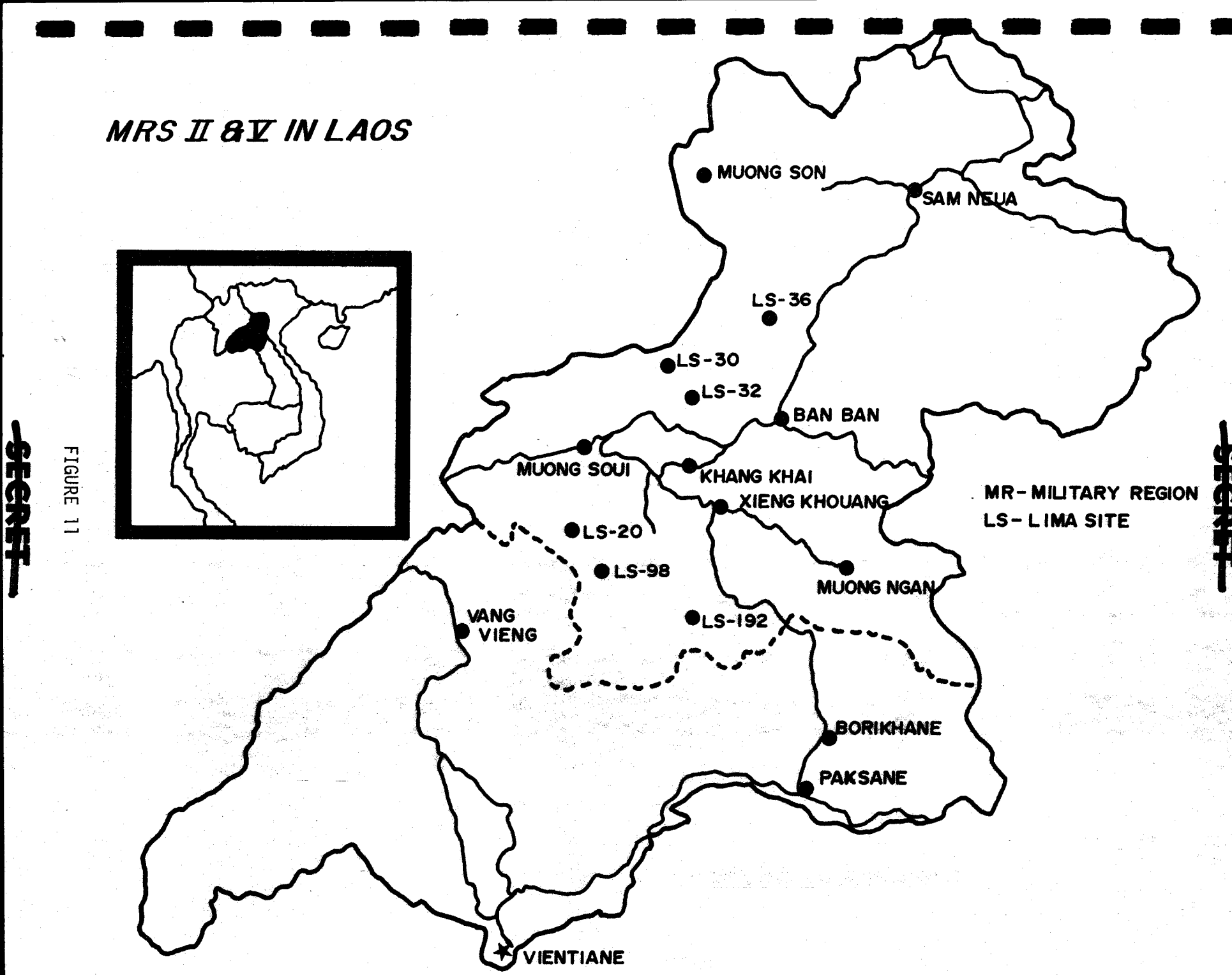

MRS II & V IN LAOS
MUONG SON
SAM NEUA
LS-36
LS-30
LS-32
BAN BAN
MUONG SOUI
KHANG KHAI
XIENG KHOUANG
LS-20
LS-98
MUONG NGAN
VANG VIENG
LS-192
BORIKHANE
PAKSANE
VIENTIANE
MR - MILITARY REGION
LS - LIMA SITE
SECRET
SECRET

FIGURE 11

at his headquarters with Col. William H. Ginn, USAF Deputy Director for Operations (DCO), of the 14th SOW at Nha Trang to discuss the utilization of Spooky gunships for night close air support (CAS) in support of his operations. At first, the General was skeptical in spite of Colonel Ginn's confident remark, "General, you have lost your last Lima Site."[19/]

Acting upon the request of 7AF/13AF, 7AF, in mid-March, assigned Spooky gunships to Udorn RTAFB, Thailand, with "the basic mission of the defense of friendly force Lima Sites in the BR operating area of Laos (North of 18° 39'). Spooky missions, in the primary sense, will be close air support."[20/]

Intelligence concerning LIma Sites under attack originated from Controlled American Sources (CAS) or the Air Attache (AIRA) channels in Vientiane. Unlike the in-country procedure where the DASCs were authorized to divert or scramble gunships, the decision to launch or use Spooky in the defense of a Lima Site was the sole prerogative of BLUE CHIP (out-country control agency at Headquarters 7AF). Close air support missions were under the control of the gunships in Laos through ALLEYCAT, the night time orbiting Airborne Battlefield Command and Control Center (ABCCC). (Fig. 12.)[21/]

The Spooky protection of the Lima Sites provided one of the best examples of close air support in Southeast Asia.[22/] The reason may be found in the nature of the targets the enemy provided to the gunship. When the enemy was on the offensive, the Spooky targets were troop concentrations in or around the Lima Sites. The Pathet Lao and the North Vietnamese Army (NVA) traveled mainly on foot, but truck and armored personnel carriers (APC) were increasingly used. Enemy weapons included 105-mm recoilless rifles, 87-mm mortars, and AK-47 automatic

rifles. When under attack, friendly troops were confined to the interior of the Lima Site. The enemy tended to stay massed in several groups around the main Lima Site or one or more of its outposts. The enemy offensives were conducted during the dry season of the northeast monsoon (November to April) and terminated with the advent of the wet monsoon (May to October). The Government forces had the advantage during the wet season, and began their offensive operations to retake the sites lost during the previous dry season. Thus, whether defending or attacking Lima Sites, the gunships found enemy troops in the open "with no place to hide."[23/]

The Spooky operation in BARREL ROLL was considered successful by every intelligence measure. AC-47 gunships were the primary means available to friendly forces and Gen. Vang Pao to withstand NVA attacks at night. The nightly presence of the gunship frequently broke up assaults against the vital Lima Sites and compensated for the great differences in numerical strength. According to U.S. field observers, without gunship support, the Lima Sites in the area north of the Plaine des Jarres would have fallen, thus removing the last vestiges of Royal Laotian Government (RLG) control.[24/]

Headquarters 7AF/13AF observed that prior to employment of the AC-47 in BR, it appeared the enemy was able to evade tactical air attack by operating in small bands during the evening hours. After the arrival of Spooky on 11 March 1969, however, experienced observers believed enemy units poised for attack at key Lima Sites had been attrited and kept in imbalance, so that despite superior numbers, they had been unable to overrun any one of those critical outposts.[25/]

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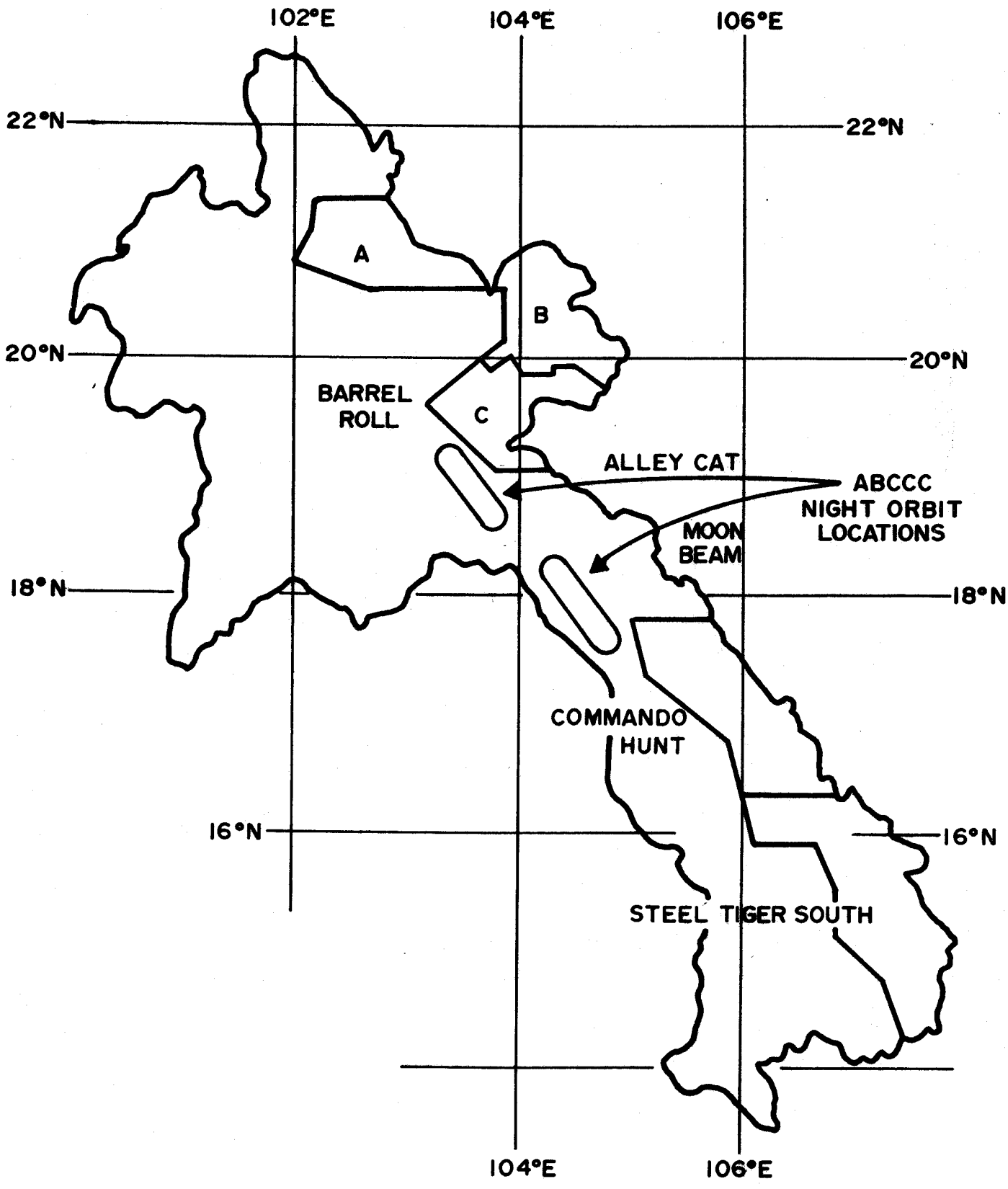

FIGURE 12

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"In summary, we feel that this year's [1969] enemy threat was so great that utilization of the gunships was the deciding factor in averting the entire collapse of the friendly paramilitary structure north of the Plaine des Jarres and has also served as a brake to an all-out enemy thrust into the Meo heartland south of the PDJ. The continued use of these gunships may cause the enemy to abandon or reduce his offensive objectives."

Realizing the value of the gunship, Gen. Vang Pao called for demonstrations in July 1969 for his leaders and gave them the widest possible publicity.[26] His guerrillas developed, like himself, a complete faith in the reliability of the weapon system.[27] Wherever the gunship operated, whether at Duc Lap or a Lima Site in Laos, the psychological effect on both friendly and enemy forces was frequently reported. The 7AF "Weekly Air Intelligence Summary" (WAIS) reported:[28]

"...The mere presence of Spooky has become a tremendous psychological factor in the war due to the primitive animistic thinking of the people. When the enemy sees the AC-47 in operation, he reportedly believes 'the sky dragon is angry.' The psychology has worked in reverse on friendly troops who have become more tenacious in Lima Site defense and aggressive on patrols."

The success of the Spooky in Laos prompted a program of conversion of Royal Laotian Air Force (RLAF) C-47s to AC-47 configuration. In August 1969, the program called for the modification of 8 aircraft. In lieu of this, 5 AC-47s were transferred from the VNAF to the RLAF on 5 July 1969, when the VNAF received AC-47s from the USAF 3d SOS. Lt. Col. Alan F. Crites, "E" Flight Commander, 4th SOS, at Udorn RTAFB was involved in teaching the AC-47 gunship

mission to Laotian pilots. He stated the crews were highly motivated, well-trained, and learned quickly. They were eager to go on their own. This training was, of course, in addition to the training given by the TAC Military Training Team from the Special Operations Force, Eglin AFB, Florida.[29/]

Shadow Employment

In response to the need for increased gunship coverage in RVN, the Air Force authorized the deployment of two squadrons of AC-119s. Each Squadron was planned to possess 16 Unit Equipment (UE) aircraft plus two Not Operationally Active (NOA). The additional gunship squadrons were programmed for assignment to the 14th SOW at Nha Trang.[30/]

The first of these AC-119 squadrons was formed from the Air Reserve element based at Bakalar AFB, Indiana. The training was accomplished at Lockbourne AFB, Ohio, by the 4413th Combat Crew Training School of the 4410th Combat Crew Training Wing, Special Operations Force. The C-119G Flying Boxcars of the 71st were modified by the addition of four 7.62-mm side-firing Gatling guns and the several highly sophisticated sighting and fire control systems listed in Appendix I. The old "Boxcars" became the AC-119G Shadow gunships.[31/]

The first increment of the 71st arrived at its Nha Trang headquarters in mid-December 1968, and the first operational sortie was flown on 5 January 1969. From that date until 8 March, Gunship III, AC-119G, received its combat evaluation.[32/]

Another version of the aircraft, the AC-119K, joined the 14th SOW in late 1969, and was assigned to the 18th SOS. The AC-119K was equipped in the same

AC-119G carrying four 7.62-mm Gatling guns using improved SUU-11A/A. Gunpoints are equipped with flame suppressors.

FIGURE 13

manner as the G model, but with additional capabilities. The extra equipment included two 20-mm M61A1 guns, a side-looking infrared sensor, a beacon-tracking radar, a Doppler computer, a radar altimeter, long-range navigational equipment, terrain following radar, radar homing and warning (RHAW), and auxiliary jet engines. Each of the AC-119s was designed to carry 32,000 rounds of 7.62-mm mini-gun ammunition and the K model was designed to carry in addition, 3,000 rounds of 20-mm ammunition.[33/]

The Shadow G evaluation began with the first night operational mission on 5 January 1969, with only four aircraft in the theater. Additional aircraft and aircrews arrived throughout the evaluation period. By 7 February 1969, all aircraft were in the theater and dispersed among Tan Son Nhut, Phan Rang, and Nha Trang. The 71st SOS (redesignated 17th SOS when USAF Reserve personnel redeployed to CONUS) was under the command and control of 7AF and its missions were fragged to satisfy the command's combat requirements.[34/]

During an evaluation in which priority was always given to troops in contact, the aircraft performed five types of missions: armed reconnaissance, combat air patrol, forward air controller, close air support, and interdiction:[35/]

> Armed Reconnaissance Operations: AR missions were conducted in assigned "Boxes" (Shadow Boxes), many of them located adjacent to the Cambodian Border near the cities of Kontum and Pleiku (Fig. 15). A box was an area in which unrestricted search was permitted.
>
> Combat Air Patrol: Aircraft were placed in an airborne status orbiting at a specified TACAN fix or an over water area. Target assignments were ordered through the DASCs.
>
> Forward Air Control: Shadow Gs were sent on out-country missions to use their detection equipment to locate targets and then became

the FACs for fighter strikes against those targets. The area of operation was Routes 110 and 96 in southern Laos. (Fig. 15.)

Close Air Support:

Illumination: The aircraft were also used for illumination of TIC and base perimeters. This included use of the illuminator white light and/or dropping flares. Also, illumination was used for Med-Evac support and supply drops. (Illumination for tactical fighter aircraft was also an important role for all gunship types.)

Troops-in-contact: The weapon was used to provide fire support to ground forces. Reaction time depended on distance to the target and whether it was launched from a ground alert or a CAP mission. Firing was most often at 3,500 feet and in some cases at 2,500 feet. The NOD was the primary method of acquisition for firing in the automatic or semiautomatic mode. On some missions, the manual mode was used.

Interdiction: These locations were detected during reconnaissance operations and classified as suspected enemy locations (SEL) or targets assigned by a controlling agency as an area of possible enemy positions. Most of these targets were located near the cities of Pleiku and Kontum near the Cambodian Border. Another common location was the A Shau Valley (Figure 15).

The results of the evaluation labeled the AC-119G aircraft as capable of performing its assigned missions. Only a few limitations were noted, namely, the weight configuration limited the aircraft mission time to five or six hours, and the aircraft did not possess an all-weather capability, insofar as target acquisition equipment was concerned. Like the Spooky, it was severely limited by ground fog and haze conditions.[36/]

Of the five subsystems, only one performed marginally. The illuminator was effective when it was operable, but from a maintenance point of view, it had to be judged unreliable.[37/]

AC-119K STINGER (SHADOW K) modified with two jet engines and carrying 7.62-mm mini-guns.

FIGURE 14

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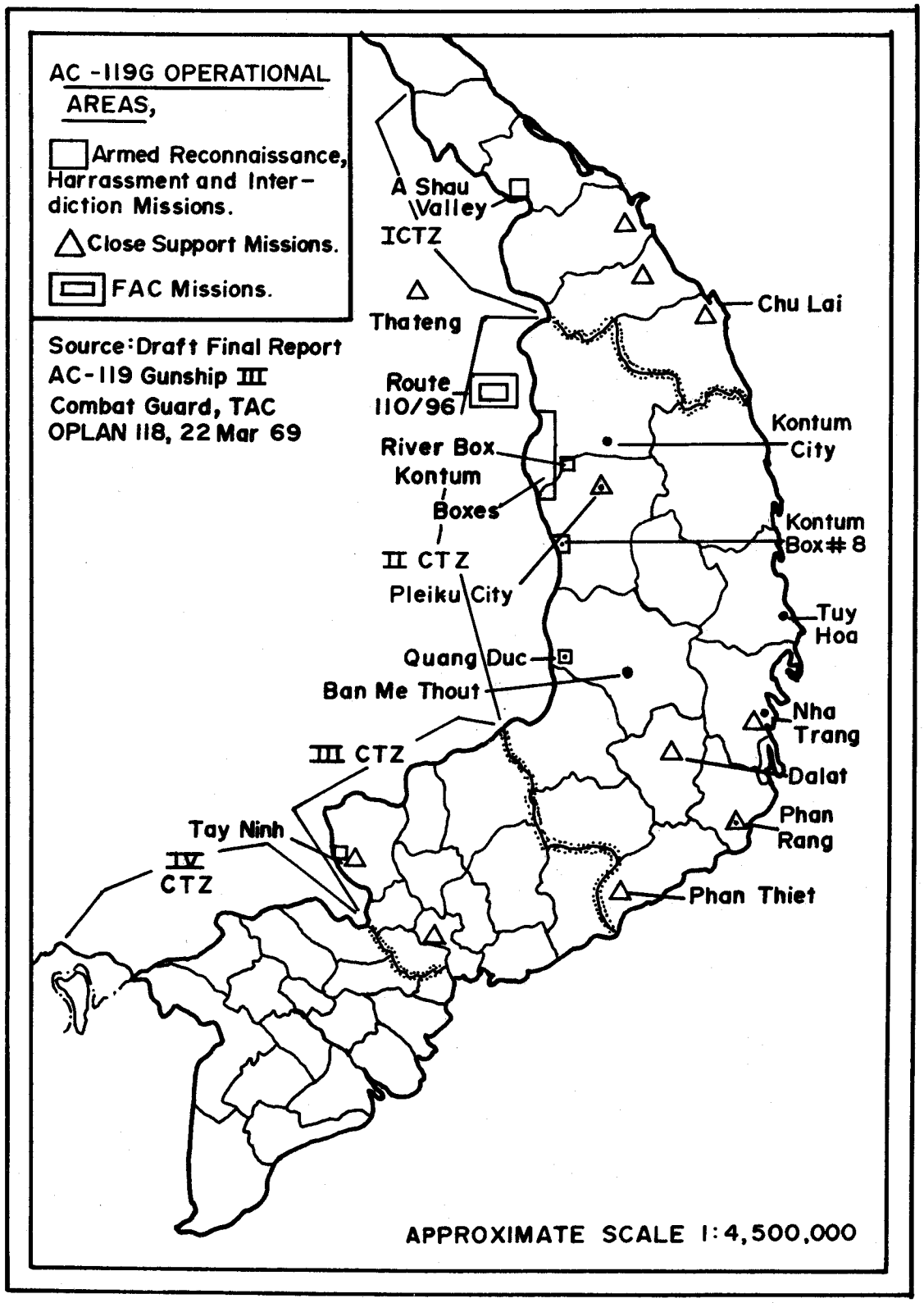
RVN PROVINCIAL BOUNDARIES AND CORPS TACTICAL ZONES



MAP OF OPERATIONAL AREAS

FIGURE 15

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As a weapon system, the Shadow G also gave a satisfactory performance in all its five types of missions. All of its roles were performed in a low threat to moderate threat combat environment.[38] However, there were some problem considerations offered by Col. Conrad S. Allman, USAF, Commander of the 14th SOW, from 18 March 1968 to 5 March 1969, in his End-of-Tour Report. The AC-119Gs were employed as part of an interdiction program to fly Air Force missions along infiltration routes in Laos, provide illumination, and serve as FACs for fighter strikes. He noted that although the aircraft was capable of performing the reconnaissance mission and marking targets with flares and ground markers, the use of the AC-119 as a FAC was proved marginal and in some cases a dangerous operation. To properly and safely direct a fighter strike on target and adjust ordnance delivery, the FAC had to be maintained in an orbit which would provide constant target acquisition and keep the fighters in sight during their attack profile. Noting that the size and speed of the Shadow G made it impossible to maintain either constant target acquisition or constant visual contact with the fighters, Colonel Allman recommended discontinuance of its use as a FAC.

Also, although the Shadow G demonstrated its ability to attack truck traffic, the 7.62-mm mini-guns were not effective beyond 3,500 feet slant range. As a result, the aircraft was well within the effective envelope of hostile ground fire, which was not a "permissive environment for aircraft survival."[39] Here Colonel Allman recommended adequate fighter cover to provide suppressive fire-power against small arms (SA) and AAA positions.

The pattern of Shadow activities was in many respects comparable to those

described for the Spooky gunships. For example, a Shadow crew out of Nha Trang provided a successful defense of a U.S. Army unit pinned down by the enemy. The situation seemed hopeless before arrival of the Shadow at the scene. When the fight ended, the ground unit radio operator called the gunship. "Thanks a lot, Shadow. You made my trip home possible."[40/]

In another instance, a Shadow caused 80 secondary explosions at a suspected enemy troop concentration and storage area north of Pleiku AB. Later, the Shadow was directed to an outpost near Dak To when the ground unit asked for flares and for illumination from the 1.5 million candlepower light. The outpost had been receiving mortar fire and enemy troops were reported trying to probe the outpost's perimeter. The enemy withdrew under the glare of the Shadow flares and illuminator.[41/]

The Shadow G combat evaluation from 5 January to 8 March 1969 provided indicators on utilization of the weapon system and its ability to perform the Pacific Air Forces (PACAF) gunship mission in SEA. During the test period, the 71st SOS (later the 17th SOS) was still in the process of acquiring its full complement of aircraft. This factor must be considered when examining the following statistics:[42/]

SHADOW COMBAT EVALUATION STATISTICS
5 Jan - 8 Mar 1969

Total Aircraft (UE)	16
Sorties Scheduled	432
Sorties Flown	424
Scheduled vs Flown Sorties (Percentage)	98
Sortie Cancellations:	
- Maintenance	4
- Operational	4
Air Aborts	18
Late Takeoffs	12
Sortie Type:	
- Operational	351
- Orientation	27
- Deployment	15
- Functional Check Flights (FCF)	13
- Administrative (Mission Support)	18
Total Flying Time	1,783.9
Sortie Rate* (UE)	.6
Operational Sorties Aborted	16
Successful Operational Sorties	335
Successful Operational Sortie Flying Time	1,664.6
Average Operational Sortie Duration	4.9
Targets (Total Number)	589
7.62-mm Expended	2,818,456
MK-24 Flares	2,793 (490 duds)
MK-6 Smoke Flares	354 (5 duds)
Ground Fire Reported	86
Ground Fire Hits	1
Harassment and Interdiction	371
Close Air Support	73
Armed Reconnaissance	109
Combat Air Patrol	26
Interdiction (Out-Country)	10

*Excludes FCF and deployment flights; .6 sorties per day per aircraft based on an average of 10.6 aircraft possessed per day.

FIGURE 16

Lt. Col. Thomas J. Sobieski, Gunship Officer and Shadow pilot in the 14th SOW, referred to the AC-47 as a defensive weapon but to the AC-119 as an offensive weapon as well. Though it was used for TIC, base defense, CAP, and other missions known to Spooky, the Shadow was equipped with a NOD and an illuminator which provided infrared and white light. These capabilites gave the Shadow a means to perform armed reconnaissance and to some extent interdiction roles.[43/]

Spectre Employment

The Gunship II weapon system, using the AC-130A, was developed to achieve a more effective night close air support capability through the marriage of selected night and all-weather sensors and the side-firing Gatling guns in an integrated weapon system. The Gunship II program sought also to evaluate the capability of the system in an interdiction role along lines of communications (LOCs).[44/]

The first of two combat evaluations of the Spectre in SEA was conducted in three phases from 20 September to 1 December 1967 by the evaluation task force based at Nha Trang AB, RVN. The first phase was accomplished in the IV Corps Tactical Zone (CTZ) area near Binh Thuy with emphasis on CAS from an airborne alert posture. The second phase centered in the TIGER HOUND area and tested the system's capability against enemy LOCs. The third evaluation phase was conducted in the II CTZ again in support of ground forces and firing on selected enemy locations (SELs). Some armed reconnaissance was flown during this phase, also.[45/]

Though limited to some extent by the weight of the weapon system components, the C-130A proved able to perform the Gunship II mission. The various weapon system components themselves proved capable of night operation in the close

support, interdiction, and armed reconnaissance roles; only the APS-42 navigation radar proved to be inadequate, since it had no terrain-following feature for an environment where terrain, altitudes, and weather conditions required this capability.[46/]

By February 1968, the Gunship II Final Report had been completed. In a message to the CSAF, Gen. John D. Ryan, CINCPACAF, summarized the results of this evaluation and provided views on the future of the gunship in SEA:[47/]

> *"...Recent highly successful combat evaluation Gunship II favors AC-130 as logical replacement for AC-47. AC-130 possesses needed capabilities as follows:*
>
> *. Speed (rapid reaction, area coverage, minimum exposure).*
>
> *. Sensors (locate enemy and friendly positions, deliver accurate firepower).*
>
> *. Increased payload (essential to carry increased firepower, sensors, armor).*
>
> *"Further advantages of C-130 are superior performance/flexibility, worldwide maintenance/supply support, contemporary navigation systems, established pilot training; schools and post-hostility airframe reconversion potential.... Gunship II C-130s should not be considered at expense of current and projected airlift assets. New production C-130 aircraft appears warranted in view recent mortar attacks on forward installations. Requirement for 32 UE AC-130 gunship force...considered urgent as it provides most effective reaction capability against attacks on installations.*
>
> *"...Recommend reconsideration C-130 as follow on gunship for AC-47 on one-for-one basis."*

On 27 February 1968, the Gunship II task force returned to SEA for a second combat evaluation which ended on 14 May 1969. The test aircraft was based at Ubon RTAFB, Thailand, and attached to the 14th SOW. Forty-three combat missions were flown over the trails of Laos with impressive results: "212 vehicles

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AC-130A
FIGURE 17

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destroyed, 107 vehicles damaged, 26 large explosions, 874 vehicles sighted, 634 trucks fired on, and 315 results not visible."[48]

After the completion of its second combat test, the Spectre remained at Ubon until 14 June 1968, when General Momyer, Commander, 7AF, ordered it to deploy to Tan Son Nhut to lend support for the expected third phase of the enemy TET offensive. Still assigned to the 14th SOW, its operations in the RVN at this time were primarily interdiction of enemy boat, sampan, and truck traffic on rivers, canals, and roads. On missions in all parts of Vietnam, the aircraft possessed a versatility far exceeding the capabilities of its sister gunships the Spooky and the Shadow G. It made extensive use of its sensor systems. On three occasions, it performed special missions in the DMZ searching for enemy helicopters. Frequently, it provided CAS for TIC situations and found its 20-mm Gatling guns extremely effective against personnel.[49]

On 31 October 1968, the 16th SOS was organized and placed under the operational command and control of the 8th TFW at Ubon RTAFB.[50] With this action, the test and experimental status of the AC-130A Gunship II Spectre ended. For the first time, a gunship squadron existed outside the jurisdiction of the 14th SOW. However, on that date, the new squadron possessed only the original test aircraft which was still serving requirements in South Vietnam at Tan Son Nhut. In November and December 1968, four Spectres out of a programmed eight arrived at Ubon, and the squadron began flying missions in Laos. The prototype Gunship II at Tan Son Nhut was sent back to Ling Temco Vought (LTV) on 15 November for modifications to a standard production model.[51]

The mission statement of the new squadron was succinct and encompassing:[52]

> *"To provide firepower offensively and defensively in support of USAF combat support activities and other U.S. sponsored activities in SEA. The 16th Special Operations Squadron may deploy to and maintain continuous alert posture at operating locations /OLs/ at designated bases in its area of responsibility."*

The 7AF OPORD 543-69 required that all airborne firepower support requests be accomplished on a priority basis. The priorities were established to take advantage of the more sophisticated equipment, the 8,000 foot effective slant range of the 20-mm weapons, and the need for a reasonable margin of safety:[53]

Priority 1: Night interdiction and armed reconnaissance to destroy wheeled or tracked vehicular traffic on roads and sampans on waterways.

Priority 2: Night interdiction of targets which have been bombed and then hit with fire suppression missions.

Priority 3: Close fire support of U.S. and friendly military installations, including forts, outposts, and strategic towns and cities.

Priority 4: Search and Rescue support.

Priority 5: Offset firing in support of troops in contact utilizing aircraft radar and ground beacons.

Priority 6: Perform daylight armed escort of road and offshore convoys.

Priority 7: Harassment and interdiction missions.

All AC-130 gunship missions were directed by fragmentary orders from 7AF in the same manner as described for the Spookies operating in Laos. Unlike in-country gunship scheduling, BLUE CHIP published out-country frags daily.[54]

The effectiveness of the Gunship II weapon system became increasingly evident during the first three months of 1969. Though various operations were conducted in most areas of Laos, the most significant effort was interdiction. The Spectre BDA for the period of 1 January to 31 March 1969 in Figure 18 shows at a glance the combat activities of the squadron.[55/]

In the month preceding this first quarter of 1969, the Spectre had demonstrated its ability to perform in the defensive role so well-known to the Spooky and to the Shadow G. For four nights, under the direction of the ABCCC, Spectres provided firepower in support of a friendly Lao town, Thateng. Intelligence sources indicated the Spectres thwarted a strong assault on the town. Supplying illumination (flares) and fire support, the AC-130A gunship caused a large fire and a very large explosion. Estimated results for the first two nights of the four-night operation accounted for an estimated 240 KBA; the siege was broken without the town being overrun. The Spectres providing the support fired a total of 16,200 rounds of 20-mm and 16,500 of 7.62-mm.[56/]

Because of increased pressure on major enemy LOCs in Laos, the enemy had steadily increased its antiaircraft artillery (AAA) threat. As early as June 1968, the increased concentration of 37-mm guns had made many lucrative areas too dangerous for the AC-130. The vulnerability of the Spectre over the road network of Laos at that time had been described in a message from the 14th SOW to 7AF:[57/]

> *"...Where there are trucks there are very many 37-mm positions. This aircraft has flown 57 sorties over the trails and has been fired at on 56 missions. The average number of rounds being 60 with a high of 400. No attempt has*

been made to keep track of the ZPU (automatic weapons-/AW/ fire. It has been heavy on nearly all missions but the 5,000 foot altitude offers security from AW. The mode of attack of the AC-130--the left-hand orbit at 5,000 at 145 knots makes it particularly vulnerable to 37-mm or higher caliber. In an area with radar controlled AAA the system could not survive....Recommend that Gunship II be utilized on a more permissive environment and avoid the intense 37-mm fire in Laos until a flak suppression effort is made with systems and ordnance suitable to the mission."

In late December, the 497th Tactical Fighter Squadron (TFS) of the 8th TFW was assigned to perform armed escort and flak suppression for the Spectre. This action permitted the "truck killer" to work deeper in the high-threat areas and remain there longer.

From there on, the AC-130s were escorted by F-4s whose mission it was to suppress any offending gunsite. When the ground batteries opened fire on the gunships, the fighter escort circling above, behind, and generally to the right of the AC-130 rolled in to attack the position. In many instances, the F-4 Wolf Pack crews would see the AAA fire before the gunship and if so would call the gunship for clearance to attack. That clearance was not always immediately forthcoming because evasive action of the Spectre to escape AAA fire obstructed the attack path of the fighter. The fighter escort maintained visual contact on the gunship throughout the mission by means of the AC-130 formation lights on top of the wings. "The AC-130 wasn't designed to engage in 'duels' with enemy AAA forces and was able to use the F-4 escort most effectively for gun suppression."[58/]

The figures presented in Appendix II are impressive in themselves for the first three months of the squadron's existence. In early May 1969, the

BATTLE DAMAGE ASSESSMENT

Spectre BDA - 1 Jan 69-31 Mar 69

ITEM	JAN	FEB	MAR	TOTAL
Missions Fragged	65	81	99	245
Missions Flown	63	73	89	225
Air Aborts	3	7	4	14
Ground Aborts	2	3	11	16
Trucks Sighted	542	618	693	1,853
Trucks Destroyed	105	210	292	607
Trucks Damaged	115	138	98	351
Truck, RNO	140	181	226	547
Boats Sighted	1	22	0	23
Boats Destroyed	1	10	0	11
Helicopters Sighted	0	0	4	4
Helicopters Destroyed	0	0	0	0
Troops-in-Contact	8	2	3	13
Secondary Fires	126	421	630	1,177
Secondary Explosions	182	514	805	1,501
20-mm Expended	237,436	376,652	312,147	926,235
7.62-mm Expended	31,221	344,621	324,594	700,436

FIGURE 18

American Embassy in Vientiane advised the Secretary of State,[59] "We consider the experiment an unqualified success and would urge on the basis of our experience that additional C-130s be configured as gunships ASAP."

Seventh Air Force was equally impressed with the Spectre's performance:[60]

> *"The contribution of the AC-130 gunships to the air interdiction campaign in Laos has been truly magnificent. During the period from January through April, the Spectre accounted for over 29 percent of the total destroyed and damaged trucks in Laos while flying less than 4 percent of the total sorties used to attack moving vehicles. The results for April alone were even more impressive with the Spectre accounting for over 44 percent of the destroyed/damaged trucks while flying only 3.7 percent of the sorties. The 1,400 plus trucks destroyed or damaged by the Spectre during the past four months have had a significant impact on the enemy's ability to sustain his forces in South Vietnam and southern Laos and were certainly a major factor in limiting the magnitude of the NVA's northeast monsoon offensive...."*

To some extent, the fighter escort BDA for the same period provides an index upon which qualitative judgments of its role might be fairly made:[61]

AC-130 GUNSHIP FIGHTER ESCORT BDA

	11 Jan 69 to 28 Feb 69	Mar 69	Apr 69
37-mm DESTROYED	19	26	18
37-mm SILENCED	23	16	20
SECONDARY EXPLOSIONS	166	393	367
LARGE FIRES	287	482	383
ROAD CRATERS	2	1	0
TRUCKS DESTROYED	10	4	12

Seventh Air Force OPlan 544-69, COMMANDO HUNT, called for an intensified interdiction campaign in Laos for the 1968-1969 Northeast Monsoon Season. This campaign had two primary objectives:[62]

1. Reduce the logistical flow by substantially increasing the time required for the enemy to transmit supplies into South Vietnam.

2. Destroy enemy trucks and caches of military supplies along the routes leading into South Vietnam.

The F-4s, B-57s, A-26s, A-7s, A-1s, and AC-123s (App. II) were used in the COMMANDO HUNT interdiction campaign. Of these, the COMMANDO HUNT report stated night-fighting Spectres and their escorts working in relatively low-threat areas and along the less defended routes "were the most potent truck-killing force used."[63] The Self-Contained Night Attack (SCNA) gunship had come into its own, a unique tactical air weapon in a unique conflict, where night and stealth were no longer an invulnerable combination of the enemy (Fig. 19). The sophisticated multi-sensor covert detection devices of the gunships were able to net the "fish" in the murky darkness. Mao Tse-Tung wrote, "The ability to run away is the very characteristic of the guerrilla."[64] The saturating ordnance of the Spectre gunship helped make Mao's statement less than axiomatic.

By May 1969, the enemy responded to the success of Spectre by assigning the highest priority to bringing down a gunship by AAA fire.[65] Operations in an environment of ever-increasing AAA activity meant working very closely with intelligence to determine the precise location of the gun sites. Nevertheless, from the first of the year, the Spectres began taking major hits. In several cases, only spectacular flying competence made it possible to return the aircraft to safe landings.

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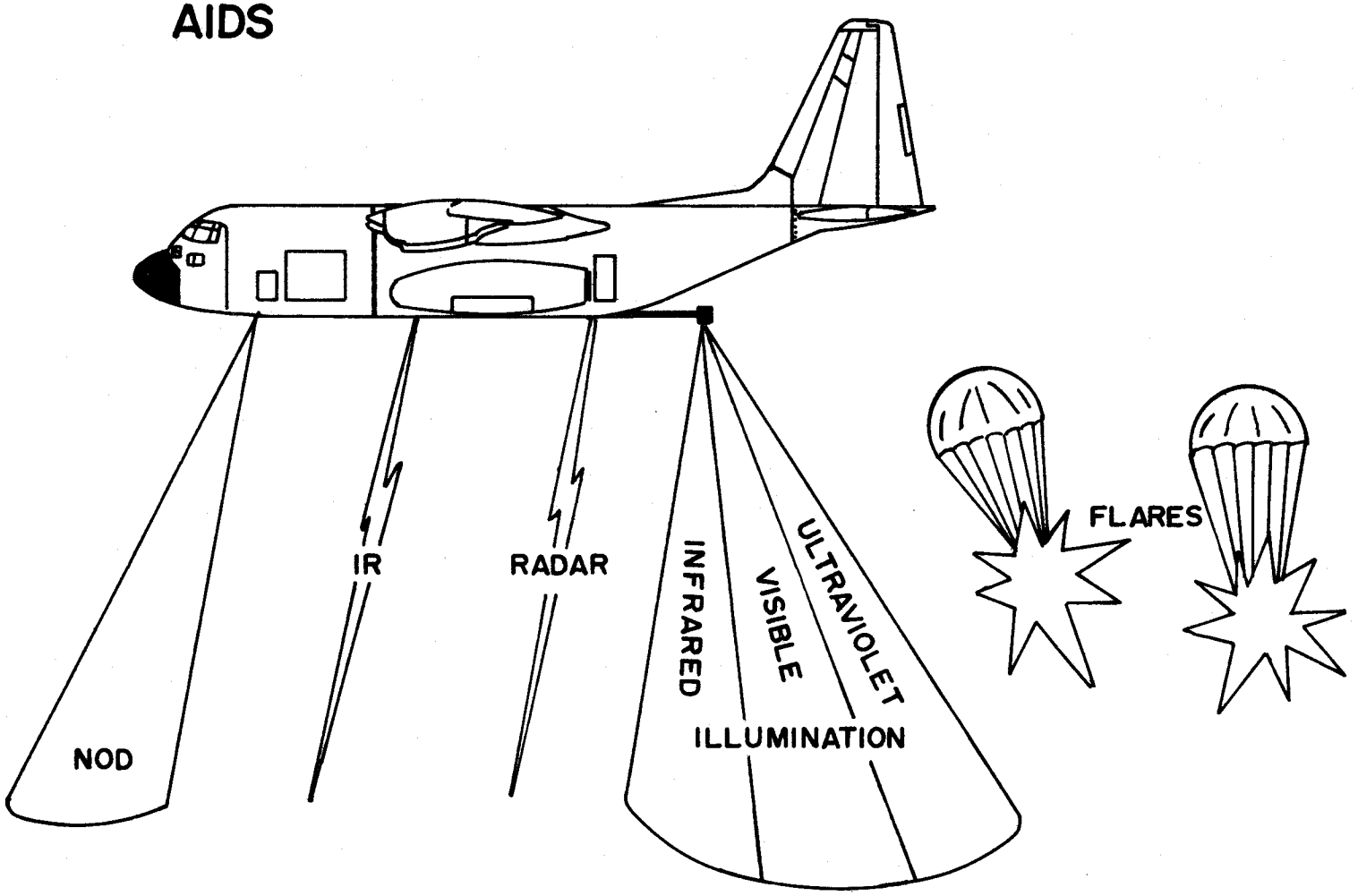

FIGURE 19

NOTE: The BLACK CROW sensor (not shown) is mounted above left paratroop door.

SOURCE: TACOPlan 6, "Final Rprt Gunship II (U)", Feb 68.

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Finally, on 24 May 1969, a Spectre was destroyed while attempting an emergency landing after taking two rounds of 37-mm fire.[66] A review of this action in the form of a Battle Damage Report is presented in Appendix III. The loss of the one AC-130 reduced the squadron aircraft by 25 percent, but despite this, the second quarter of the calendar year reflected outstanding accomplishments.[67] (Fig. 20.)

Though the AC-130 gunship resource was used primarily for LOC interdiction in central and southern Laos, it was frequently employed in the BARREL ROLL area of northern Laos. In this area, the Spectre worked the enemy LOCs and assisted the Spookies in support of the Lima Sites.

As early as 30 November 1968, the Operational Considerations and Recommendations portion of the Joint Planning and Targets Conference requested of 7AF the use of the AC-130 gunships in BR. In January 1969, 7AF advised the 8th TFW that Spectre crews should be prepared on short notice to divert to BR, that action should be taken to familiarize them with the differences in operating restrictions, procedures, and terrain features.[68]

Then in early March 1969, Maj. Gen. Louis T. Seith, Deputy Commander, 7AF/13AF, raised the issue of night coverage in BR with the 7AF DCS/Operations, Maj. Gen. David Jones. The continuing strong enemy offensive at that time posed a major threat to U.S. objectives in the BR operating area. Tactical airstrikes during daylight hours held the enemy at bay, forcing him into a night strategy to achieve his goal. Recognizing this, General Seith called for procedures that permitted the quick diversion of the AC-130s to the BR area for night defense of Lima Sites and to the Plaine des Jarres area where trucks were

known to operate at night with virtual impunity. Too, the psychological factor of gunship presence would deter the enemy from the usual tactic of night attacks on the Lima Sites.[69/]

Despite continued truck killing effectiveness in central and southern Laos, the AC-130s were increasingly diverted to targets in the BR area. They were successful in both the defensive role of Lima Site protection and the offensive interdiction role. Armed with only three aircraft after the battle loss in mid-May, the Spectre squadron at Ubon became a well-known and highly regarded weapon throughout SEA for its Laos operations.

SPECTRE RESULTS 1 APR - 30 JUN 69

ITEM	APRIL	MAY	JUNE	TOTAL
Missions Fragged	91	147	105	343
Missions Flown	86	120	85	291
Flight Time	395.2	480.9	358.5	1,234.6
Air Aborts	2	3	3	8
Ground Aborts	6	8	4	18
Trucks Sighted	963	985	140	2,088
Trucks Destroyed	493	427	46	966
Trucks Damaged	100	120	21	241
Trucks RNO	356	247	45	648
Helicopters Sighted	2	1	1	4
Helicopters Destroyed	0	1	0	1
Boats Sighted	4	12	21	37
Boats Destroyed	1	4	8	13
Boats Damaged	1	1	7	9
Warehouses Destroyed	1	0	3	4
Secondary Fires	643	462	98	1,203
Secondary Explosions	1,016	1,050	900	2,966
AAA Destroyed	2	1	0	3
AAA Silenced	0	3	0	3
20-mm Expended	410,505	502,609	222,130	1,135,244
7.62 Expended	416,601	466,416	152,415	1,035,432
AAA Received				
ZPU	1,380	578	55	2,013
23-mm	4,532	6,188	177	10,897
37-mm	8,624	17,924	1,029	27,577
57-mm	36	12	0	48
AAA Monthly Total	14,572	24,702	1,261	40,535

FIGURE 20

CHAPTER III

TACTICS

The employment of Gunships I, II, and III SEA was not restricted to a particular geographical area nor to a particular mission. The Spooky, however, was known primarily for its role in close air support in the Republic of Vietnam and in BARREL ROLL in Laos; the Shadow worked mainly in South Vietnam in an armed reconnaissance function; and the Spectre earned a reputation as "the best truck killer in SEA"[1/] for its interdiction role, predominantly in the STEEL TIGER region of southern Laos.

Determining Factors

The specific activities of the gunships were governed in large measure by the monsoons, the immediate weather, and the enemy. Since the weapon was new, tactics were developed gradually in direct line with the threat.[2/] Because the Allied forces possessed air superiority in SEA, there was no threat to gunship operations from enemy air. Tactics were developed primarily as a response to the differing threat levels of ground fire ranging from small arms (SA) to AAA.

In general and relative terms, each of the gunship types was a "slow-mover," restricted to a predictable "attack geometry." These two factors increased their vulnerability to ground fire and were the prime considerations in the survivability problem.[3/]

Current intelligence information was used as a basis for directing the gunship to specific areas of operation and to targets. After its arrival in the

general area and, depending on the gunship type, the crew relied on whatever target acquisition equipment it had on board to perform reconnaissance. When the target was obtained, the gunship attacked using a left-hand orbit at varying altitudes depending upon terrain, cloud ceiling, and enemy ground fire capability.[4/]

The acquisition of and the firing on targets by gunships were largely procedural problems rather than tactical and are not treated here. But those protective actions and techniques which evolved from the employment of the gunships in differing combat roles and environments provided insights to limitations of the weapon, as well as its capabilities and potential.

The question of vulnerability to gunfire accompanied the earliest discussions of the value of the gunship concept. Five years after their introduction into combat, the aircraft were still considered vulnerable but devastating when employed in the low to medium-threat spectrum.

The range of enemy AAA weapons is shown in Figure 21.[5/] Not shown, but a ground-to-air threat nevertheless, were small arms/automatic weapons fire. The normal attack mission altitude for the Shadow K and the Spectre was 2,500 to 6,500 feet, which placed them within the range of all antiaircraft weapons used by the enemy ground forces.[6/] The optimum firing altitude of the Spooky was 3,000 feet while 3,500 feet was optimum for the Shadow G.[7/] The pylon turn attack geometry required the aircraft to remain in a relatively fixed area for extended periods of time. As a result, hostile gunners had the opportunity for repeated firing attacks.[8/]

AAA WEAPONS THREAT

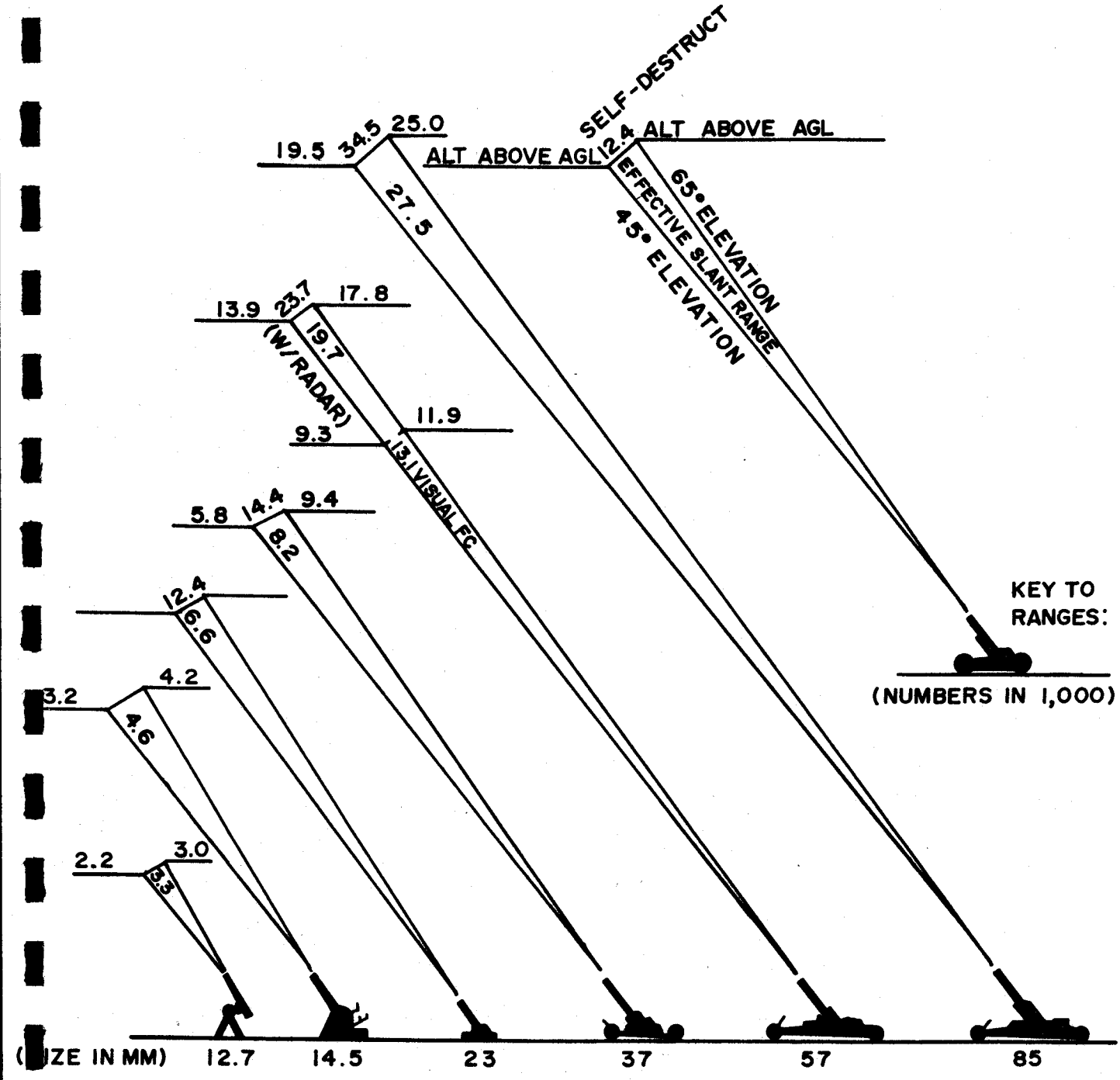

FIGURE 21

SOURCE: DIO, Hq 7AF.

Moon Factor

Certain moonlight and weather conditions compounded the adverse factors of relatively slow airspeeds, low altitude, a predictable attack maneuver, and extended TOT. The enemy's ability to see the gunship operating at night and the effectiveness of hostile defenses were intimately related. In a report entitled "Project MOONWATCH," the 16th Special Operations Squadron studied combat operations for a four-month period from 1 February to 31 May 1969. The purpose of the report was to provide a consolidated source of information relative to BDA, AAA reactions, and meteorological phenomena which had a significant impact on the mission. It sought specifically to measure the effects of lunar illumination. Though the 16th SOS was employed solely in an interdiction truck-killing role in Laos during this period, the findings are applicable in principle to all gunship roles. The Project MOONWATCH report was based on unit mission reports, intelligence reports, and interviews with members of crews who had received battle damage during the reporting period.

Figure 22 through 25 present statistics on the number of Spectre sorties flown, rounds of AAA fired, vehicle sightings, and trucks damaged/destroyed.[9] The statistics are matched with the phases of the moon. Prior to the study, the notion of very high risk when operating in full or near full moonlight was prevalent.[10] The report conclusions contained some surprises:[11]

> *"Contrary to expectations, there appeared to be little correlation between the number of truck sightings, rounds of AAA received, and the phase of the moon. It has been generally assumed that hostile vehicle traffic is greatest during periods of moonlight when vehicles may travel without the use of headlights. However, during the months of April and May, the periods of peak travel occurred when*

the moon was less than half full. This suggests that the hostile forces may have shifted their tactics in hopes of negating the effectiveness of the Night Optical Sensor (Device), which has been widely publicized as a 'Starlight Scope.' (Fig. 26.)

"The number of rounds of AAA received has increased steadily throughout the period, approximately doubling each month. Although the sortie rate also increased, there has definitely been an upward trend in the number of rounds received on a 'per mission' basis. This was interpreted as reflecting an increased emphasis on the part of the hostile forces to protect their supply routes by concentrating their fire against the AC-130s.

"No significant relationship between the phase of the moon and the amount of AAA received could be developed, discrediting the assumption that hostile fire is lighter but more accurate during the full moon. While (there are indications) under certain conditions, moonlight does tend to increase the gunners' accuracy, there does not appear to be any correlation between phase of the moon and the amount of AAA. It may be noted that some of the heaviest AAA reactions have occurred during periods of less than a half moon.

"During the last two months of the period, some relationship between the amount of truck traffic and the amount of AAA appears to be emerging, indicating that the hostiles may be attempting to increase the efficiency of their defense system by withholding fire unless they have traffic to protect.

"The attitude of the aircraft appears to have little or no effect upon the ability of the gun crew to track the plane. More aircraft were hit while in straight and level flight than were hit while in orbit, but results here are inconclusive, as in several instances the crews report that they were hit just after breaking out of an orbit."

The Project MOONWATCH report, notwithstanding, absolute darkness remained an important consideration for fragging purposes and the establishment of operational procedures. During a full moon, the gunships could be seen at operating altitudes with the naked eye.[12/] The "certain condition of moonlight"

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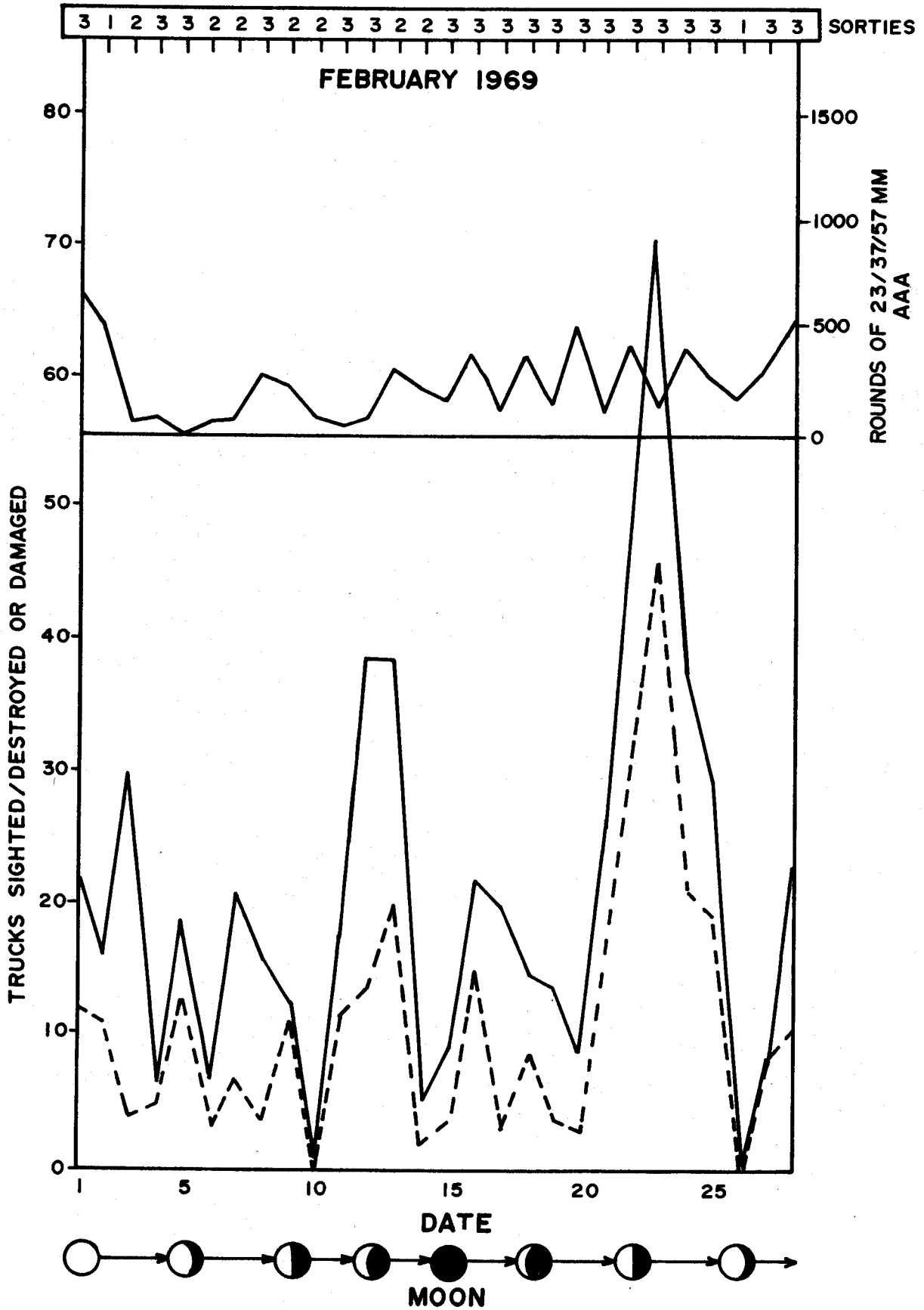

FIGURE 22

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SOURCE: (Figs 22-25) "PROJECT MOONWATCH, 8th TFW, 1 Feb-31 May 69.

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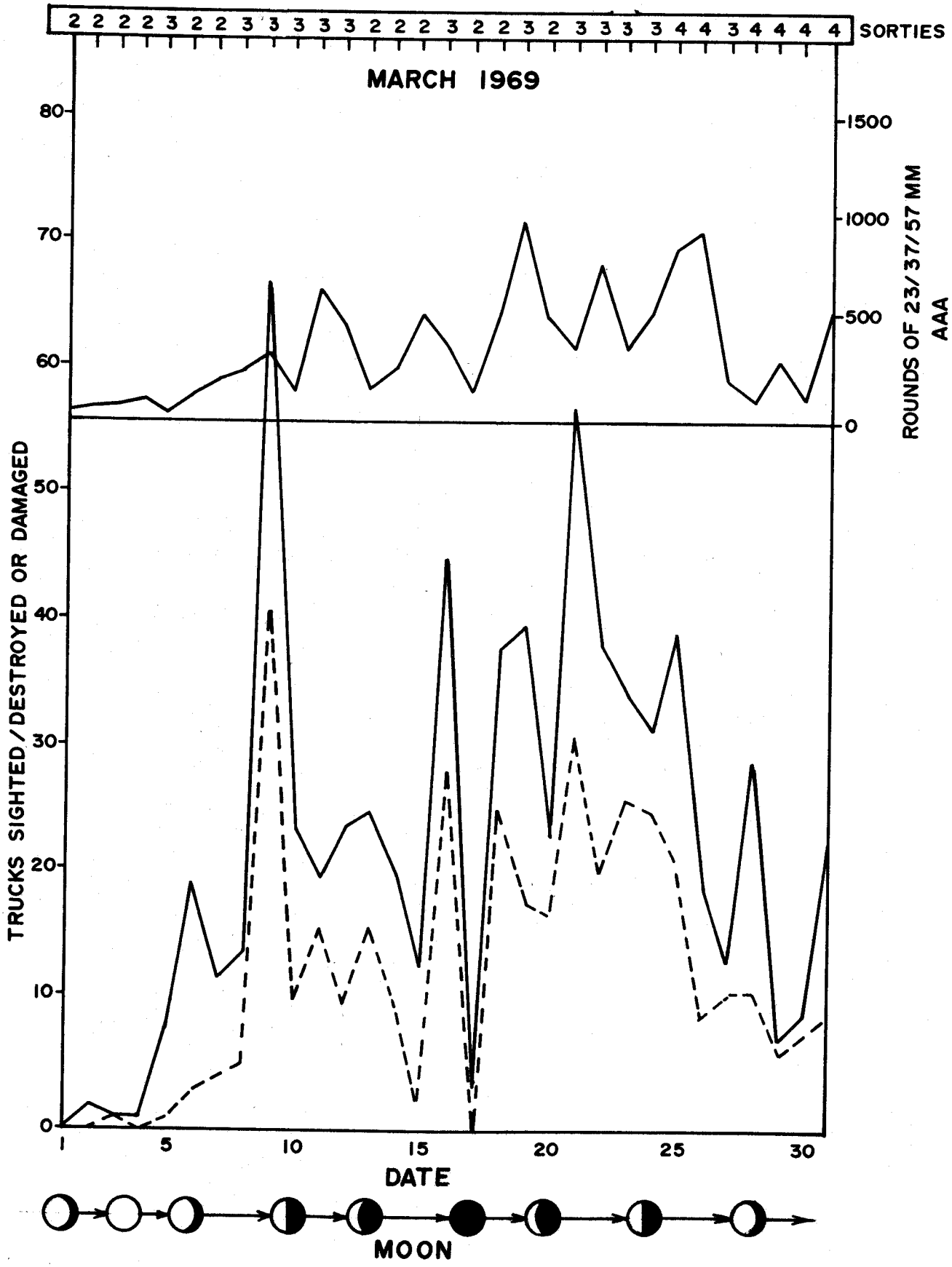

FIGURE 23

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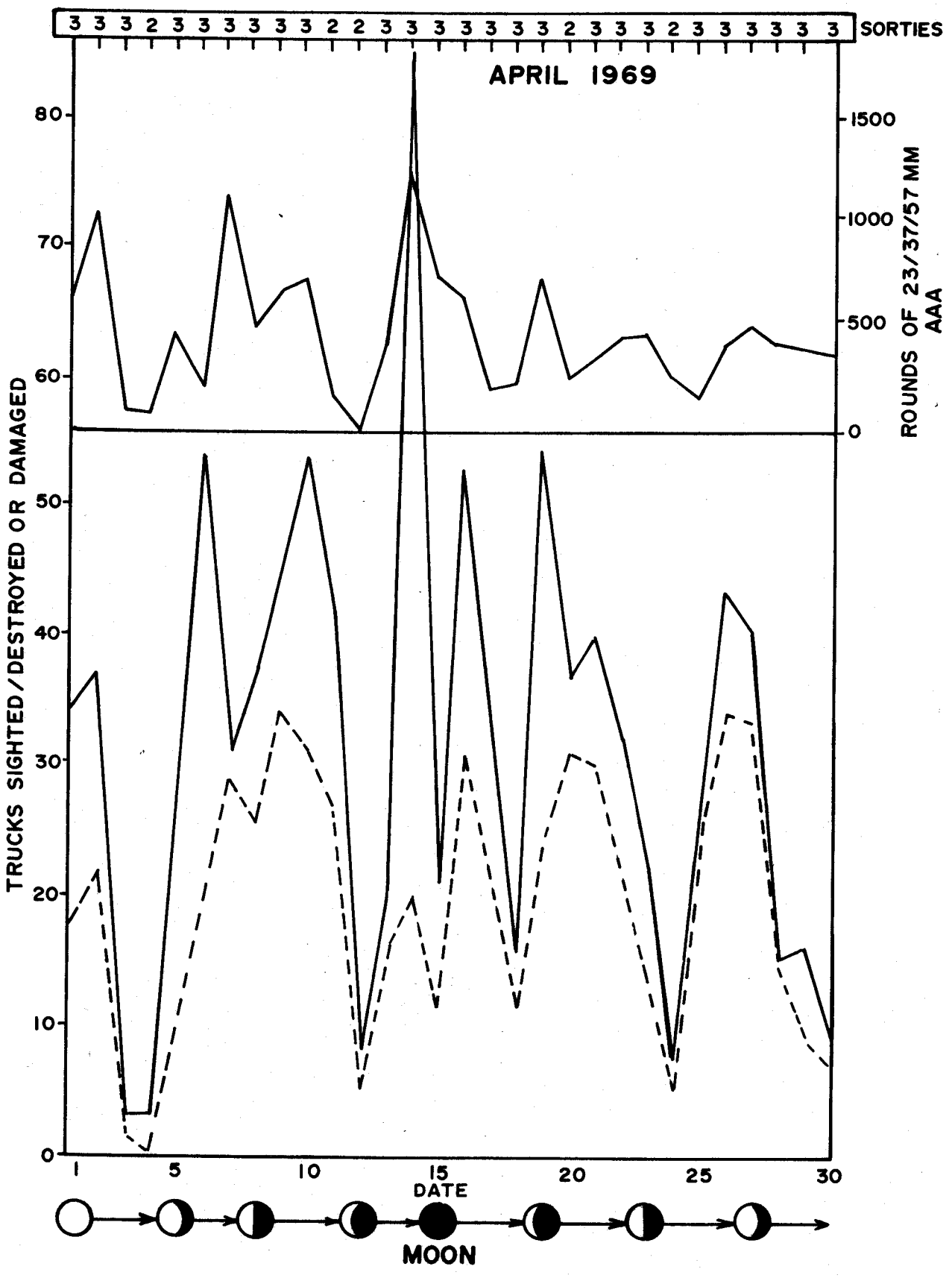

FIGURE 24

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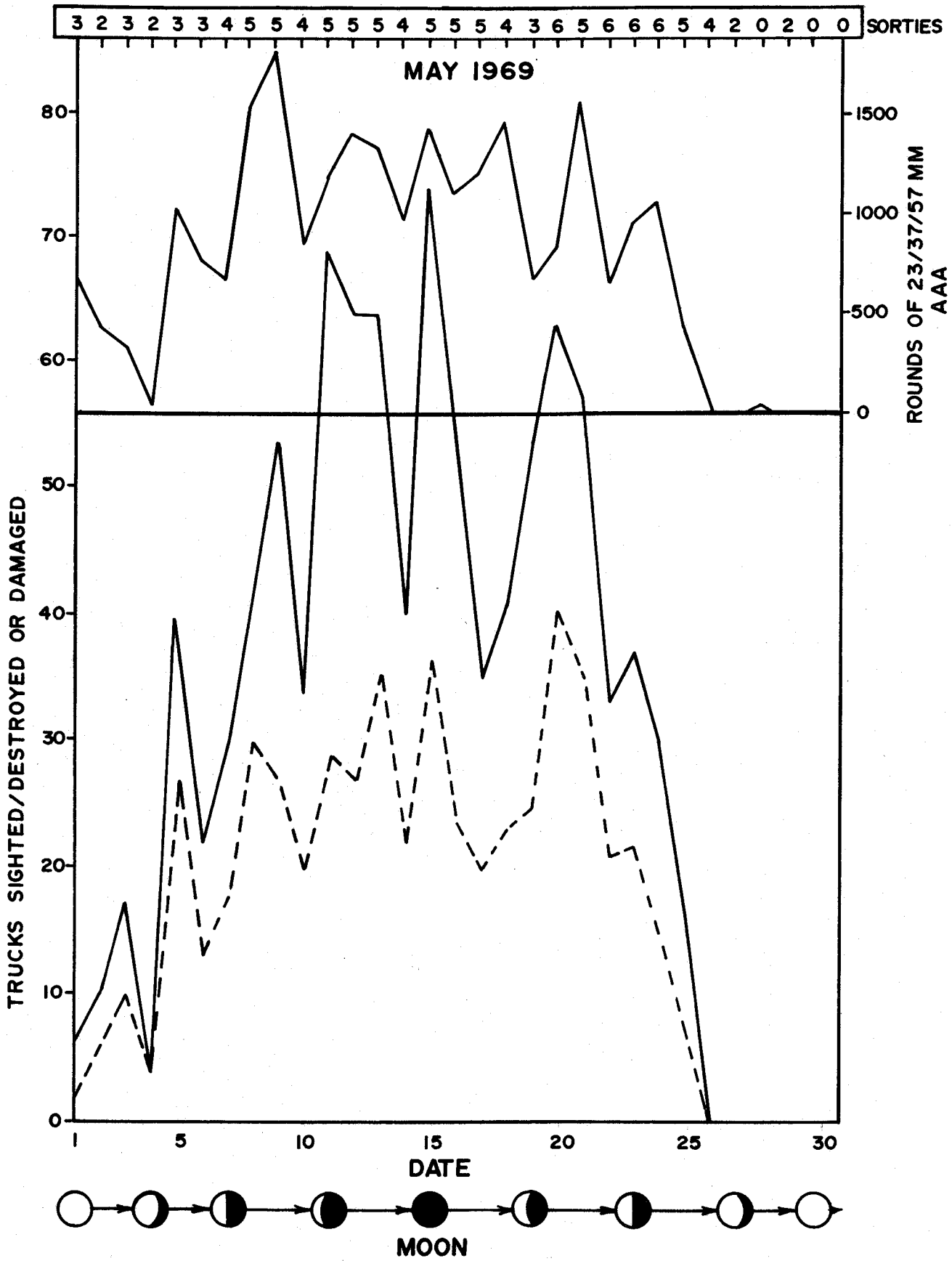

FIGURE 25

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which most concerned fraggers and gunship crews occurred when a thin overcast existed even with as little as a quarter moon. In this situation, the moon illuminated the clouds and diffused the light, providing a background which constantly silhouetted the aircraft.

Figure 27[13/] presents a six-month summary of AAA battle damage sustained by the 16th SOS Spectres. Of the thirteen times the gunships were hit, nine occurred when the moon was half full or more. Only one hit occurred during the new moon phase, two when the moon was down, and only one other hit occurred when the moon was one quarter full. Interestingly, only once was a gunship hit when it was a clear night. In most instances, a thin overcast condition existed.[14/]

Intelligence and Survivability

In spite of the many factors that would seem to forbid survivability, gunships have proved quite versatile and successful in night close air support operations in Southeast Asia. Destroying trucks and supplies in Laos made the gunship an important interdiction weapon as well. Part of the success was due to immediate and accurate intelligence on high-threat AAA areas. Spooky crews engaged in out-country missions without the benefit of sensing equipment had to rely heavily on pre-mission intelligence briefings and the ground controllers' guidance at the target area. For example, fragged to a Lima Site in Laos for four consecutive nights, a Spooky aircraft made contact with the ground controller and expended its normal load of ordnance without gound fire on 21 and 22 March 1969.

On the third night, however, the Spooky was warned by the ground contact to turn off its lights and remain out of the area because of the presence of 50

calibre weapons and possibly heavier AAA. Following this direction, the Spooky stayed away while Spad A-1s worked the target under FAC direction for four and one-half hours. Heavy ground fire was directed at the attacking Spads and the Spooky crew expressed the opinion that it would have been extremely hazardous had they gone on target as on the previous two nights. On the fourth night, the Spooky was cleared on target but met with heavy AAA including 50 calibre, 12.7-mm, and 37-mm; on this night, the Spooky made only two firing passes with all guns on the line, then backed away from the target. Continued operation in such an area could have resulted in the loss of an aircraft.[15/]

With the exact position of the aircraft and the precise location of AAA sites known, Spectres were able to patrol areas in Laos where AAA emplacements (including non-radar controlled 57-mm) were as close together as six or seven miles. One tactic used in areas of known AAA was to wait until the truck or target traffic moved to a lower-threat area before launching a strike. In most cases, however, when operating in or near a high-threat or heavy AAA environment, gunships would use as short a time as possible in the actual firing orbit. "Going more than 90 to 135 degrees around an orbit proved to be highly undesirable and not conducive to longevity for the aircrew, because the AAA gunners were able to project the aircraft flight path accurately."[16/]

Gunship/Fighter Escort Tactic

As the enemy tightened his LOC defenses, the gunship/fighter escort concept, as described in the preceding chapter, was a major tactical development in air-to-ground combat. The operating environment of the AC-130 was greatly

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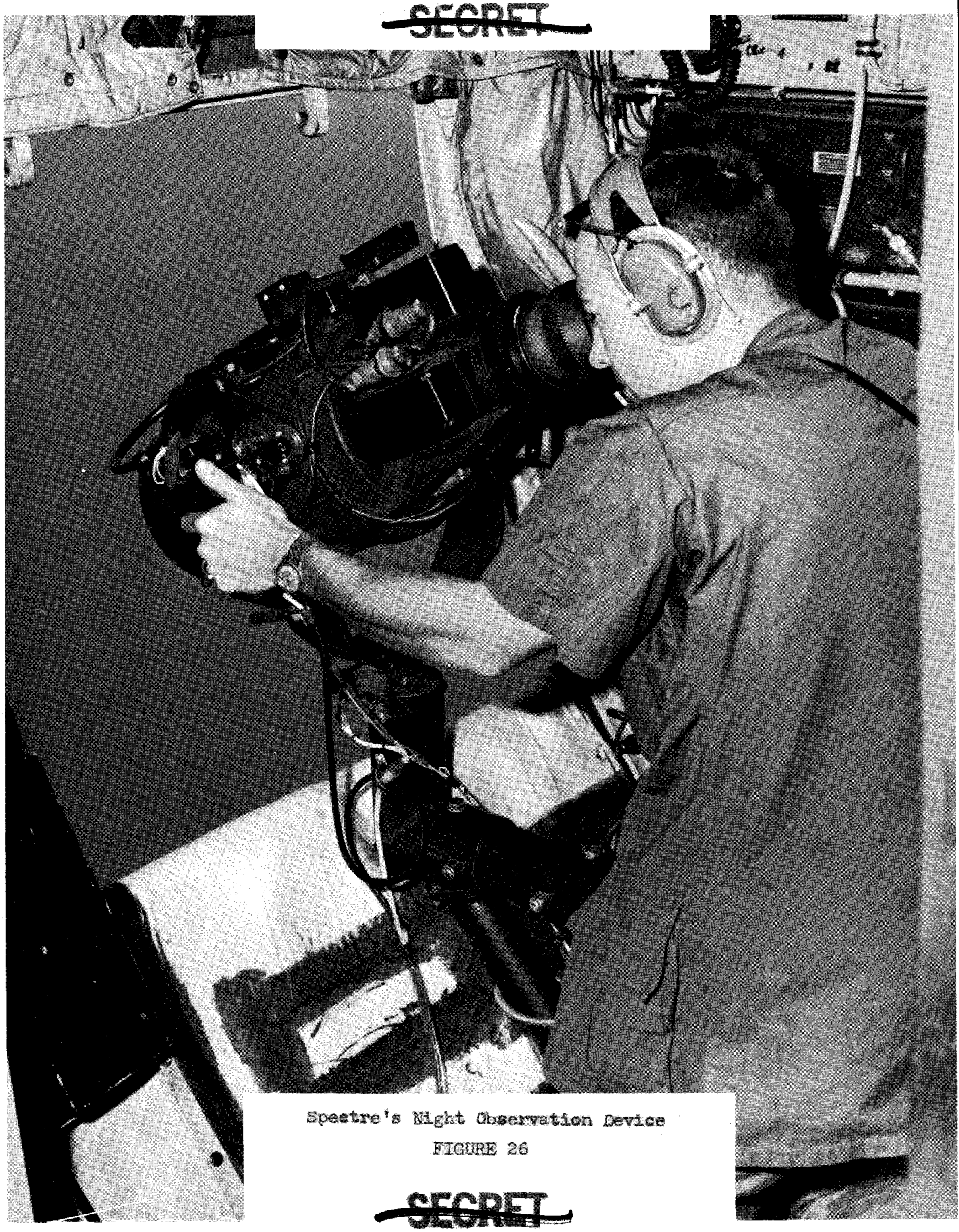

Speetre's Night Observation Device

FIGURE 26

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AC-130 BATTLE DAMAGE SITUATION SUMMARY

DATE	TIME (L)	ROUTE SEGMENT	AAA GUNS FIRING	MOON PHASE	MOON ELEVATION ANGLE	UNDERCAST	OVERCAST
26 Dec 68	2000	96B	1 x 23	1/4	Unknown	Broken	Hvy Solid
11 Jan 69	1840-2155 Unknown	92C	Unk X 37	1/2	Down	Unknown	Unknown
3 Mar 69	1911	8	3-4 X 23	Full	24°	Low Clouds & Haze	High Thin Broken
5 Mar 69	2144	92E	1 X 37	Full	37°	Broken	Thin Broken
19 Mar 69	2300-0130	92C	2 X 37	New	Down	Light Haze	Unknown
27 Mar 69	2001	92D	1 X 37	1/2	77°	Clear	Clear
28 Mar 69	2250	914	3-4 X Unk	3/4	53°	Haze	Haze
3 Apr 69	2133	92E	1 X 37	Full	37°	Light Haze	Thin Solid
24 May 69	1948	92D	1 X 37	1/2	77°	Clear	Thin Broken
24 May 69	2120	911E	4-6 X 37	1/2	45°	Clear	Thin Broken
29 May 69	1934	92C	2 X 37	3/4	57°	Broken	Hvy Broken
29 May 69	2050	911E	4-6 X 37	3/4	74°	Thin Broken	Thin Broken
4 Jun 69	2039	92E	1 X 23	3/4	Down*	Scattered	Hvy Broken

* No moon, but extensive illumination of overcast by nearby Blind Bat Flareship.

FIGURE 27

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expanded when the F-4 cover tactic was employed. In assessing this new tactic, Maj. Gen. Robert L. Petit, 7AF/13AF Deputy Commander, remarked, "The enemy pays a hell of a price to go after a Spectre now. Retaliation is severe."[17/] Very soon after the introduction of the escort tactic, commanders reported that the ground gunners learned fast; they found that ground fire at the Spectre brought in the CBUs of the attack-F-4 escorts within a minute, usually less. Gunship aircraft commanders reported circling over areas which previously drew heavy fire with no response from the ground as long as the F-4s were present; to the surprise of the gunship crews, this even held true while attacking trucks. These early observations caused cautious optimism and the feeling that the tactic was a promising development.[18/]

The gunship/fighter escort procedures were relatively simple. Normally, three fighter aircraft were assigned to each Spectre mission which "worked" a target area for approximately three hours before returning to their home station in Thailand. The fighter takeoff times were scheduled so as to provide one escort over the AC-130 at all times. Each escort cycled to a tanker once, which allowed that escort to provide two periods of cover, each of approximately 30 minutes duration.[19/] The tankers remained in Thailand, west of the Mekong River, but periodically they were repositioned, depending upon the location of the Spectre. Usually the tanker was within 100-NM of the Spectre or less than 15 fighter minutes away. Figure 28 illustrates what came to be known as the "Spectre Shuttle,"[20/] In pre-mission briefings, the Spectre crew and escort crews discussed in careful detail the mission, the terrain, aircraft lighting and configuration, tactics, etc. If the working areas were changed after take-off, the AC-130 advised the escort aircraft of the new area and included a

complete briefing on the target location. Discrete radio frequencies were assigned for inter-plane communications. The position of the escort varied constantly to some extent according to the gunship maneuvering; it flew at approximately twice the altitude (12,000 to 14,000 feet) of the AC-130 and maintained an orbit around the Spectre when it was in its firing orbit[21/] (Fig. 29).[22/] The AC-130 utilized its formation lights on the top of its wings and a shielded rotating beacon to effect join-up and to allow the escort to maintain a visual reference with the gunship.

When the escort attacked an offending enemy AAA site, the fighter pilot called the gunship on the discrete radio frequency to insure aircraft separation. With the gunship clearance, the fighter rolled in, directed the gunship away from his run-in and dropped a single CBU dispenser.[23/]

The escorting F-4 played a dual role of suppressing AAA and supplementing the gunship's firepower. The Spectre aircraft commander was the on-scene commander and had the prerogative to direct or "FAC" the F-4 into either role several times each mission. The weapons normally carried for each of the three escort aircraft were:[24/]

LEAD AND THREE:	6 x CBU-24 and/or 49 3 x MK-82FE
TWO:	6 x CBU-24 and or 49 2 x MK-84FE or 2 x BLU-27 (Finned)

An important aspect of the gunship mission was the accurate marking of ground targets both for its own attacks and for the escorting fighters. The two ships formed an effective night strike team.[25/] (Fig. 30.)

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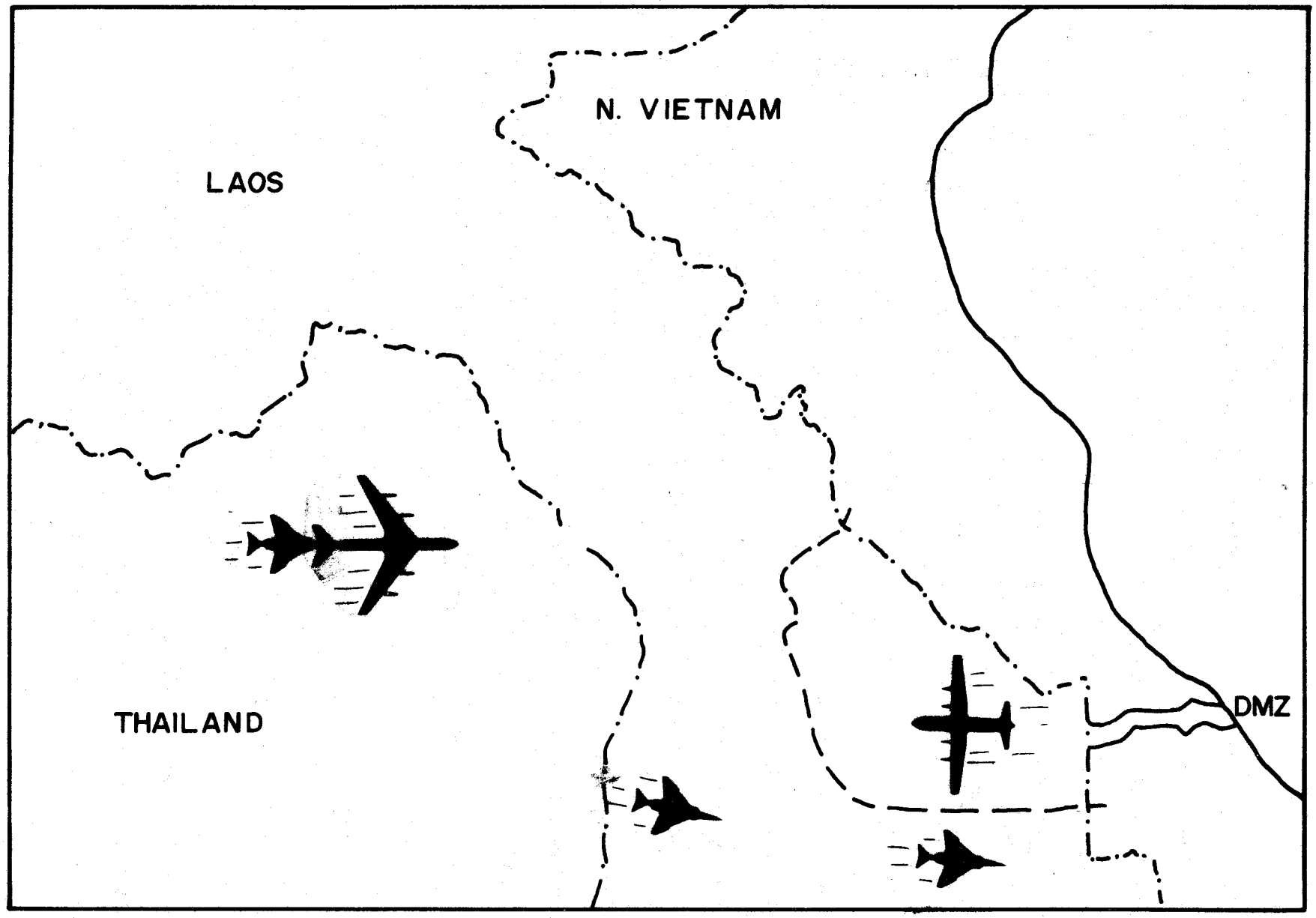

FIGURE 28

THE SPECTRE SHUTTLE

SOURCE: End of Tour Rprt, Col W. L. Bevin, Jr., Comdr, 432 TR/FW, Udorn RTAFB, 3 Sep 68-7 Jun 69.

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GUNSHIP ESCORT POSITION

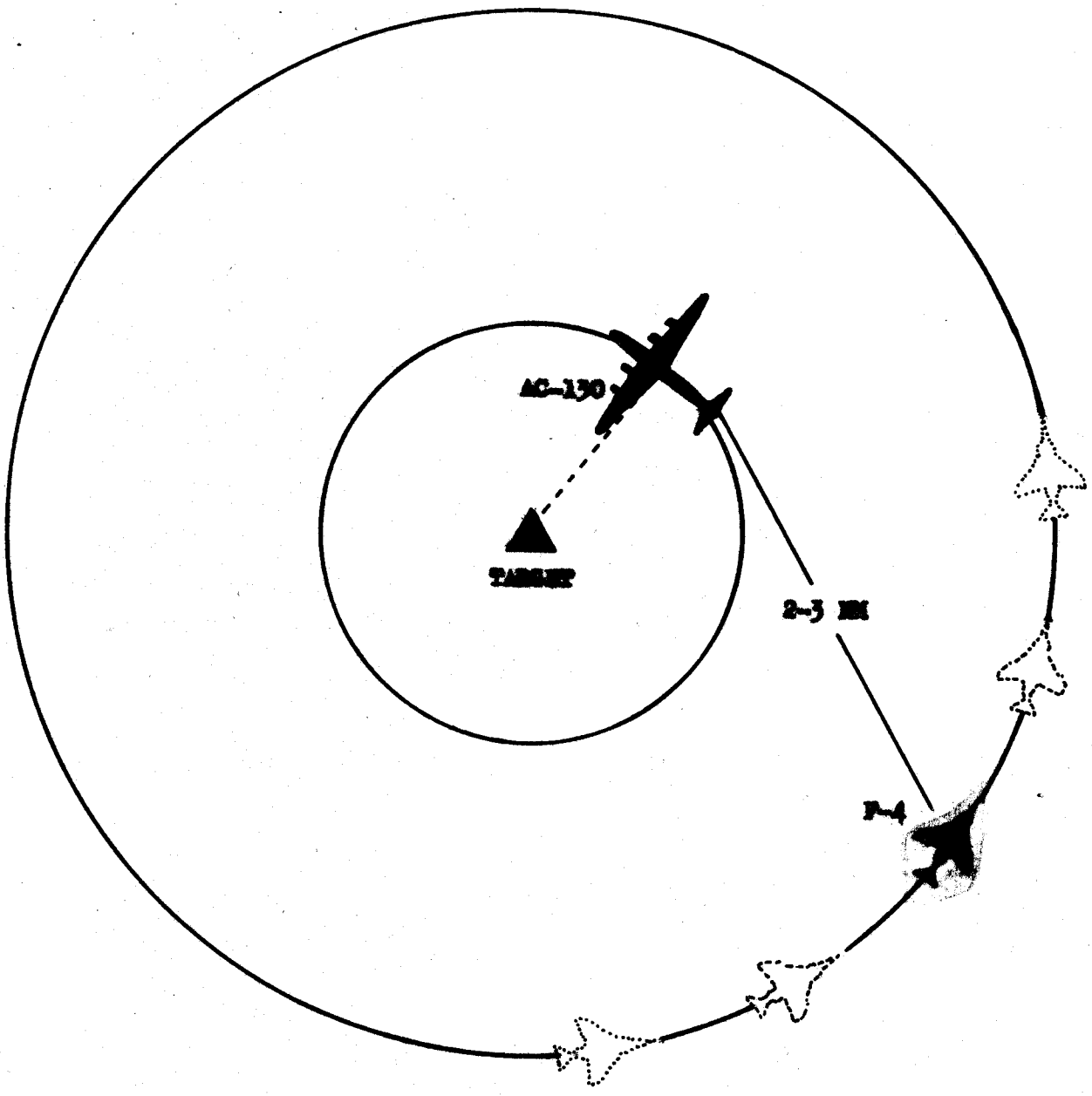

FIGURE 29

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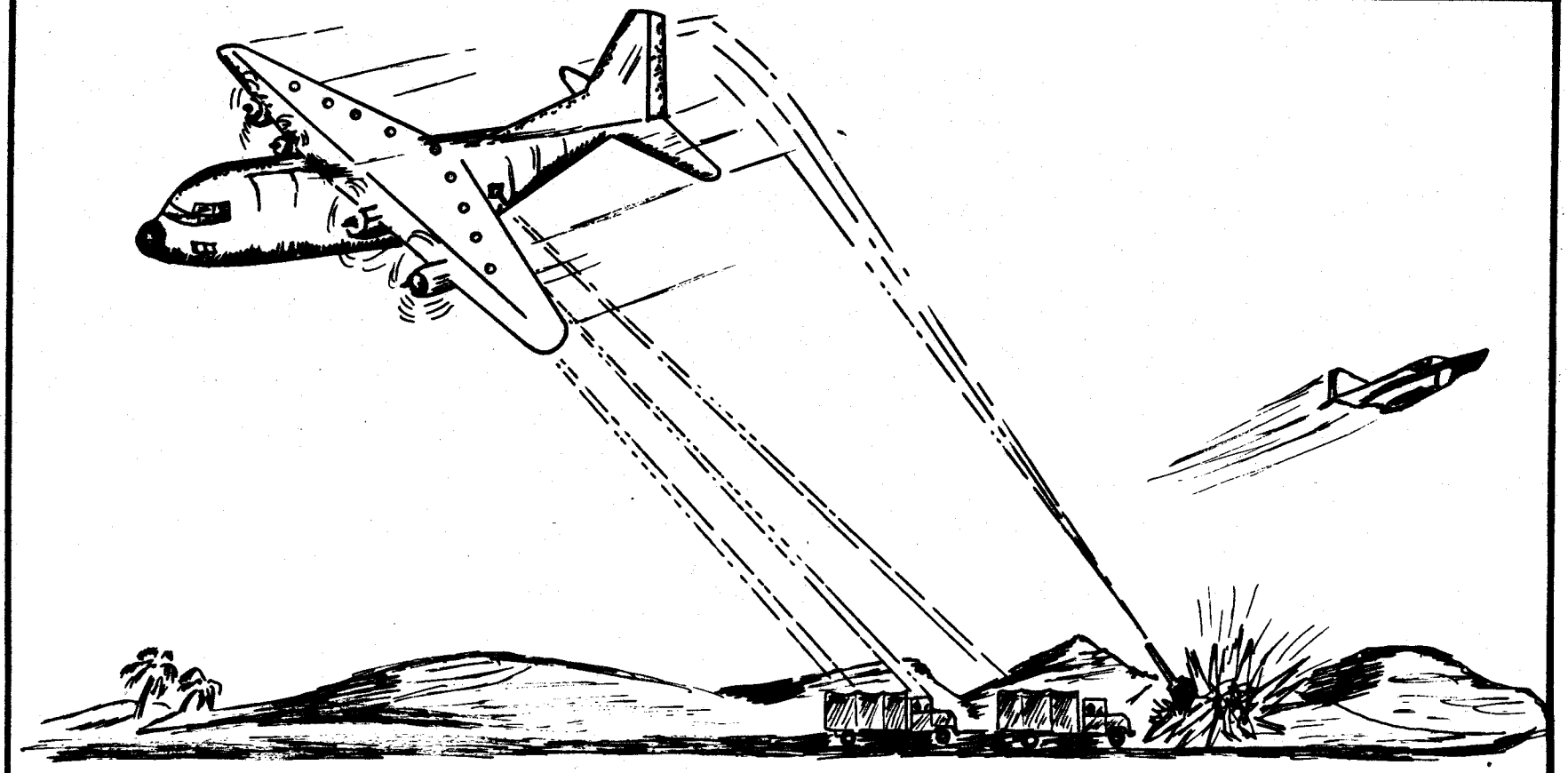
FIGURE 30



SINCE THE AC-130 FIRES FROM A 30° LEFT BANK AND SINCE THE ENEMY GUNNERS NORMALLY FIRE BEHIND THE GUNSHIP, THE F-4 STAYS IN THE GUNSHIP'S APPROXIMATE 9 O'CLOCK POSITION/IN A LEFT BANK. AS SOON AS THE ENEMY GUNNERS FIRE, THE F-4 DIRECTS THE GUNSHIP AWAY, ROLLS IN AND DROPS ORDNANCE ON THE HOSTILE GUN POSITION.

Source: "End of Tour Report", Colonel W.L. Bevan, Jr., Comdr, 432 TR/FW, Udorn RTAFB, 3 Sep 68 - 7 Jun 69.

THE SPECTRE-STRIKE TEAM

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Prior to the assignment of the 497th Tactical Fighter ("Night Owl") Squadron to the Spectre escort mission on 30 December 1968, the Directorate of Tactical Analysis at Headquarters 7AF published a working paper, dated 10 December 1968, entitled "Flak Suppression with F-4s for AC-130 Missions Against Trucks." The report set forth an investigation proving that when F-4s provided flak suppression for the AC-130s, they killed more trucks together than they did operating alone.[26/] The Spectre/F-4 strike team destroyed/damaged record climbed steadily, indicating validity of the "Flak Suppression...." study.

As effectiveness of the gunship/escort increased, however, so did enemy defenses in both accuracy and intensity (Figs. 22-25). In March 1969, alone, five battle damage incidents (App. II) caused a reevaluation of the routes or LOCs Spectres should work. Prior to that time, it was the general practice to frag the Spectres to the same area, at the same time, for several consecutive nights--a situation which compromised elements of surprise and secrecy.[27/] Consequently, in April, gunships were alternated, or randomly selected in an unpredictable method to achieve maximum possible surprise. Employed in this manner, the AC-130 was able to operate with escort in most of the heavily defended areas of Laos, except those obvious high-threat complexes with in-depth concentrations of 23/37/57-mm guns.

Col. Slade Nash, Deputy Commander for Operations of the 8th TFW, at the Ubon RTAFB, observed, "Fighter escort was effective in reducing the number and magnitude of AAA reactions."[28/] The escorts did have a positive effect on the survivability of AC-130s in the high-threat areas. By June 1969, the gunships

recorded receiving from 100 to 900 rounds of AAA in between 10 and 70 separate firings per sortie over a defended area.[29/]

Enemy Defensive Tactic

Nevertheless, armed with the ability to work deeper into the threat spectrum, Spectre amassed such an outstanding record of truck kills that it raised considerable skepticism, until a strike recording photographic system on the NOD was developed. The enemy, very much aware of the catastrophic impact on its logistic lines to South Vietnam, tightened its defenses. The increasing resistance provoked a detailed analysis of the enemy techniques for defense against AC-130s by the 7AF Directorate of Operational Intelligence (DIO). Each battle damage incident was carefully examined. The standard doctrine of all enemy AAA gunners in Laos, as derived from firing reports and other data, had been to fire at FAC and gunship aircraft at extended ranges and at all other aircraft within effective ranges; additionally, the gunners were to fire whenever vehicles were within the protective range of the guns or strikes were being made in the vicinity.

In May 1969, the enemy intensified efforts to shoot down or at least drive away the AC-130 gunships. Based on the analysis of gunship battle damage circumstances, the enemy was believed to know the following about the Spectre:[30/]

- It must fire while in a left turn.
- The altitude flown is about 6,500 feet AGL.
- The airspeed is 165 knots TAS.
- Multiple orbits over a detected target may be expected.
- The AC-130 can be heard in a directional manner.
- The Spectre can be observed through night binoculars.
- During times of high moonlight intensity, visual detection and sighting are enhanced--this is particularly true when

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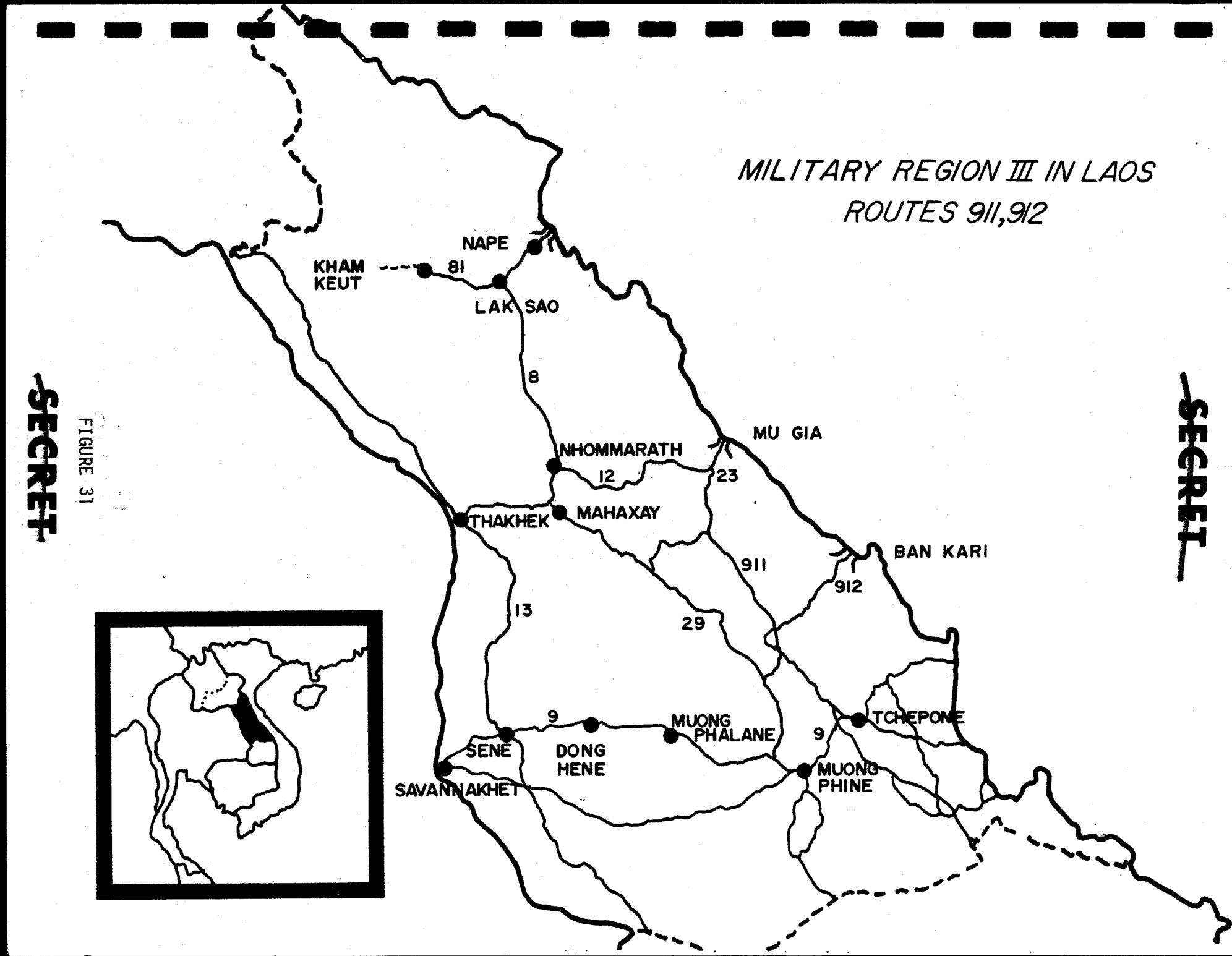

FIGURE 31

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the aircraft is slightly below a thin illuminated overcast.
. F-4 escorts are ready to attack defending gun positions.

The following incident illustrates the enemy's altered tactics. On 29 May 1969, a Spectre received a hit by one round of 37-mm. In the dark of early evening of that day, the AC-130 had been directed by ABCCC to reconnoiter Route 911 in the vicinity of the junction of 912 (Fig. 31). For many months, intelligence and reconnaissance confirmed a considerable number of 12.7/23/37-mm guns in this area whose mission had been to protect vehicles on the road and defend interdiction points, truck parking, and storage points.

Analysis of this incident caused intelligence experts to conclude that selected 37-mm gun crews had been placed in extremely well-camouflaged sites 1,200 to 1,500 meters off the road and under the supervision of a senior officer. One of the sites was a four-gun installation and the other a two-gun site. The Spectre had received a 10-round firing from the site on its second orbit. On the third orbit, 20 rounds were fired, 10 from each site; as the aircraft withdrew, an additional 20 to 30 rounds were fired in 10-round volleys. The use of only 10-round volleys from one gun at a time occurred in approximately 8 seconds and decreased the probability of detection of the ground location by the F-4 escorts. In addition, by using 10-round volleys from one gun position, all the gunners did not lose their night vision at the same time. It appeared that the gunners had also adopted the technique of withholding their fire until they estimated the AC-130 to be within 3,500 meters slant range and then fired a 10-round barrage at the predicted flight path.[31/] The precision of the defensive tactics left little doubt the enemy had instigated strong incentive measures to

kill the Spectre gunships.

Tactics Continue to Evolve

According to Lt. Col. Thomas Simone, Commander of the Spectre 16th SOS, "We're still new and we're learning as we go along. But then so is our opponent."[32] Capt. Louis E. Bartrand, a Spectre pilot and tactics officer of the 16th SOS, spoke about enemy defenses:[33]

> *"We are wary of their flak traps. Our 69-70 tactic is to roll in, fire, and then get off the target. Previously, we'd stay in the pylon turn, keep firing and then suffer from overexposure--too long on target. The enemy is foxy and good and he's getting better. Tactics in the Squadron are similar in form but they vary from pilot to pilot."*

Tied as they were to the very narrow parameters of airspeed, altitude, and method of attack, tactics were indeed similar, not only among the pilots but among the three gunship types themselves. The more capable gunships, however, the Shadow and the Spectre, were equipped with computer offset capability. The familiar attack pattern and all attending limitations remained in this mode, but the feature permitted all-weather employment of the weapon system. For computer offset, the NOD, FLIR, or SLR tracked a friendly position or any known point. The distance in meters from that position to the target was set into the computer. This permitted the gunship to aim its sensor on the known friendly point and "offset" its pylon turning point of fire to the enemy position. The principles of offset firing geometry are shown in Figures 32 and 33.[34]

However, the tactics of offset were not often used because its reliability was questionable. Because of the danger of Short Rounds, aircraft commanders were reluctant to use offset tactics except under the most ideal circumstances.

FIRING GEOMETRY
(Offset and Wind Coorected)

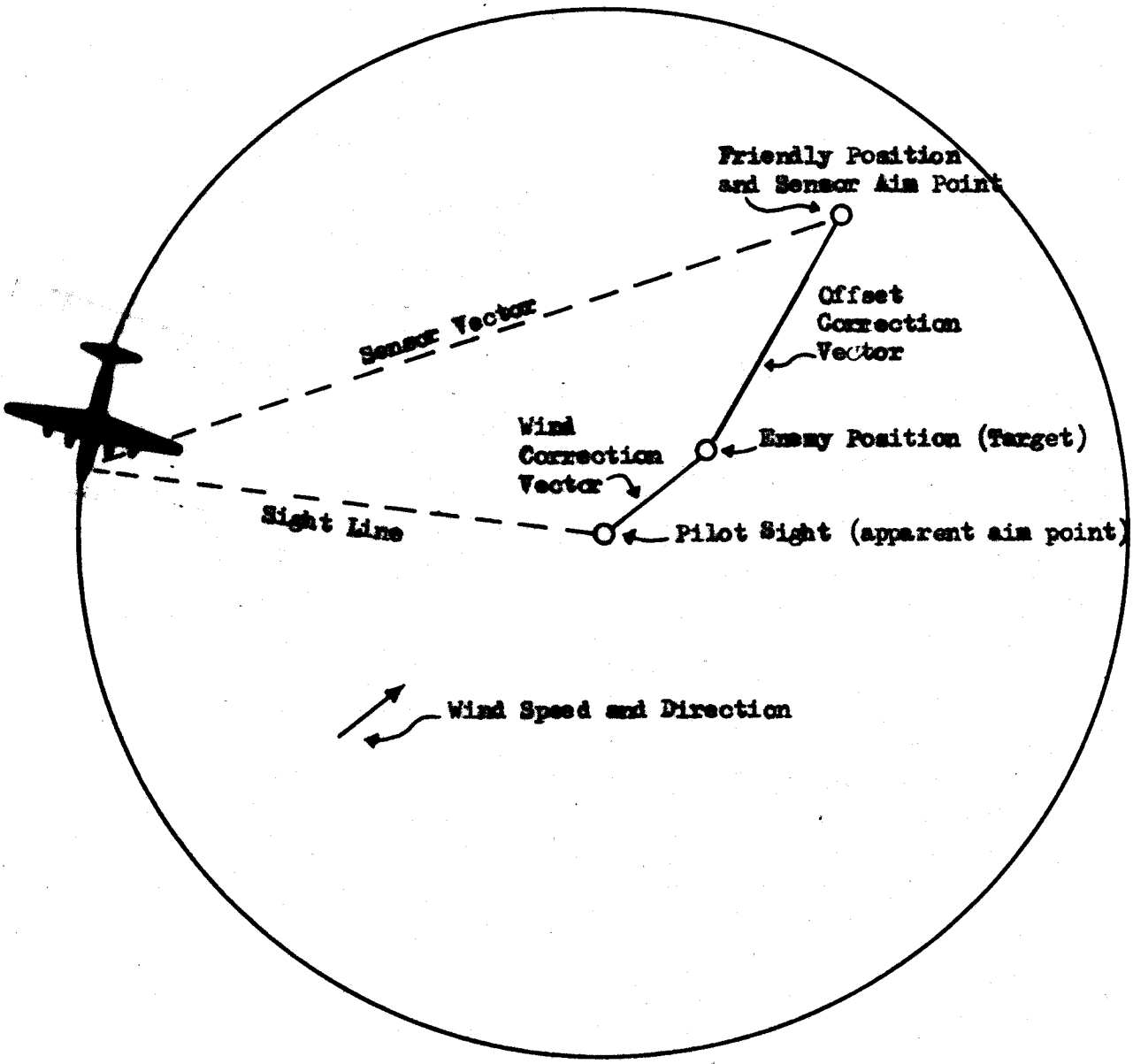

FIGURE 32

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ATTACK ANALYSIS
(OFFSET WITH WIND)

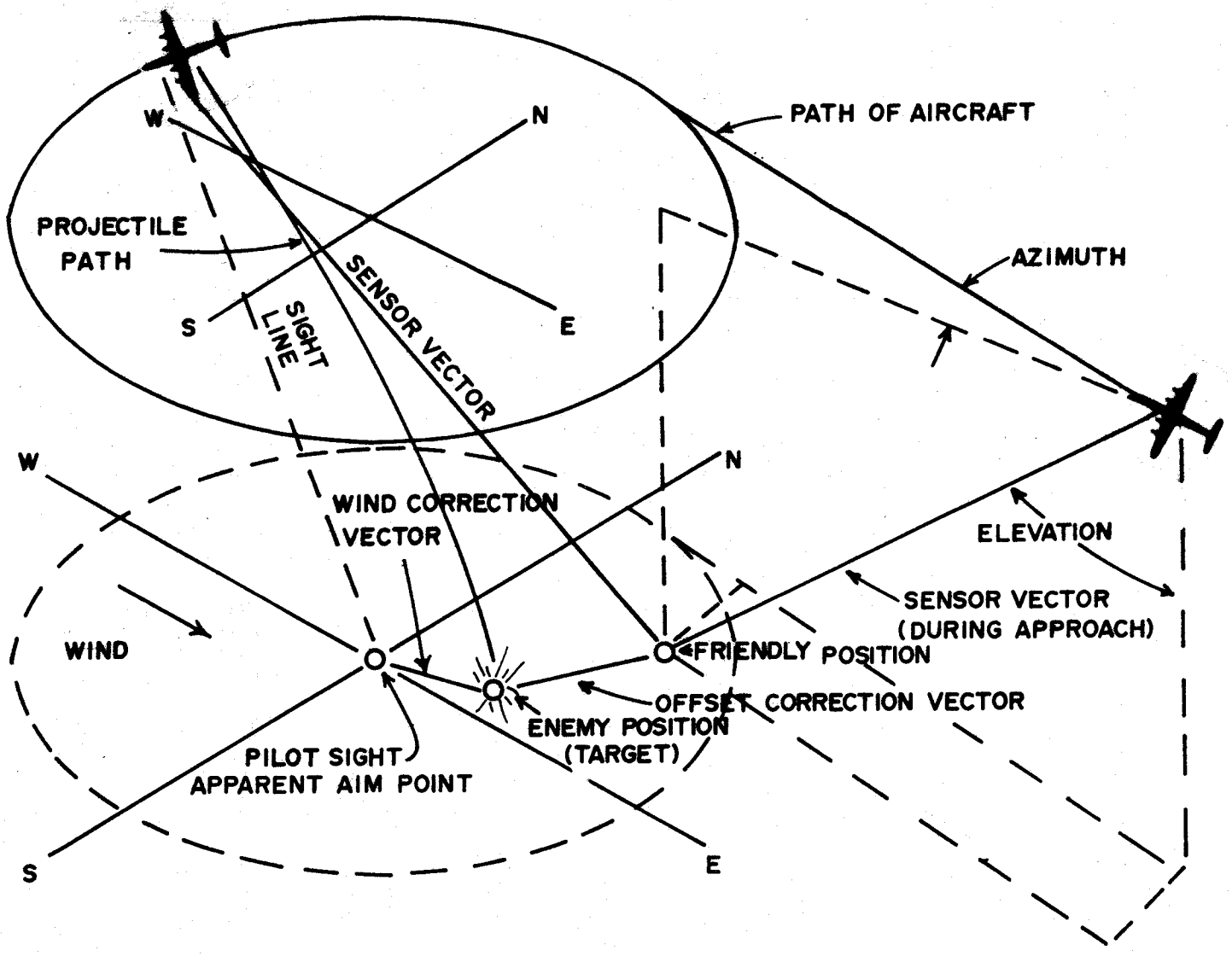

FIGURE 33

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Reports of gross firing errors in offset were common. Tests on the offset mode of equipment were conducted in mid-1969; the results created the suspicion that the mode could not be used safely and all offset firing was discontinued.[35/] At the writing of this report, actions taken to correct these deficiencies were still in progress.[36/]

CHAPTER IV

OBSERVATIONS

The fundamental concept of the gunship did not change as more advanced and sophisticated models were introduced. Limitations of the mini-guns and the Vulcan cannons kept the gunship at relatively low working altitudes making them vulnerable to ground fire. This factor caused the gunships to operate mainly at night in low-threat areas.

The fact that the AC-47 did not become obsolete in spite of gunship sophistication had an important and favorable implication. The weapon system was ideally suited for incorporation into the Lao and Vietnamese Air Force. The Spooky was a simple aircraft, inexpensive, easy to fly, and maintain. The attack procedures and tactics were not complex. The C-47 aircraft was known and flown throughout the world. Both Vietnamese and Lao pilots were easy to train, proficient and aggressive in the aircraft, and competent in the gunship mission.

The effectiveness of the gunship weapon system was impressive from the outset and caused a spirited dialogue among the highest command and planning levels. There was little controversy on the apparent success of the new weapon. Dispute was centered mainly on the vulnerability/survivability question. At the writing of this report, that question remained open and a "wait and see attitude" prevailed.

In 1966, the Air Force noted that during the previous 22 years, U.S. night strike effectiveness had not significantly progressed in spite of giant technological strides.[1/] As a result, Operation SHED LIGHT was instituted to

achieve a "creditable night capability as rapidly as possible."[2/] Gunships benefitted from many of the developments achieved under the SHED LIGHT program.

Recognizing the high cost factor and the increasing sophistication required for profitable night air combat operations, Maj. Gen. Robert L. Petit, USAF, Deputy Commander of the 7AF/13AF, observed that, "The enemy is willing to commit manpower; very simply, we are not. Technology is our substitute for manpower in combat and the reason for sophistication of our weapon systems."[3/]

Technological development of gunships and other night attack weapons is expected to continue. While admitting the AC-47 was excellent for its intended missions, the many interviews conducted in connection with this report almost invariably included speculation on future design, capabilities, and tactics of a "super-gunship." The following represents a composite of these ideas: such an aircraft would be uniquely designed for a broad spectrum of night attack operations in an insurgent/guerrilla environment as well as to meet non-nuclear conventional war needs; it would be an aircraft that could be easily converted from a gunship to an airlift configuration; the craft would have at least four very powerful engines mounted on top of the wings to provide a capability for fast acceleration as well as lift great weights; the top wing mount would provide an element of protection from ground fire; all flight control cables, servos, trim, and engine control lines would be redundantly rigged to expand possibilities of continued aircraft control in case of a direct hit; terrain avoidance radar, LLLTV, NOD, FLR, SLIR, ignition detection, RHAW, laser guidance, illuminator, and flares would be part of its standard equipment; since most ground fire was directed toward the underside of the gunship when in firing orbit, a bulletproof

clear vision port in the belly with two full swivel turrets would be useful, one for a mini-gun or Vulcan cannon, the other for small air-to-ground guided missiles; the gunship would be capable of firing from both sides, guns ranging from 6.72 to 40-mm and higher; BLACK SPOT (Appendix IV) type bombing could be incorporated; the innovations at once called for heavy armor and STOL characteristics; finally, the aircraft should be as quiet as possible.

The gunship weapon system is five years old. Despite its uniqueness and impact on the air war in SEA, there appear to be no immediate doctrinal implications that are not within the purview of existing statements. It fits within the multi-mission mixed force concept that underlies current doctrine. Policy on the other hand, might well be affected by the continued and increasing effectiveness of the weapon in the air superiority, low-threat environment in which it has operated. The devastating results of the gunship/escort team tactic might suggest added emphasis on this method of night firepower delivery.

FOOTNOTES

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2. (S) CHECO Rprt, Hq PACAF, DOTEC, "Night Close Air Support in RVN, 1961-1966," 15 Mar 67.

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   (S) Rprt, ASD, Wright-Patterson AFB, Ohio, "Evaluation Rprt, Project Gunship II," May 68;
   (C) Memo, Gen George S. Brown, Comdr, 7AF to DPL, "Turnover of AC-47s to VNAF," 19 Dec 68;
   (S/NF) "First Test and Combat Use of the FC-47."

2. (C) Briefing, 7AF (DPLG) "Answer to SECAF's 20 Dec 68 Memo and ASD Position on Evaluation of Gunship," Dec 68. (Hereafter cited: Briefing, 7AF, Dec 68.)

3. (S) Msg, C, Hq 7AF to CINCPACAF, (S) "Follow-on Acft for AC-47," 30 Jun 67.

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7. (S) Msg, 7AF, DPL to CINCPACAF, "Mixed Gunship Force for SEA (U)", 5 Apr 68.

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21. (U) Article, "Viet AF Gets 'Spookies'," "Stars and Stripes," 2 Jul 69;
(U) Article, "VNAF Receives USAF Spookies," "7AF News," 17 Sep 69, pg 1.

22. (S) Rev 68-115, 7AF, PAD, 1 Sep 69, pg 1.

23. (S) Cmd Correspondence Staff Summary Sheet, 7AF, DPLG 3920, "Chronology of AC-47 Transfer to VNAF," 10 May 69.

24. (S) Msg, 8th TFW to 13th Air Force/DM, "AAD-4 Update (FLIR) for AC-130A, 1 Jun 69.

25. (TS) Memo, USECAF John L. McLucas to SECAF Seamans, 16 Jul 69. (Extract is SECRET.)

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10. (S) Hist Rprt, 14th ACW, "Operations," Nov-Dec 66, Vol I, Chap III, pg 32.

11. (S) Hist Rprt, 14th ACW, "Operations," Jan-May 68, Vol I, Chap III, pg 28.

12. Ibid, pp 27-28.

13. (S) Hist Rprt, 14th ACW, "Operations," Jan-Jun 66, Vol I, Chap III, pg 62.

14. (S) Hist Rprt, 14th ACS, "Operations," Jul-Sep 66, pg 3.

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16. (S) Hist Rprt, 4th ACS, Jun-Sep 66, pg. 3;
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17. (S) Rprt, E Flight, 4th SOS, Nha Trang, "Gunship Tactics History File (S)," 28 Apr 69, pg 1. (Hereafter cited: "Gunship Tactics History File [S].")
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22. (S/NF) WAIS, 31 May 69, pg 4;
(S/NF) CAS Memo.

23. (S) "Gunship Tactics History File (S)," pp 2-3.

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(S) Colonel Ginn Interview.

27. (S) Colonel Ginn Interview.

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29. (S) Interview, Lt Col Alan F. Crites, Comdr, "E" Flight, 4th SOS, Udorn RTAFB, Thailand, with Maj R. F. Kott, 24 Aug 69;
(S) Ltr, Hq PACAF, DOCOO to DOTE, subj: Review of CHECO Rprt on "The Role of USAF Gunships in SEA (U), 20 Feb 70." (Hereafter cited: DOCOO Ltr to DOTE.)

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35. (S) Draft, Final Rprt, TAC OPlan 118, pp 21-25.

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APPENDIX I

GUNSHIP TYPES: COMPONENTS AND CHARACTERISTICS

SPOOKY COMPONENTS AND CHARACTERISTICS

GUNSHIP	SPOOKY
ACFT	AC-47
MISSION	AREA DEFENSE
AREA/TARGET	IN-COUNTRY AND OUT-COUNTRY/TROOPS IN CONTACT
ARMAMENT	3x7.62-MM MINI-GUNS FAST: 6,000 RDS/MIN (MXU-470/A) SLOW: 3,000 RDS/MIN
ARMOR	
ORDNANCE	21,000 RDS*
FCS	NONE-GUNSIGHT: FIXED RETICLE
TGT ACQ	VISUAL
ILLUMINATION	24-56 FLARES* MANUALLY DISPENSED
REACTION AIRSPEED	130K TAS
OPERATING ALTITUDE	3,000 FT AGL (OPTIMUM)
FUEL DURATION	7+00
TURNAROUND	30 MIN
ESCORTS	NONE
AIRCREW	2 PILOTS 1 NAV 2 GUNNERS 1 LOADMASTER 1 FLT ENGINEER
ONE ENGINE OUT	UNSATISFACTORY AT COMBAT GROSS WEIGHT

*Varies According to Mission.

SHADOW G COMPONENTS AND CHARACTERISTICS

GUNSHIP III	SHADOW
ACFT	AC-119G
MISSION	ARMED RECCE
AREA/TARGET	IN-COUNTRY/TROOPS IN CONTACT, MOVER, ETC.
ARMAMENT	4x7.62-MM MINI-GUNS FAST: 6,000 RDS/MIN SLOW: 3,000 RDS/MIN
ARMOR	2,000 LBS
ORDNANCE	31,500 RDS
FIRE CONTROL	COMPUTERIZED FCS INCORPORATING FULLY AUTO, SEMI-AUTO, MANUAL FIRING, OFF-SET CAPABLE
TGT ACQ (SENSOR)	NIGHT OBSERVATION SIGHT (NOS)
ILLUMINATION	ILLUMINATOR 1.5 MILLION CANDLEPOWER WITH 20-40 DPG VARIABLE BEAM (20KW). 24 FLARES DISPENSED FROM LAUNCHER
REACTION AIRSPEED	180K TAS
OPERATING ALTITUDE	3,500 FT AGL
FUEL DURATION	6+30
TURNAROUND	30 MIN
ESCORTS	NONE
AIRCREW	2 PILOTS 2 NAV: TABLE NAV, NOS OPR 1 ILLUM OPR 2 GUNNERS 1 FLT ENGINEER
ONE ENGINE OUT	UNSATISFACTORY AT COMBAT GROSS WEIGHT

SHADOW K COMPONENTS AND CHARACTERISTICS

GUNSHIP III	STINGER OR SHADOW K
ACFT	AC-119K
MISSION	ARMED RECCE/INTERDICTION
AREA/TARGET	IN-COUNTRY/TROOPS IN CONTACT, MOVERS, ETC. AND OUT-COUNTRY/TRUCKS, LOC'S
ARMAMENT	4x7.62-MM MINI-GUNS FAST: 6,000 RDS/MIN SLOW: 3,000 RDS/MIN 2x20-MM CANNON 2,500 RDS/MIN
ARMOR	2,000 LBS
ORDNANCE	31,500 RDS 7.62-MM 4,500 RDS 20-MM
FIRE CONTROL	COMPUTERIZED FCS, INCORPORATING FULLY AUTO, AUTO, MANUAL FIRING, OFF-SET CAPABLE
TGT ACQ (SENSORS)	NIGHT OBSERVATION SIGHT (NOS) INFRARED SIDE LOOKING RADAR
ILLUMINATION	ILLUMINATOR 1.5 MILLION CANDLEPOWER PENCIL BEAM (20-KW). 24 FLARES DISPENSED FROM LAUNCHER
REACTION AIRSPEED	180K+TAS
ALTITUDE	3,500 FT AGL (OPTIMUM)
FUEL DURATION	5+00
TURNAROUND	30 MIN
ESCORTS	NONE
AIRCREW	2 PILOTS 3 NAV, TABLE NAV, NOS OPS, RADAR/IR OPR 1 ILLUM OPR 3 GUNNERS 1 FLT ENGINEER
ONE ENGINE OUT	500 FPM CLIMB

SPECTRE COMPONENTS AND CHARACTERISTICS

GUNSHIP II	SPECTRE
ACFT	AC-130
MISSION	ARMED RECON/INTERDICTION
AREA/TARGET	OUT-COUNTRY/TRUCKS, LOC'S
ARMAMENT	4x7.62-MM MINI-GUNS FAST: 6,000 RDS/MIN SLOW: 3,000 RDS/MIN
	4x20-MM CANNON 2,500 RDS/MIN
ARMOR	5,000 LBS
ORDNANCE	15,000 RDS 7.62-MM 8,000 RDS 20-MM
FIRE CONTROL	COMPUTERIZED FCS, INCORPORATING FULLY AUTO, SEMI-AUTO, MANUAL FIRING, OFFSET CAPABLE
TGT ACQ (SENSORS)	NIGHT OBSERVATION DEVICE (NOD) INFRARED (IR) SIDE LOOKING RADAR IGNITION DETECTION
ILLUMINATION	ILLUMINATOR 1.5 MILLION CANDLEPOWER WITH 20-40 DFG VARIABLE BEAM (20KW) AND IR FILTER CAPABILITY. 24 FLARES DISPENSED FROM LAUNCHER
REACTION AIRSPEED	200K TAS
OPERATING ALTITUDE	5,500 FT AGL (OPTIMUM)
FUEL DURATION	6+30
TURNAROUND	1+30
ESCORTS	1xF4 (OF 3 ROTATING TO TANKER)
AIRCREW	2 PILOTS 3 NAV: TABLE NAV, NOD OPR, RADAR/IR 1 ILLUM OPR 3 GUNNERS 1 FLT ENGINEER
ONE ENGINE OUT	400 FPM CLIMB

APPENDIX II

GUNSHIPS EFFECTIVENESS

Statistical Data

Mission Function Analysis and Battle Damage Assessment

The information presented in this section was obtained mainly from the Hq 7AF Southeast Asia Data Base File (SEADAB) which is maintained by the Deputy Chief of Staff for Operations, Hq Seventh Air Force. The data base contains mission function data starting October 1967 whereas the Battle Damage Assessment (BDA) data begin September 1968. These dates were used as the starting points for the respective data.

Tables 1 through 6 present a summary of this information. The symbols below are keys to these tables:

CAS	Combat Air Support
AL	Airborne Alert
S	Strike
FD	Flare Drop
AB	Air Abort
AI	Air Interdiction
AR	Armed Reconnaissance
CAP	Combat Air Patrol
DAM	Damaged
DES	Destroyed
SEC	Secondary
KBA	Personnel Killed by Air

Certain observations might be made about this data. It describes the versatility of the weapon as well as the day to day manner in which it was employed and to what effect. It is evident that the AC-47 had as its primary mission in South Vietnam combat air support (CAS). Total AC-47 in-country action reached a peak in February 1968. Activity in general decreased until October

TABLE 1

AC-47 MISSION FUNCTION ANALYSIS SOUTH VIETNAM BY SORTIES

	CAS	AI	CAP	AL	FD	AB	OTHER	TOTAL
OCT 67	330	96				1	1	428
NOV 67	348	61		1				
DEC 67	404	66				1		410
JAN 68	496	97						593
FEB 68	641	100				18		759
MAR 68	493	65				161		719
APR 68	341	65				125		531
MAY 68	445	70				169		684
JUN 68	283	85				248	1	617
JUL 68	232	106			3	248		589
AUG 68	343	108			50	248	1	750
SEP 68	261	136			98	256		751
OCT 68	71	48			34	209		362
NOV 68	210	93	44		68	73	1	489
DEC 68	196	100	32		71	127	67	593
JAN 69	159	95	32	35	66	164	67	618
FEB 69	252	162	90	46	80	73	72	775
MAR 69	273	88	87	68	27	17	73	663
APR 69	193	122	115	25	49	2	54	560
MAY 69	30	169	164	5	44	4	68	484
JUN 69	24	103	153	25	40	1	70	416

TABLE 1 (Continued)

AC-47 BATTLE DAMAGE ASSESSMENT SOUTH VIETNAM*

	STRUCTURES DAM	/ DES	GUNS DAM	/DES	SEC FIRES	SEC EXP	SAMPANS DAM	/DES	KBA	ROADS TRAILS	CAVES TUNNELS
SEP 68	-	-	-	2	-	13	-	-	14	-	-
OCT 68	-	-	-	-	-	5	-	-	-	-	-
NOV 68	-	-	-	1	2	9		5	5	-	-
DEC 68	7	5	-	-	3	-	-	-	50	-	-
JAN 69	-	2	-	-	-	5	-	-	16	-	-
FEB 69	-	4	-	-	19	14	-	-	55	-	-
MAR 69	2	5	-	-	2	37	4	5	12	-	-
APR 69	-	-	-	-	7	3	1	1	14	-	-
MAY 69	5	13	-	-	13	16	-	7	15	-	1
JUN 69	-	-	-	1	3	8	-	1	3	-	1
JUL 69	3	5				6			46		
AUG 69		3				2			4	1	
SEP 69					2	4					

* Data for Oct 67 through Aug 68 not available.

TABLE 2

AC-47 MISSION FUNCTION ANALYSIS
LAOS BY SORTIES

	CAS	AL	S	FD	OTHER	TOTAL
DEC 68			1			1
JAN 69	3		3		3	9
FEB 69						
MAR 69	2		41	4		47
APR 69		1	80			81
MAY 69		3	63	5		71
JUN 69		4	29	4	1	38
JUL 69						
AUG 69						

AC-47 BATTLE DAMAGE ASSESSMENT LAOS

	TRUCKS DAM	TRUCKS DES	SEC FIRES	SEC EXP	KBA
DEC 68					
JAN 69					
FEB 69					
MAR 69			4	4	
APR 69	3	-	-	8	
MAY 69		2			5
JUN 69		3			
JUL 69				1	
AUG 69			1		

SECRET

SECRET

TABLE 3

AC-119 MISSION FUNCTION ANALYSIS SOUTH VIETNAM BY SORTIES

	CAS	AL	AI	CAP	FD	AB	OTHER	TOTAL
JAN 69	10	4	26		2	2	11	55
FEB 69	29	16	36		18	7	16	122
MAR 69	77	28	30	5	9	5	16	170
APR 69	182	26	66	8	5	6	9	302
MAY 69	193	1	84	41	25	5	8	357
JUN 69	233	19	15	17	23	2	-	309

AC-119 BATTLE DAMAGE ASSESSMENT SOUTH VIETNAM

	STRUCTURES DAM / DES	TRUCKS DAM/DES	GUNS DAM/DES	SEC FIRES	SEC EXP	SAMPANS DAM/DES	KBA
JAN 69			3	14	29		
FEB 69	1 1			14	7		
MAR 69				16	5		
APR 69	2			10	107		
MAY 69			1	45	78		
JUN 69	17		2	12	118	- 7	104
JUL 69	1		5	2	98	16 5	82
AUG 69				4	25	1 -	

TABLE 4

AC-119 MISSION FUNCTION ANALYSIS LAOS BY SORTIES*

	CAS	S	AI	UR	AR	FD	AB	OTHER	TOTAL
JAN 69				3	4	3			10
FEB 69		4		20	2	5	2		33
MAR 69		3		5	2				10

* AC-119 BDA for Laos not available.

TABLE 5

AC-130 MISSION FUNCTION ANALYSIS SOUTH VIETNAM BY SORTIES*

	CAS	AR	S	AI	CAP	FD	AB	TOTAL
OCT 67	8			8				16
NOV 67	2			2				4
DEC 67								
JAN 68								
FEB 68								
APR 68								
MAY 68								
JUN 68	5							5
JUL 68	8			14				22
AUG 68	18	1		2			1	22
SEP 68	8			9			1	18
OCT 68				1				1
NOV 68	6			8	1	2		17

* The reported AC-130 BDA in South Vietnam for this period was: 1 gun destroyed in Sep 68; 10 secondary fires and 6 secondary explosions in Sep 68; 1 sampan destroyed in November 68.

TABLE 6

AC-130 MISSION FUNCTION ANALYSIS
LAOS BY SORTIES

	AR	S	CAP	FD	AB	OTHER	TOTAL
OCT 67							
NOV 67	6	1					7
DEC 67							
JAN 68							
FEB 68	1	1					2
MAR 68	6	15					21
APR 68	10	1					11
MAY 68	12	5			1		18
JUN 68	3	6					9
JUL 68							
AUG 68							
SEP 68							
OCT 68							
NOV 68	3	3		1			7
DEC 68	22	23			3	1	49
JAN 69	20	39			3		62
FEB 69	32	37		3	5		77
MAR 69	14	62		86	5	5	172
APR 69	23	55		82	3	1	164
MAY 69	74	47	131	1	7		260
JUN 69	47	19	81		15		162
JUL 69							
AUG 69							
SEP 69							

TABLE 6 (Continued)

AC-130 BATTLE DAMAGE ASSESSMENT*
LAOS

	STRUCTURES DAM	/ DES	TRUCKS DAM	DES	GUNS DAM	DES	SEC FIRES	SEC EXP	SAMPANS DAM	DES	KBA
DEC 68	-	-	19	60	-	3	25	50	-	-	-
JAN 69			68	102	1	3	89	100	1	-	-
FEB 69	-	-	77	116	-	1	168	281	1	-	-
MAR 69	-	-	66	119	-	-	196	450	-	-	-
APR 69	-	-	70	356	-	7	376	654	1	5	-
MAY 69	-	-	180	387	-	5	437	804	1	4	-
JUN 69	-	-	25	37	-	-	74	586	-	18	30
JUL 69	-	-	7	20	-	-	72	399	3	1	240
AUG 69	-	8	7	19	-	-	61	295	1	1	4
SEP 69	-	4	12	14			61	82	17	1	429

* Data for Oct 67 through Nov 68 not available.

1968 which, perhaps, was a function of reduced enemy movement during the wet season.

The AC-130 program in Laos showed a rapid build up in activity after October 1968 as the dry season began. Armed reconnaissance, strike, and combat air patrol were the dominant missions, with truck killing as the primary role. The total sorties flown by the various gunships both in-country and out-country are shown by Figures 1 and 2.

Figure 1 (total sorties in-country) indicates that the primary gunship used in South Vietnam was the AC-47. The AC-130 was used sparingly as a prototype in combat test until December 1968 when it was phased out of RVN operations. That month, the AC-119 was introduced in South Vietnam with the record showing a continued increase in its use from that time onward.

Figure 2 shows the level of participation of the AC-130 Spectre in the conduct of operations in Laos. The increased utilization of gunships in an interdiction role is readily apparent in this chart through the sortie rate for the AC-130s which were used primarily as truck killers. The AC-47s were increasingly used in BARREL ROLL in support and defense of Lima Sites.

Figure 3, in showing in/out-country total gunship sorties, provides a record of the introduction of the gunship in the out-country war. The level of activity, though increasing out-country, remained well below in-country utilization.

Effectiveness of the AC-130 Against Trucks in Laos

Concurrent with the writing of this CHECO report, a study was being prepared by the office of analysis, Directorate of Operations, Hq Seventh Air Force, which compared the effectiveness of various Air Force aircraft against enemy trucks in Southern Laos during the 1968-1969 Northeast Monsoon (time period 1 Sep 68 - 30 Apr 69). These aircraft were the A-1, A-26, AC-123, AC-130, B-57, F-4, F-100, and F-105.

Three sources of data were used: (1) SEADAB; (2) the Hq 7AF Mission Summary File (IDHS), which was a file maintained by the Deputy Chief of Staff for Intelligence and (3) a special computer program written for the L&N Card File (a file of out-country target nominations and sortie/BDA data maintained by DOA, Hq 7AF). The L&N Card File provided information on truck kills as a function of convoy size.

Two measures of effectiveness in comparing aircraft against one another in killing trucks were used. The first was trucks damaged or destroyed (D/D) per sortie, and the second, trucks D/D per attack. These measures are presented in Table 7:

TABLE 7

TRUCK KILLING EFFECTIVENESS
(Night Operations Only)

Type Aircraft	TRUCKS DES/DAM per Sortie	TRUCKS DES/DAM per Attack
A-1	.41	.36
A-26	.82	
A-26	.82	.58

Type Aircraft	TRUCKS DES/DAM per Sortie	TRUCKS DES/DAM per Attack
AC-123*	3.94	1.20
AC-130*	4.59	1.04
B-57	.55	.54
F-4	.23	.22
F-100	.38	.32
F-105	.21	.18
Overall	.76	.55

* AC-123 and AC-130 often utilized 2 A-1 and F-4 escorts, respectively. The effectiveness values do not consider the number of escort sorties flown. Some aspects of the gunship/escort relationship and escort effectiveness are treated in Chapter III of the basic report.

The AC-130 ranked first in trucks D/D per sortie and followed close behind the AC-123 in trucks D/D per attack (see Appendix IV). Both the AC-130 and AC-123 were the best two truck killers using these measures of effectiveness.

The effectiveness of the AC-130, that is represented by the above figures can also be shown another way. The relative contribution of the AC-130 to the total USAF strike effort and to the total trucks killed at night is shown in Table 8.

TABLE 8

AC-130 RELATIONSHIP TO USAF STRIKE EFFORT

	Total	% AC-130
All Sorties Flown	18,775	0.8
Truck Sorties**	6,895	4.5
Trucks D/D	5,265	27.3

** Sorties where an attack is made against a truck.

In discriminating between the two alternative measures of effectiveness, certain other factors were considered. For example, there were average differences in the attacks per sortie for various aircraft. These resulted partly from differences in loitering time, other factors such as sensing devices carried aboard the aircraft, and whether the aircraft could carry sufficient ordnance for several attacks against trucks. The following table represents attacks per sortie and on-station loitering time for each aircraft.

TABLE 9

AVERAGE NUMBER OF ATTACKS AGAINST TRUCKS
DURING TRUCK SORTIE IN SOUTHERN LAOS

Type Aircraft	Attacks per Sortie (Night)	On Station Loiter Time (HRS) Per Sortie
A-1	1.15	3.00
A-26	1.42	2.50
AC-123	3.29	3.00
AC-130	4.41	3.50
B-57	1.02	1.00
F-4	1.08	.83
F-100	1.17	.66
F-105	1.17	.66

During the time period considered, it was also possible to evaluate certain probabilities (which may have a large variance because of sample sizes) for the number of trucks destroyed and damaged by one AC-130 against various size convoys. This is presented in the following table:

TABLE 10

PROBABILITY OF DESTROYING OR DAMAGING TRUCKS FOR
AN ATTACK BY ONE AC-130 AT NIGHT ON A CONVOY OF N TRUCKS

Convoy Size (N)	0	1	2	3	4	5	6	7	8	9	10	E(n)*
1.	.41	.59										.59
2.	.27	.34	.39									1.12
3.	.19	.24	.28	.29								1.67
4.	.15	.18	.22	.24	.21							2.18
5.	.12	.15	.18	.20	.20	.15						2.66
6.	.10	.12	.16	.17	.18	.14	.13					3.15
7.	.08	.11	.14	.15	.15	.14	.12	.11				3.63
8.	.07	.10	.12	.13	.14	.13	.12	.10	.09			4.08
9.	.06	.09	.11	.12	.13	.12	.11	.10	.09	.07		4.50
10.	.06	.08	.10	.11	.12	.12	.11	.09	.08	.07	.06	4.85

* Where E(n) is the average number of trucks destroyed or damaged for various convoy sizes.

The table reveals that approximately one-half of the trucks in a convoy can be expected to be destroyed or damaged regardless of the size of the convoy, though there does appear a slight decrease in the trucks destroyed or damaged as the convoy size increases.

Responsiveness to Requests for Air Support

In October 1969, DOA, 7AF, prepared a special report entitled "Survey of

Air Force Responsiveness to Immediate ASAP Requests for Air Support." The survey revealed that the majority of AF jet fighters, scrambled from ground alert, responded to immediate requests for air support in 40 minutes or less. Most gunship responses, on the other hand, came from air divert, not ground alert resources; the majority of gunship air divert response times was 24 minutes or less.

Response time for both scrambled and diverted gunship missions was defined as that period from the receipt of an immediate ASAP request for support by the DASC until the ordnance (flares or firepower) was delivered. The DASC had direct scramble and divert authority except in the case of gunships assigned at Tan Son Nhut where the TACC was also located. All fighter missions and diversions throughout Vietnam required TACC processing except in I Corps, where HORN DASC could divert and then inform TACC.

The DOA survey sampled only in-country AC-47 and AC-119 responses for night missions only. Figure 4 shows a cumulative distribution of air divert and ground alert gunship response times to immediate requests. Fifty percent of the times were 30 minutes or less and seventy-five percent were 48 minutes or less. Air divert and ground alert scramble missions were compared in Figure 5.

The ability of the gunships to acquire targets quickly is demonstrated in Figure 6 which measures holding time. Gunship holding time started at rendezvous in the target area and ended when the aircraft began firing or dropped flares. (Although response times were tabulated for flare drops, they represented only a small portion of the sample--less than 7 percent.) In almost

70 percent of the cases there was no delay between rendezvous and target engagement. But where delays did occur, the delay was 25 minutes or more.

Gunship Losses

Gunship vulnerability has been frequently mentioned in the body of this report. Some combat losses have been described. Table 11 provides a chronology of gunship losses since their introduction into the SEA conflict in December of 1964. Thirteen of the losses were classified as combat losses (CL) with eight of them known to have been downed by ground-to-air gunfire. VNAF gunship losses are included in the total loss count. Of the four operational losses (OL), one resulted from a mid-air collision, two from pilot error (PE) and one attributed to mechanical failure.[5/]

TABLE 11

CHRONOLOGY OF GUNSHIP LOSSES IN SEA

SERVICE	DATE YR/MO/DA	TYPE AIRCRAFT	TYPE LOSS	CAUSE
USAF	651217	AC-47	CL	Ground fire
USAF	651224	AC-47	CL	Unknown
USAF	660309	AC-47	CL	Ground fire
USAF	660313	AC-47	CL	Unknown
USAF	660515	AC-47	CL	Unknown
USAF	660603	AC-47	CL	Ground fire
USAF	670109	AC-47	CL	Ground fire
USAF	670323	AC-47	CL	Ground fire
USAF	670329	AC-47	CL	Ground fire

SERVICE	DATE YR/MO/DA	TYPE AIRCRAFT	TYPE LOSS	CAUSE
USAF	680215	AC-47	CL	Unknown
USAF	680403	AC-47	UL	Unknown
USAF	681214	AC-47	OL	Mid-air Collision
USAF	690524	AC-130	CL	Ground fire
VNAF	690814	AC-47	CL	Ground fire
VNAF	690816	AC-47	OL	Pilot Error
VNAF	690905	AC-47	OL	Pilot Error
USAF	691011	AC-119	OL	Mechanical Failure

SOURCE: (S) SEADAB, Hq 7AF, Oct 67-Sep 68, 31 Oct 69, and Working Papers.

The 17 gunship losses listed here lend themselves to speculation and qualitative judgments, but they clarify why there has been so much concern for the vulnerability/survivability factors.

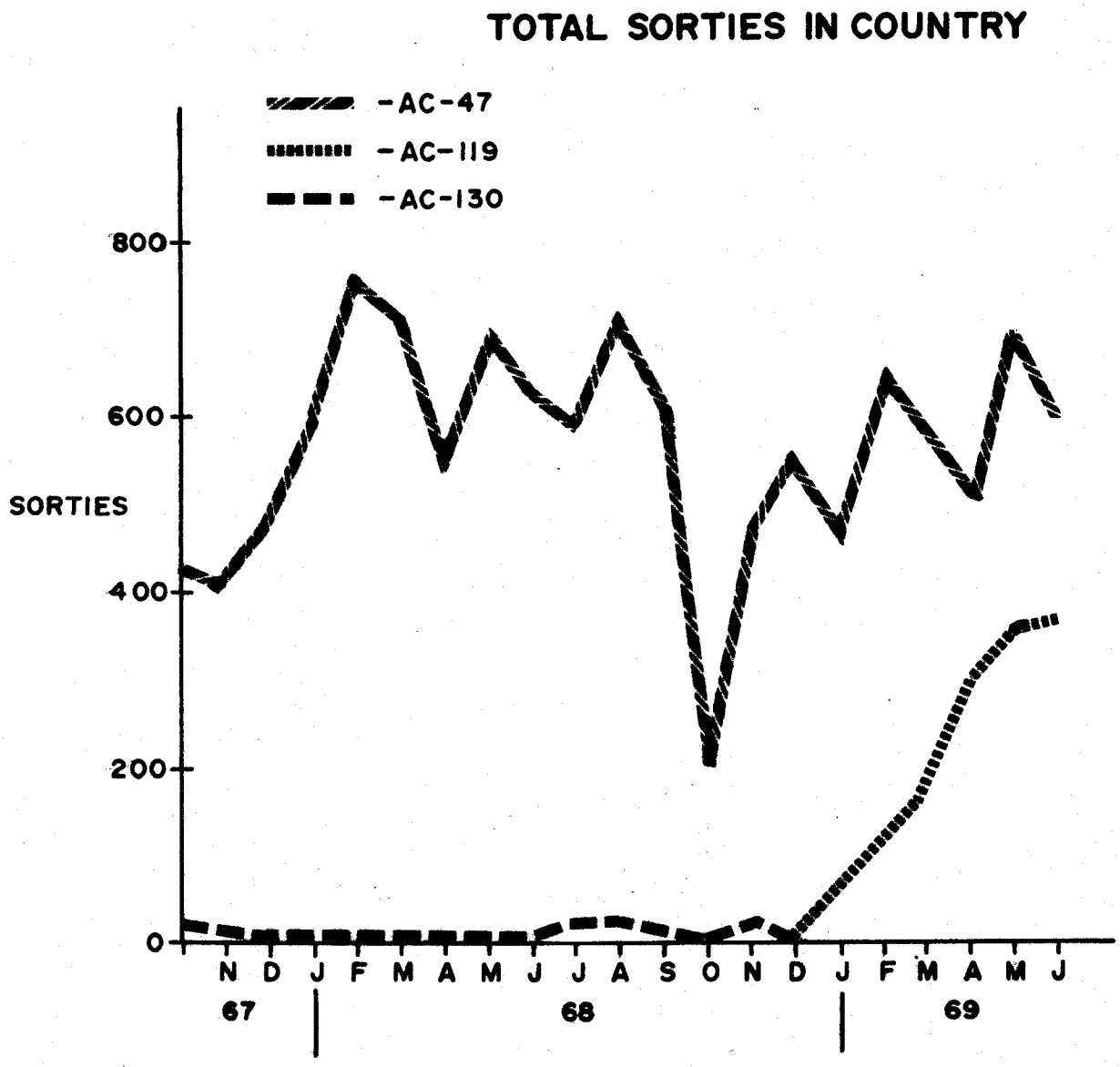


FIGURE 1
(APP. II)

TOTAL SORTIES OUT COUNTRY

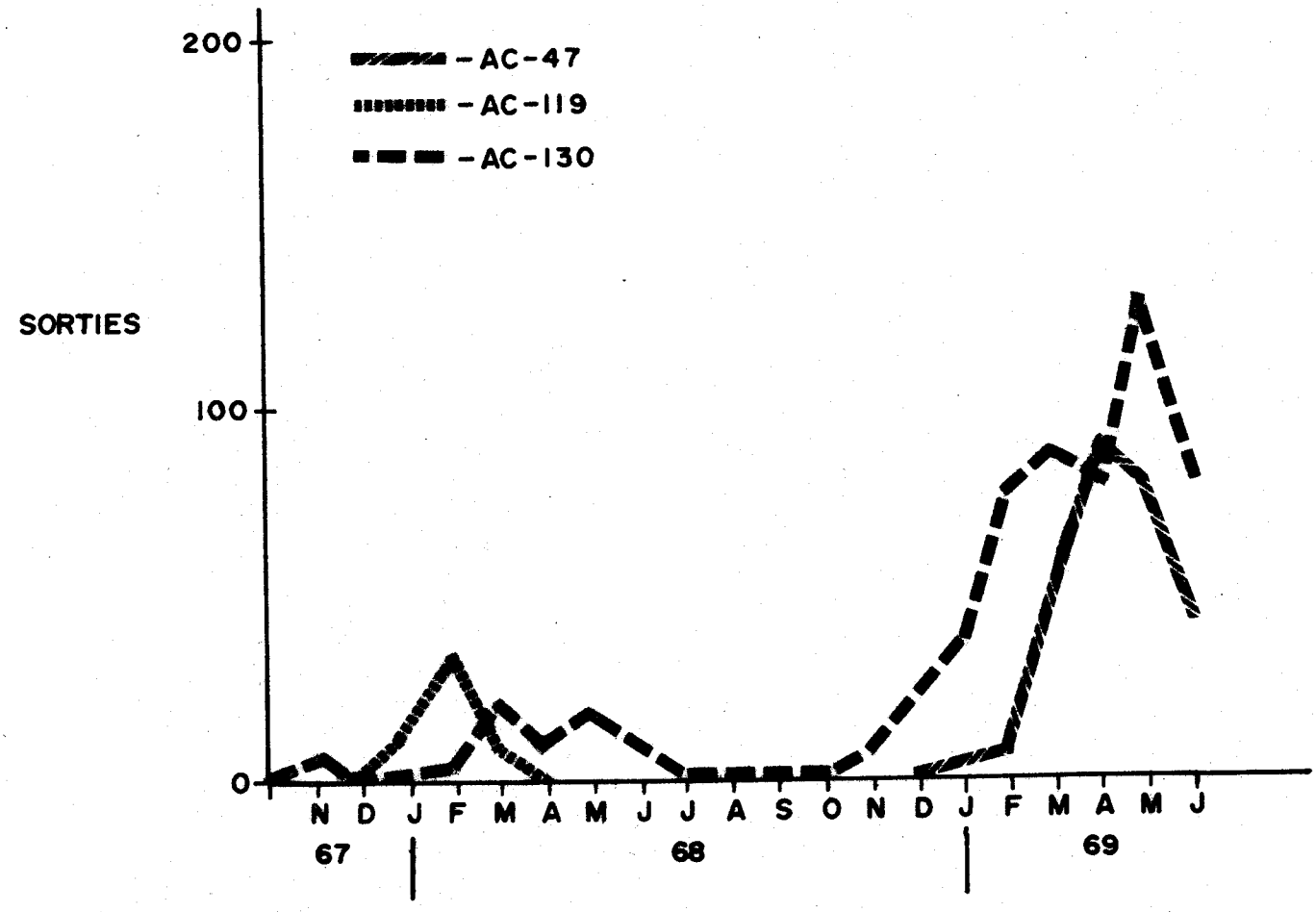


FIGURE 2
(APP. II)

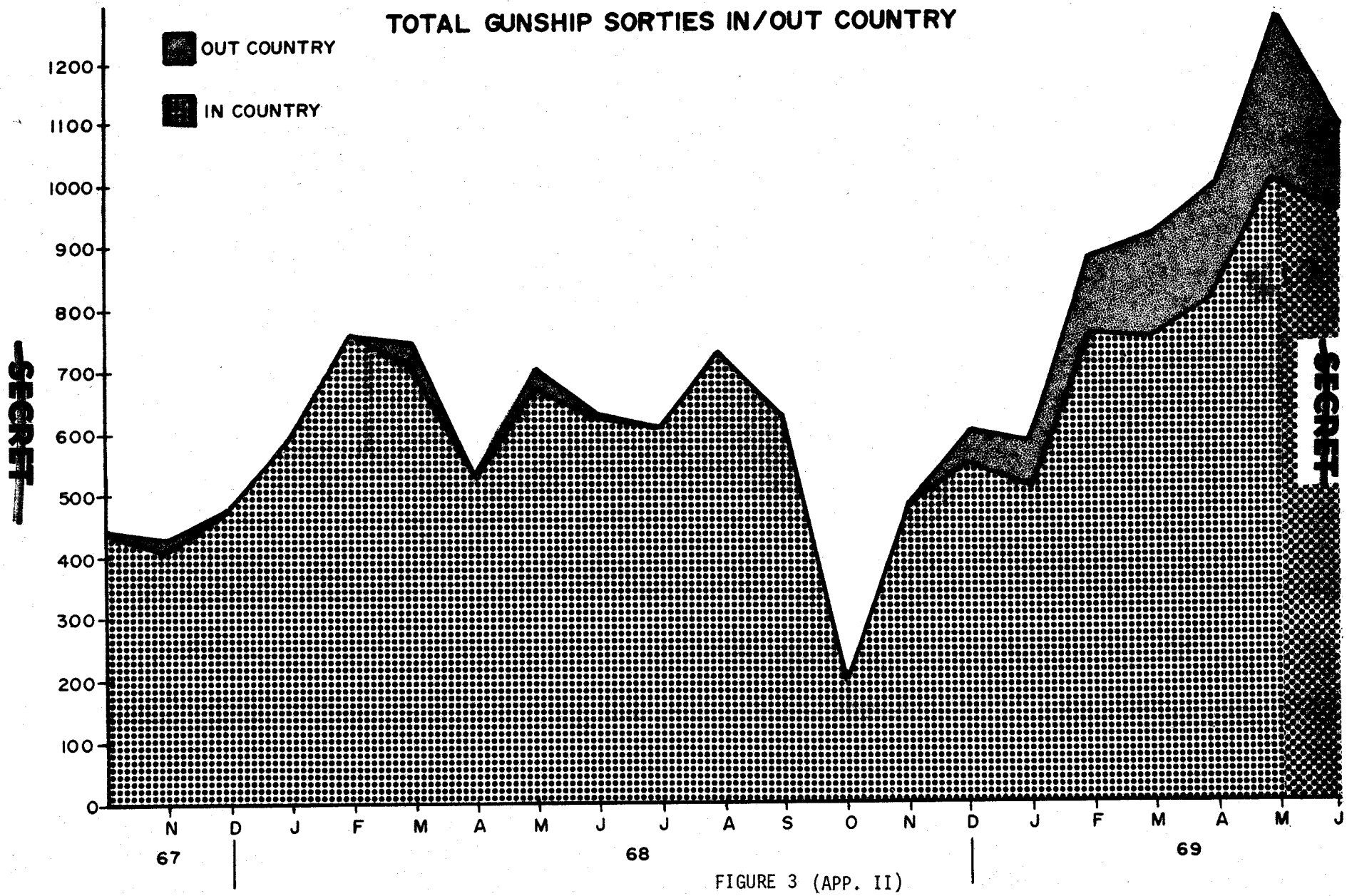
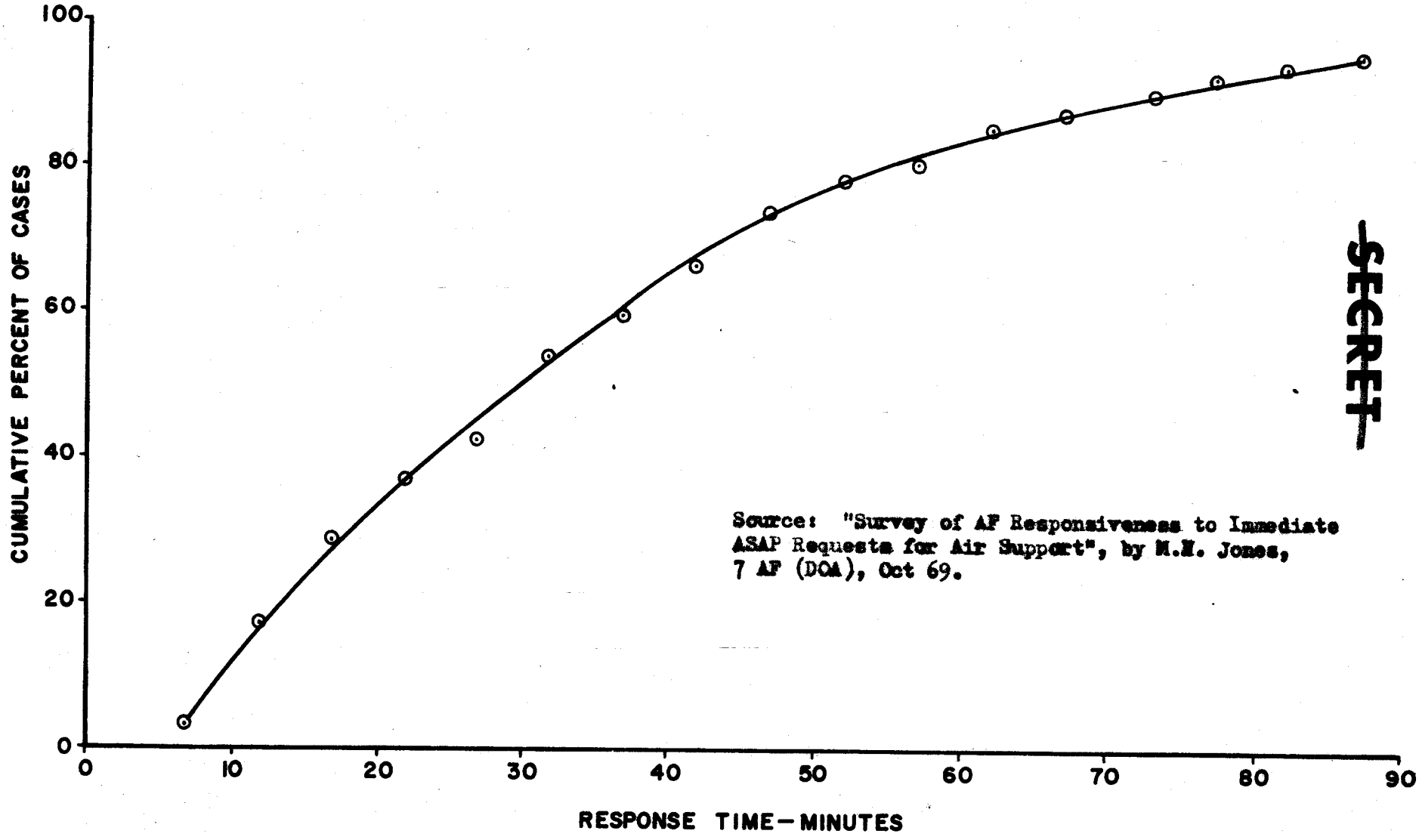


FIGURE 3 (APP. II)

SECRET

CUMULATIVE DISTRIBUTION OF GUNSHIP RESPONSE TIMES
SAMPLE OF 129 IMMEDIATE RESPONSES, 98 AIR DIVERT, 31 GROUND ALERT
RVN, SEPTEMBER 1969

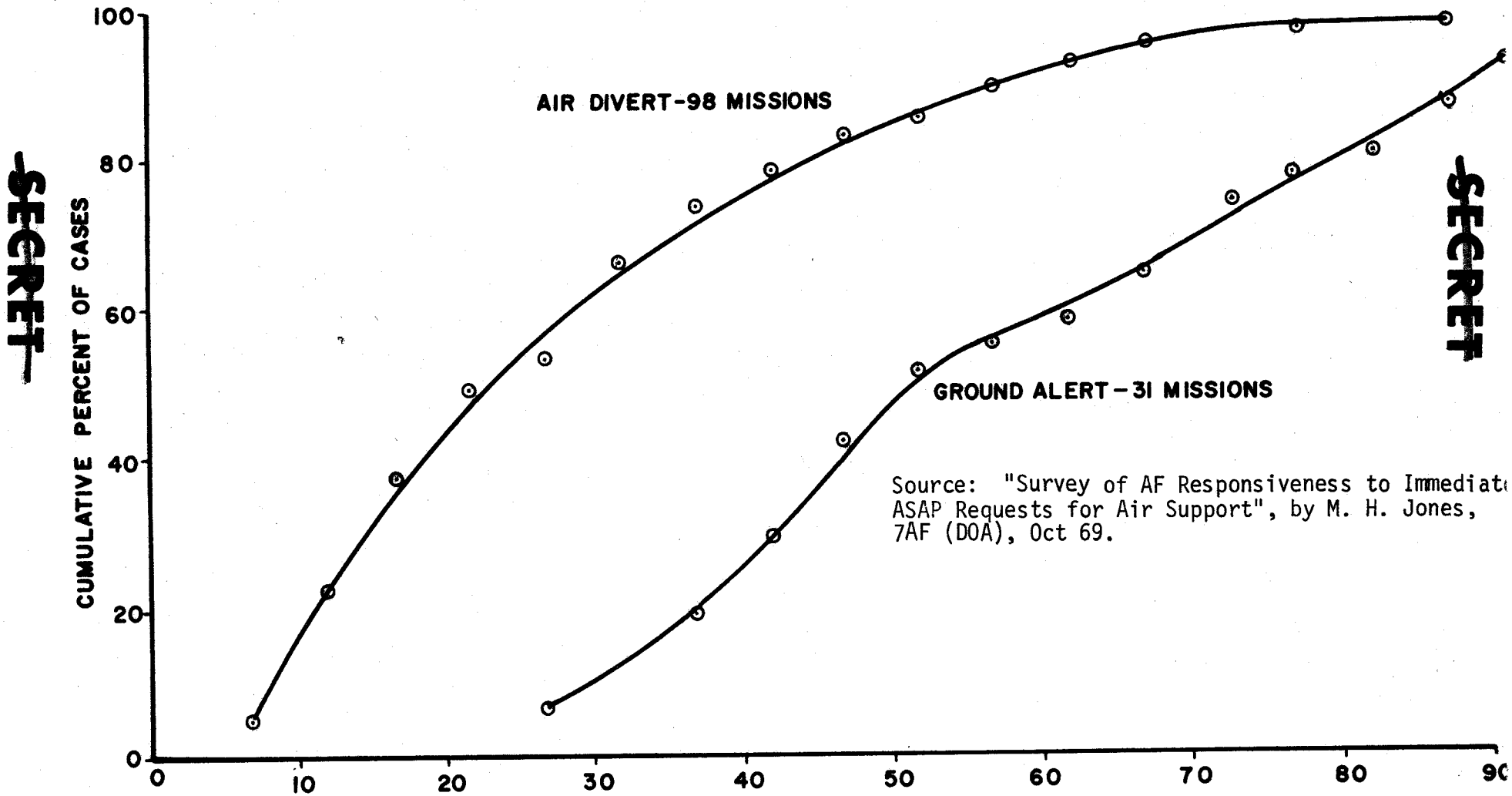


Source: "Survey of AF Responsiveness to Immediate ASAP Requests for Air Support", by M.M. Jones, 7 AF (DOA), Oct 69.

SECRET

FIGURE 4 (APP, II)

CUMULATIVE DISTRIBUTION OF GUNSHIP RESPONSE TIMES
SAMPLE OF 129 IMMEDIATE RESPONSES, 98 AIR DIVERT, 31 GROUND ALERT
RVN, SEPTEMBER 1969



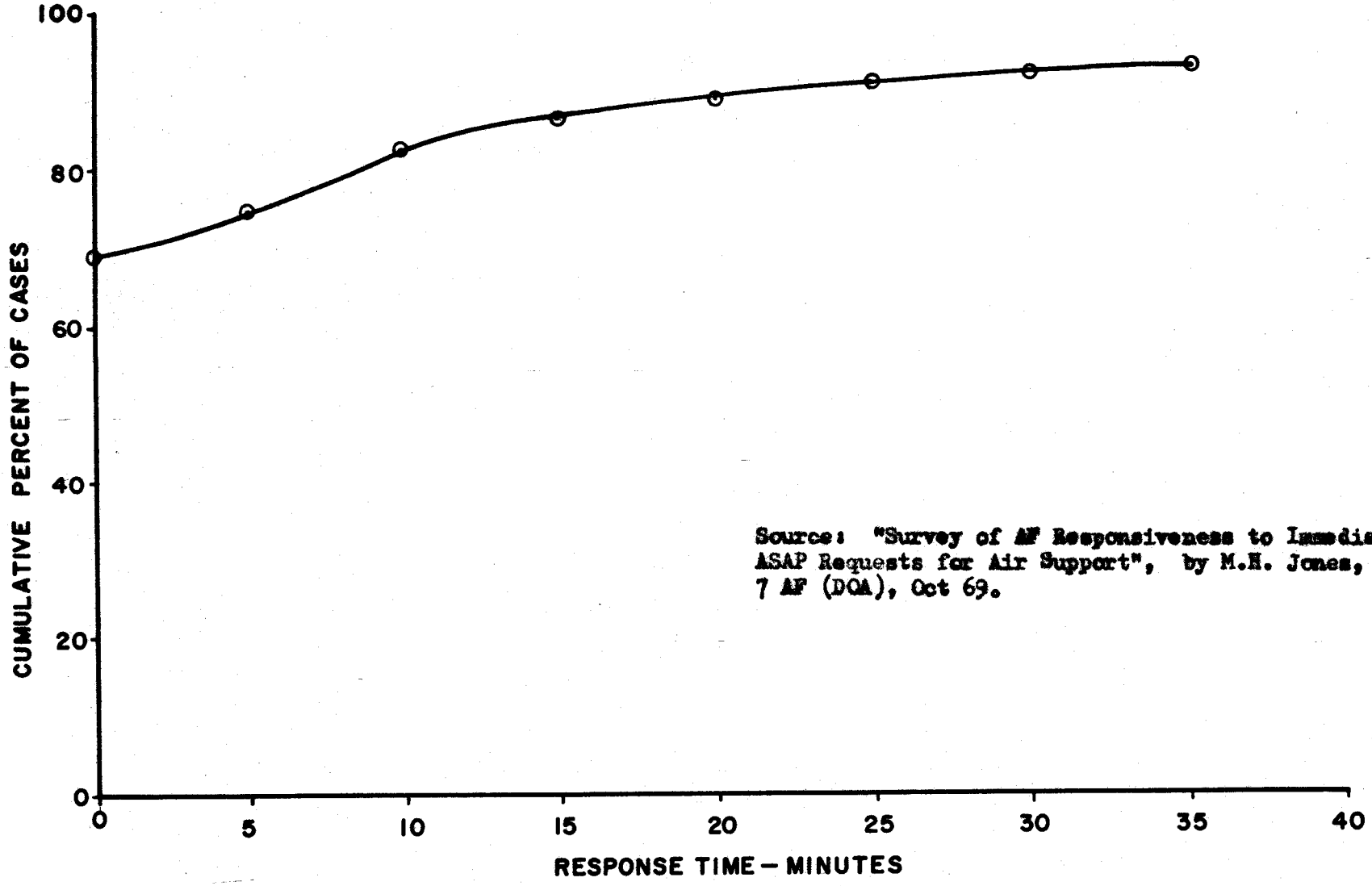
Source: "Survey of AF Responsiveness to Immediat
ASAP Requests for Air Support", by M. H. Jones,
7AF (DOA), Oct 69.

FIGURE 5 (APP. II)

SECRET

FIGURE 6 (APP. II)

CUMULATIVE DISTRIBUTION OF GUNSHIP HOLDING TIMES
SAMPLE OF 98 IMMEDIATE MISSIONS - AIR DIVERT ONLY
RVN, SEPTEMBER 1969



Source: "Survey of AF Responsiveness to Immediate ASAP Requests for Air Support", by M.H. Jones, 7 AF (DOA), Oct 69.

SECRET

APPENDIX III

AC-130 BATTLE DAMAGE ACCIDENT REPORT

DTG: 25/1041Z MAY 69

FROM: 8TH TAC FTR WG UBON AFLD THAI

TO: 13 AF CLARK AB PI

INFO: 7 AF TSN RVN

7/13 AF UDORN RTAFB THAI

SECRET/PAFOB/JOPREP JIFFY/WC

SUBJECT: AC-130 BATTLE DAMAGE ACCIDENT, 24 MAY 69 (C)

FOR GEN GIDEON FROM COL STANFIELD.

AT CREW INTEL BRIEFING 1630 L 24 MAY 69, CREW WAS ADVISED THAT AN EFFORT WAS BEING TAKEN BY THE ENEMY TO DOWN AN AC-130 (REF 7AF MSG (S) 230935Z MAY 69). TOOK OFF AT 1840L, PROCEEDED TO TARGET AREA 92C, AND D. ARRIVED IN TARGET AREA AT 1935L AND EFFECTED JOIN UP WITH FIGHTER ESCORT, NETTLE ONE. WEATHER WAS APPROX 12,000 THIN BROKEN WITH A QUARTER MOON. 1940L MOD OPERATOR OBSERVED A MOVER. A FIRING PASS WAS MADE WITH FAC. MOVED SOUTH ON 92 C TO INTERSECTION OF 92 AND 914. TURNED ON 92C TO HEADING OF 120 DEGREES. JUST AFTER ROLL OUT ON HEADING, ILLUMINATOR OPERATOR REPORTED AAA AT 6 O'CLOCK, ACCURATE. TEN ROUNDS WERE SEEN, FOUR ON EACH SIDE, WITH THE AIRCRAFT BEING STRUCK BY AN ESTIMATED TWO ROUNDS. ONE IN TAIL SECTION AND ONE IN FUSELAGE AT UNKNOWN POSITION. THE MOON WAS AT 6 O'CLOCK AND THE AIRCRAFT COMMANDER DID NOT CONSIDER IT TO HAVE SILHOUETTED THE AIRCRAFT. AAA SUCCESS IN THIS INSTANCE WAS A NORMAL COMBAT HAZARD RESULTING FROM OPERATIONS IN A NON-PERMISSIVE AREA.

CREW WAS SEARCHING FOR TRUCKS IN STRAIGHT AND LEVEL FLIGHT. THESE WERE THE FIRST ROUNDS ENCOUNTERED IN THIS PARTICULAR AREA. TURN WAS STARTED TO THE WEST. IMMEDIATELY AFTER ROLL OUT ON WESTERLY HEADING UTILITY HYDRAULIC SYSTEM FAILED. REPORT ON CREW MEMBERS INDICATED ILLUMINATOR OPERATOR SERIOUSLY WOUNDED. ACFT MEMBERS WERE INSTRUCTED TO AID INJURED MAN. WITHIN SECONDS OF LOSS OF UTILITY SYSTEM, BOOSTER HYDRAULIC SYSTEM FAILED AND CONTROL OF AIRCRAFT WAS LOST TEMPORARILY. AIRCRAFT STARTED A LEFT ROLLING NOSE DOWN TURN. THE WING FLAPS WERE 50 PERCENT (NORMAL CONFIGURATION FOR FIRING ORBITS) AND COULD NOT BE RAISED. AS POWER WAS APPLIED TO KEEP AIRSPEED UP, NOSE OF AIRCRAFT CAME UP AND A NEAR UNCONTROLLABLE CLIMB RESULTED. TO CORRECT THIS THE A/C & CP BRACED THE CONTROL COLUMN TO THE FULL FORWARD POSITION AND BROUGHT CREW MEMBERS TO THE FLIGHT DECK. FLIGHT ENGINEER CHECKED ALL ELECTRICAL CIRCUITS TO INSURE PROPER OPERATION. ALL CIRCUIT BREAKERS WERE IN, HOWEVER, THERE WAS NO RUDDER OR ELEVATOR TRIM AND AUTO PILOT WAS INOPERATIVE. FLIGHT ENGINEER THEN CHECKED ACFT CONTROL BOOSTER PACKAGES AND REPORTED BOTH ELEVATOR CONTROL CABLES CUT AND RUDDER AND ELEVATOR BOOSTER PACKAGES DAMAGED. THIS CAUSED JAMMING OF THOSE CONTROLS. REASON FOR JAMMED AILERON IS UNKNOWN. HEADING AND ALTITUDE ON RETURN TO UBON WAS ACCOMPLISHED WITH AILERON TRIM AND ENGINE POWER PLUS RELOCATION OF CREW MEMBERS. DURING RETURN TO BASE CONTACT WAS ESTABLISHED WITH CONTROLLING AGENCIES. ALL KNOWN INFORMATION WAS PASSED. ILLUMINATOR OPERATOR DIED. THE PHOTOGRAPHER REPORTED HIMSELF WOUNDED. INITIAL CONTACT WITH WOLF PACK (8TFW TOC) WAS AT 1955L, 045 RADIAL/90NM DME CHANNEL 76. AFTER DISCUSSION WITH WOLF PACK, AIRCRAFT COMMANDER ELECTED TO HAVE NON-ESSENTIAL CREW MEMBERS BAIL OUT. AT 19DME CREW WAS ORDERED TO BAIL OUT. PILOT, COPILOT, AND FLIGHT ENGINEER WERE TO REMAIN ABOARD PLUS BODY OF ILLUMINATOR OPERATOR. IT TOOK BOTH

PILOTS TO CONTROL THE AIRCRAFT. BAIL OUT FOR EITHER WAS IMPOSSIBLE. THE FLIGHT ENGINEER WAS NEEDED TO MANUALLY LOWER THE GEAR. THIS HE COMPLETED AT 9DME. ABOUT A MINUTE PRIOR TO TOUCHDOWN HE REPORTED HE WAS SECURED IN REAR OF AIRCRAFT (SPECIFIC POSITION UNKNOWN). WHEN ENGINE POWER WAS SLIGHTLY REDUCED TO PLACE AIRCRAFT ON RUNWAY, AIRCRAFT NOSE DROPPED AND IMPACTED VERY HARD ON APPROACH END OF RUNWAY. AIRCRAFT BOUNCED AND HIT RUNWAY ON MAIN GEAR AND THEN NOSE WHEEL. REVERSE WAS APPLIED TO ALL FOUR ENGINES BUT ENGINES DID NOT RESPOND TO REVERSE. INSTEAD POSITIVE POWER INCREASED UNTIL THROTTLE AGAIN RETURNED TO MINIMUM POWER. AFTER APPROXIMATELY 2000 FEET OF TRAVEL ON RUNWAY, AIRCRAFT STARTED A TURN TO THE RIGHT. LEFT RUDDER WAS APPLIED BUT RUDDER WAS STILL FROZEN. NOSE WHEEL STEERING WAS INOP DUE TO LOSS OF UTILITY HYDRAULIC SYSTEM. POWER WAS APPLIED ON NUMBER 3 AND 4 ENGINES IN ATTEMPT TO STRAIGHTEN AIRCRAFT BUT THIS HAD NO EFFECT. AT THAT TIME AIRCRAFT LEFT RUNWAY AND RIGHT WING STRUCK BAK 13 SHELTER. AIRCRAFT BECAME AIRBORNE AT THE SAME TIME AFTER RICOCHETING OFF THE LARGE MOUND OF DIRT WHICH COVERS BAK 13 CABLE. (BAK 13 UNDAMAGED). THE AIRCRAFT BURST INTO FLAMES AS RIGHT WING WAS TORN OFF. AIRCRAFT THEN HIT BAK 13 COMPLEX AND CAME TO REST WITH BAK 12 ENGINE IMBEDDED IN RIGHT SIDE OF FUSELAGE. COPILOT EVACUATED AIRCRAFT AND WAS FOLLOWED BY PILOT. DURING THEIR EVACUATION THE FLIGHT ENGINEER WAS NOT NOTICED AND WAS ASSUMED TO HAVE ESCAPED. AIRCRAFT WAS TOTALLY DARK WITH THE INITIAL FIRE RESTRICTED TO BOTH SECTIONS OF THE WING. COPILOT AND PILOT WERE OUT OF AIRCRAFT; IT WAS DISCOVERED THAT A NAVIGATOR SENSOR OPERATOR HAD ALSO RIDDEN THROUGH THE CRASH LANDING IN THE IR BOOTH AND HAD EVACUATED THROUGH THE REAR TROOP DOOR UNHARMED. BY THE TIME HIS TURN TO BAIL OUT ARRIVED HE FELT IN HIS OWN MIND THAT IT WAS TOO LATE TO GO SAFELY. THE FLIGHT ENGINEER COULD NOT BE LOCATED IMMEDIATELY AFTER CRASH.

HIS REMAINS HAVE BEEN IDENTIFIED IN THE WRECKAGE. PRIOR TO LANDING, RUNWAY HAD BEEN FOAMED FROM 100 FT FROM OVERRUN OF RUNWAY 23 TO 3000 FEET MARKER. ON SCENE COMMANDER WAS ADVISED OF MK 24 FLARES, GROUND MARKERS, AND 20-MM AND 7.62 AMMO WHICH COULD NOT BE JETTISONED AND THREE SOULS PLUS THE KIA ON BOARD. FIREFIGHTING EQUIPMENT WAS ON SCENE WITHIN 30 SECONDS OF THE TIME THE AIRCRAFT STOPPED. EQUIPMENT INCLUDED ONE (1) -P2 AND (2) O-11AS, ONE (1) 1500WD, ONE (1) R-2, ONE (1) P-6, AND ONE (1) 6-PAX CHIEFS VEHICLE. FIREFIGHTING EFFORT WAS CONCENTRATED FROM CENTER OF FUSELAGE FORWARD AND THE LEFT WING. AFTER APPROXIMATELY 10 MINUTES THE FIRE HAD BEEN NEARLY SUBDUED; HOWEVER, WITHDRAWAL WAS ORDERED WHEN FIRE TRUCKS BEGAN RUNNING OUT OF AGENTS AND 20-MM BEGAN COOKING OFF. EXCEPT FOR EMPENNAGE, AIRCRAFT WAS CONSUMED BY FLAMES. AGENTS USED WERE 5500 GALS WATER, 550 GALS FOAM, AND 20 GALS CB. SIX OF SEVEN CREWMEN WHO EVACUATED WERE PICKED UP BETWEEN 2115L AND 2145L BY UBON RESCUE HELICOPTER, DET 3, 38ARS, AND ONE BY JOLLY GREEN 71, 40 ARRS, NAKHON PHANOM. GP-4.

APPENDIX IV

BLACK SPOT

This appendix provides a reference for comparison of the AC-123 BLACK SPOT to the side-firing gunship. It is based on information contained in the February 1969 "Trends, Indicators, and Analysis/Air Operations" report prepared and published by the Directorate of Operations, DCS Plans and Operations, Headquarters USAF.

The BLACK SPOT weapon system was essentially a transport aircraft converted to a night/all-weather attack configuration. Unlike the gunship which used machine guns, BLACK SPOT was a "bomber." Developed under the USAF Project SHED LIGHT program, which sought to improve airborne systems for more effectively impeding enemy night logistics operations in SEA, BLACK SPOT was fitted with several sensor devices and a weapons delivery capability.

Sensor System. The BLACK SPOT sensor system was composed of Low Light Level Television (LLLTV), Forward Looking Infrared (FLIR), Forward Looking Radar (FLR), and a laser ranger which was used in conjunction with the LLLTV and FLIR. (The LLLTV, FLIR and laser ranger were mounted in a movable ball turret and the radar was located in a nose radome. Each sensor detected different unique target characteristics, which when compared, contributed to total target recognition.

LLLTV. The LLLTV system consisted of a TV camera and display scope to permit the operator to detect and identify ground targets under conditions of low ambient lighting. Cursors on the TV display provided the operator with a means of feeding target position information and weapons delivery data into the computer for automatic or manual delivery of munitions. The LLLTV camera was precisely aligned with the laser ranger which provided air-to-ground ranging information.

FLIR. The FLIR System employs an IR scanner which was designed to provide a means of detecting targets of a different temperature than the surrounding background. A

typical nighttime temperature difference of 1.5 degrees between wood and water was sufficient for the FLIR to detect a sampan up to a range of 4,000 feet. Hot targets such as motor vehicles and camp stoves were even more susceptible to detection.

Laser Ranger. The laser ranger, used in conjunction with LLLTV and FLIR, used an optical ranging device which operated just outside of the visible light range. It provided a means of determining the slant range from the aircraft to the ground target along the bore sight axis of the laser beam. The laser signals reflected by the target were automatically introduced into the weapons release computer.

Sensor Housing. The fiberglass ball turret assembly was mounted in the nose under-section. The bottom half had two windows (for the LLLTV and laser ranger) and one lens port for the FLIR. The turret was gimbaled, and provided a means for positioning the three electro-optical sensors which were boresighted with respect to each other. The FLIR antenna was located within an enlarged fiberglass nose radome.

Sensor Display Compartment. A specially designed, environmentally controlled compartment was provided for the control and display equipment and the operators necessary to perform the BLACK SPOT tasks. In addition to air-conditioning and soundproofing, the compartment provided some armor protection against small arms fire.

Computer. The heart of the weapon system was an analog computer which provided the necessary computations for target positioning and weapons release. It permitted the systems operators to fully exploit the capabilities of the BLACK SPOT sensors, provided steering signals for the pilot on a strike approach, and provided for automatic munitions release.

Munitions Control and Dispensing. The munitions dispenser assembly consisted of two box-frame units, stacked one on top of the other. Each unit had 12 vertical chutes and each chute held three munitions canisters. Stacking the two units, permitted six canisters to be dropped from each chute opening for a total capacity of 72 canisters. Munitions used were the BLU-3/B and the BLU-26/B.

Navigation/Communication Equipment. Special navigation equipment installed to support the BLACK SPOT mission included a Doppler Radar, a Vertical and Heading Reference System, a Navigation Computer, and a Map Display Unit. The communication subsystem, although specially adapted to the BLACK SPOT mission, was conventional and includes HF, UHF, and VHF (AM and FM) equipment.

BLACK SPOT was introduced into SEA for combat evaluation on 15 November 1968. Fifty-seven days later, on 9 January 1969, the two prototype aircraft had flown 106 sorties, some in IV Corps in SVN, most in southeastern Laos in support of COMMANDO HUNT. The test period truck and waterborne logistics craft (WBLC) kills were considered impressive.

TABLE 1

BLACK SPOT RESULTS

TARGET TYPE	NUMBER ATTACKED	DAMAGED	DESTROYED	% DESTROYED
TRUCKS	205	67	69	33.7
WBLC	96	24	50	52.1

The two test aircraft were retained 120 days beyond the termination of the evaluation period largely due to their truck killing successes. Late in May 1969, the aircraft returned to the CONUS. After modifications, improved avionics and munitions, BLACK SPOT aircraft were reassigned to SEA in November 1969.

GLOSSARY

AAA	Antiaircraft Artillery
ABCCC	Airborne Battlefield Command and Control
AFGP	Air Force Advisory Group
AFSC	Air Force Systems Command
AGL	Above Ground Level
AIRA	Air Attache
AM	Amplitude Modulation
AmEmb	American Embassy
ARRS	Aerospace Rescue and Recovery Squadron
ARS	Air Rescue Squadron
ARVN	Army of Republic of Vietnam
ASAP	As Soon As Possible
ASD	Aerospace Systems Division
Avg	Average
BDA	Battle Damage Assessment
BR	BARREL ROLL
CAP	Combat Air Patrol
CAS	Close Air Support; Combat Air Support
CBU	Cluster Bomb Unit
CIDG	Civilian Irregular Defense Group
CINCPACAF	Commander-in-Chief, Pacific Air Forces
CL	Combat Loss
CONUS	Continental United States
CTZ	Corps Tactical Zone
DASC	Direct Air Support Center
DMZ	Demilitarized Zone
FAC	Forward Air Controller
FCF	Functional Check Flight
FLIR	Forward Looking Infrared Radar
FLR	Forward Looking Radar
FM	Frequency Modulation
HF	High Frequency
KBA	Killed by Air
KM	Kilometer
LLLTV	Low-Light-Level Television
LOC	Line of Communications
LTV	Ling Temco Vought

mm	Millimeter
MR	Military Region
NM	Nautical Mile
NNE	North, Northeast
NOA	Not Operationally Active
NOD	Night Observation Device
NVA	North Vietnamese Army
OL	Operating Location; Operational Loss
OpOrd	Operations Order
OPlan	Operations Plan
PACAF	Pacific Air Forces
PDJ	Plaine des Jarres
RHAW	Radar Homing and Warning
RLG	Royal Laotian Government
RTAFB	Royal Thai Air Force Base
RVN	Republic of Vietnam
SA	Small Arms
SCNA	Self-Contained Night Attack
SEA	Southeast Asia
SEADAB	Southeast Asia Data Base File
SEL	Selected Enemy Location
SLIR	Side-Looking Infrared
SLR	Side-Looking Radar
SOS	Special Operations Squadron
SOW	Special Operations Wing
STOL	Short Takeoff and Landing
TAC	Tactical Air Command
TACAN	Tactical Air Navigation
TACC	Tactical Air Control Center
TAS	True Airspeed
TFS	Tactical Fighter Squadron
TFW	Tactical Fighter Wing
TIC	Troops-in-Contact
TOC	Tactical Operations Center
TOT	Time Over Target
UE	Unit Equipment
UHF	Ultra High Frequency
UL	Unknown Loss
Unk	Unknown
UTM	Universal Transverse Mercator

VC	Viet Cong
VHF	Very High Frequency
VNAF	Vietnamese Air Force
WAIS	Weekly Air Intelligence Summary
WRLC	Waterborne Logistics Craft