PROJECT CHECO SOUTHEAST ASIA REPORT

THE BATTLE FOR AN LOC
5 APRIL - 26 JUNE 1972 (U)

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Project CHECO was established in 1962 to document and analyze air operations in Southeast Asia. Over the years the meaning of the acronym changed several times to reflect the escalation of operations: Current Historical Evaluation of Counterinsurgency Operations, Contemporary Historical Evaluation of Combat Operations and Contemporary Historical Examination of Current Operations. Project CHECO and other U. S. Air Force Historical study programs provided the Air Force with timely and lasting corporate insights into operational, conceptual and doctrinal lessons from the war in SEA.

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PROJECT
Contemporary
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Examination of
Current
Operations
REPORT

THE BATTLE FOR AN LOC
5 APRIL - 26 JUNE 1972 (U)

31 JANUARY 1973

HQ PACAF

Directorate of Operations Analysis
CHECO/CORONA HARVEST DIVISION

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS PACIFIC AIR FORCES
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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 7/13AF, 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. It is an authentic source for an assessment of the effectiveness of USAF airpower in PACOM when used in proper context. The reader must view the study in relation to the events and circumstances at the time of its preparation--recognizing that it was prepared on a contemporary basis which restricted perspective and that the author's research was limited to records available within his local headquarters area.

Robert E. Hiller

ROBERT E. HILLER
Director of Operations Analysis
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FOREWORD

THE battle for An Loc may well prove to be a classic study in the use of tactical airpower in the years to come. It was an interlude in the Vietnam War where COSVN, confident in its own strength, introduced "a true conventional strategy for the first time," employing armor, artillery, and infantry.[1/] The Seventh Air Force entered the battle basing its strategy and tactics on the assumption that a relatively permissive environment would exist for aircraft operation. Both were mislead. That the Seventh Air Force was able to adjust to the unexpected, and succeed, clearly demonstrates the need for flexible ideas and varied weaponry in both conventional and unconventional war.

The immediate impact of the battle was to end the VC/NVA invasion thrust into Military Region III by decimating the enemy units participating in the struggle for An Loc. In the view of General John W. Vogt, Commander of Seventh Air Force, the VC/NVA inability to make up for losses sustained there resulted in COSVN's failure to take or to even seriously threaten Saigon. Thus the VC/NVA loss involved more than the failure to take a provincial capital that had far more psychological than military significance. The effective loss of three crack divisions, however, signaled the end of the possibility for any serious inroads into Military Region III during the Spring and Summer offensive of 1972.[2/]

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INTRODUCTION

In South Vietnam where reliance upon supernatural signs is a way of life, it might have been noted that at the juncture of Tay Ninh and Binh Long Provinces, the Cambodian border probes deeply east and south like some sinister finger pointing into the center of Binh Long Province. An Loc, capital and nerve center of Binh Long ("Peaceful Dragon") Province, is small but holds an important political and military position astride Highway 13. This highway, obscured by the heavy canopy of a rain forest once populated by tigers and elephants, winds out of Cambodia to Loc Ninh and then follows an abandoned railroad bed into An Loc before dropping 76 kilometers further south into Saigon. Scattered throughout this rolling province on both sides of the highway are huge rubber plantations of up to 75,000 acres containing some of the finest rubber in the world. These stands of rubber trees provide about 1/3 of South Vietnam's total exports as well as protection for ambushers crouched behind the trees to interdict the exposed highway. It was here that the "Peaceful Dragon" was to shudder with the thunder of war during the battle for An Loc--a chapter of the NVA Spring and Summer Offensive in 1972.[3/]

For months prior to the attack in Binh Long Province, allied leaders had expected a series of attacks throughout Vietnam. Drawing on previous experience, many observers predicted that the initial attacks were likely during the TET Lunar New Year's celebration in February. Some South Vietnamese Army (ARVN) commanders suggested that March was perhaps a

better estimate. In any event, ARVN and American leaders agreed that attacks were imminent and began a coordinated series of actions on enemy base camp, supply, and assembly areas in an effort to forestall or at least blunt any determined enemy offensive. While principal attacks were anticipated in Military Regions (MR) I and II, limited activity was also expected in the western part of MR III.[4/]

Movement of the VC 5th, 9th and NVA 7th Divisions to the border area north of Tay Ninh Province, coupled with Communist propaganda stressing the importance of Tay Ninh, seemed to indicate that it was the enemy's primary objective. Subsequent action demonstrated that Tay Ninh, although a logical choice, was only a diversion, and that the enemy had chosen Highway 13 through An Loc as its main route to Saigon. The subject of this study is the NVA attempt to seize An Loc and the role of air power in thwarting the NVA's efforts to gain its principal objective in MR III.[5/]

An Loc as viewed by A-37 Pilot

FRONTISPIECE

[redacted]

CHAPTER I

FIRST DAYS

On the night of 31 March/1 April, a series of actions in Tay Ninh Province tended to confirm earlier speculation that the VC/NVA offensive in MR III was to focus there. The key action occurred at Fire Support Base (FSB) Lac Long, seven miles north of Thien Ngon, where a six hundred round rocket and mortar barrage was followed by a ground assault. The ARVN infantry repulsed the attack and found 151 enemy bodies around the perimeter of the installation. The plan of the Central Office for South Vietnam (COSVN) seemed clear--FSB Lac Long guarded the approach to Tay Ninh City along Highway 22, a major artery leading from the city to Route 1 and Saigon. If COSVN could capture FSB Lac Long, their forces would be able to begin a drive directly into the capital.[6/]

The next two nights saw continuing action in Tay Ninh Province, especially in the vicinity of FSB Lac Long. On the night of 1/2 April, more indirect fire hit the outpost. Again, hostile ground forces attacked and a tank appeared at the main gate shelling the installation. Aircraft were scrambled and indications were that the tank was destroyed. Relief of the defense forces was short-lived, however, because the ARVN command confirmed that at least six hostile tanks,[7/] including U.S. model M-41s, were still operating in the area. On the following night, the VC/NVA again poured over six hundred rounds of mixed fire into the fire base. Following the barrage, three tanks led a determined infantry attack that broke into

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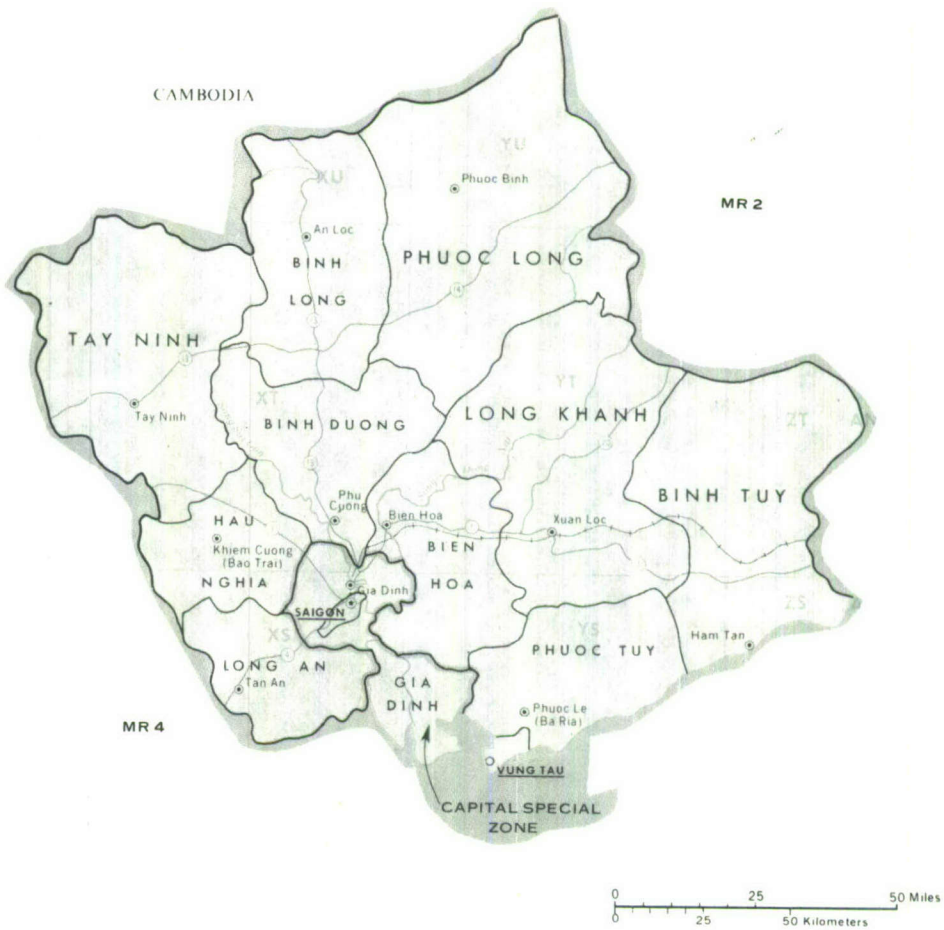
the center of the installation causing the ARVN defenders to fall south to the Trai Bi area. Defense positions here would attempt to hold the VC/NVA back from Tay Ninh City. Although the Allied Command did not realize it at the time, the battle for An Loc had begun.[8]

After the ARVN withdrew from FSB Lac Long, the entire area surrounding it was left devoid of friendly forces. Besides leading the ARVN command to believe that Tay Ninh City was the objective, the VC/NVA had severely hampered allied intelligence gathering in the area. USAF Forward Air Controllers (FACs) and remnants of the U.S. Army's 1st Air Cavalry were spread so thinly that little definite information became known concerning the location of the three VC/NVA divisions seen earlier just north of Tay Ninh Province in Cambodia.[9] In addition, other sources of information were sparse and any evidence contrary to ARVN assumptions, rare. One exception was a document containing information on artillery and mortar units and mentioning positions near Loc Ninh and An Loc. This document, found on the body of a dead cell leader, must have seemed spurious in the light of so much contradictory evidence.[10]

While the attention in MR III was drawn to Tay Ninh, the VC/NVA had begun to put their master plan, "The Nguyen Hue Campaign," into effect. It developed that the seuzure of FSB Lac Long was only a screening action to enable the VC 9th Division to move undetected into Base Area 708, northwest of An Loc and within easy striking distance of any point within Binh Long Province. COSVN targeted the 9th Division against An Loc itself.

MILITARY REGION 3
AND
CAPITAL SPECIAL ZONE



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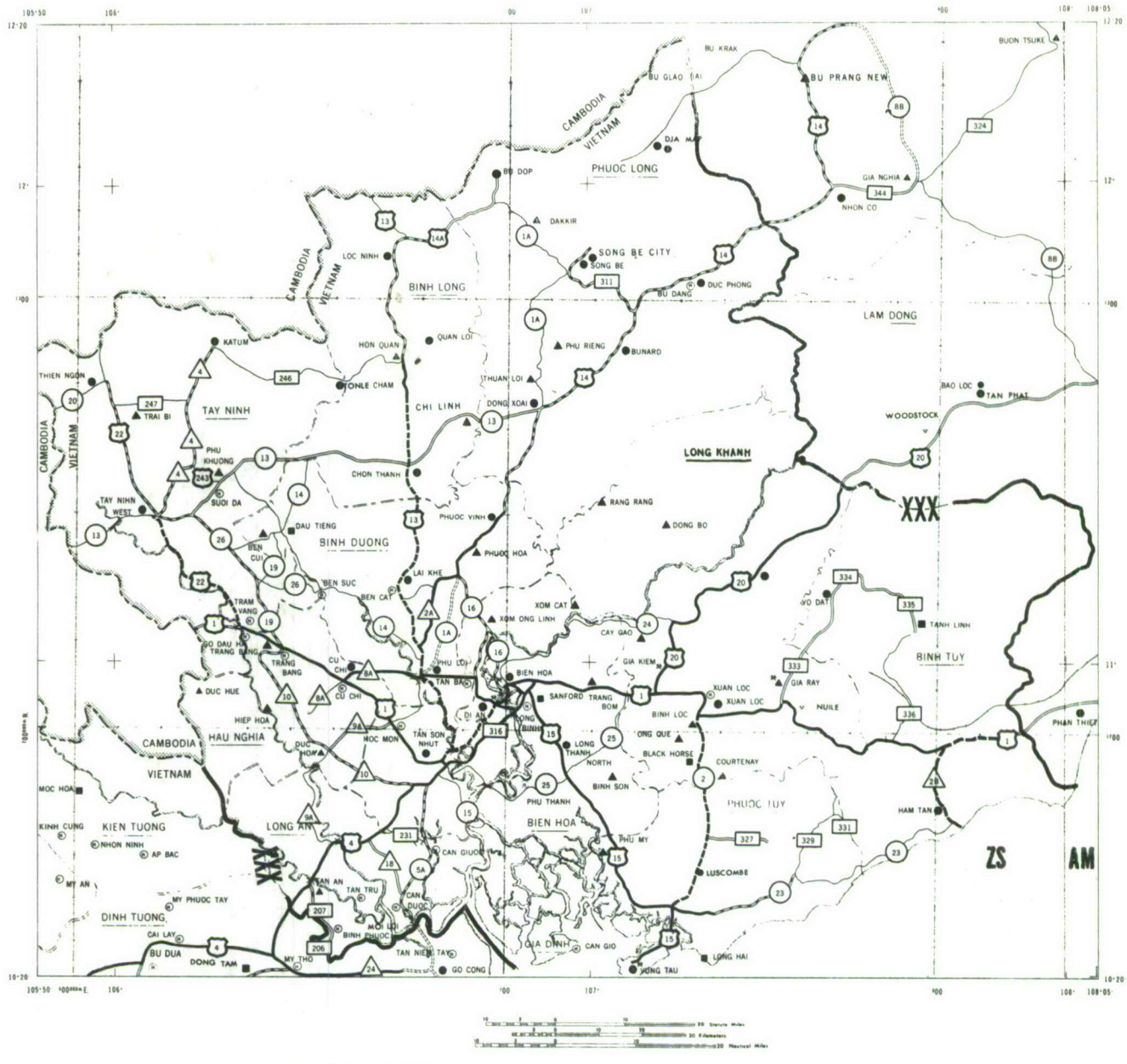
Military Region 3 and Captial Special Zone

FIGURE 2



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- CENCON STANDARD ROAD UNDER CONSTRUCTION
- CLASS 31 ROAD
- CLASS 18 ROAD
- CLASS 5 ROAD
- STATUS OF ROAD NOT KNOWN OR CLOSED
- NATIONAL ROUTES (QL)
- INTERPROVINCIAL ROUTES (LTL)
- PROVINCIAL ROUTES (TL)
- SUPPLEMENTARY ROUTES (RTE)
- COMMUNAL ROUTES (HL)

AIRFIELDS

	ABANDONED	CLOSED	OPEN
C-130	●	①	●
C-123	■	①	■
C-7A	▲	①	▲
LIGHT AIRCRAFT	●	①	●
MAJOR HELIPORT		⑥	

NOTE: Numbers within aircraft classification symbol denote the current airfield standard. See MACV Directive 415-9 for criteria

OTHER FEATURES

- INTERNATIONAL BOUNDARY
- PROVINCE BOUNDARY
- PROVINCE NAME
- RAILROADS
- QUARRY SITES FOR MACV LOC

NOTES

AIRFIELDS SHOW NORMAL CLASSIFICATION AS OF DATE OF PUBLICATION AND ARE SUBJECT TO CHANGE

DELINEATION OF INTERNATIONAL BOUNDARIES MUST NOT BE CONSIDERED AUTHORITATIVE

III MR Major Road Net and Airfields

FIGURE 3

The NVA 7th Division was to stop reinforcements and supplies from reaching An Loc from Saigon by cutting Highway 13 south of An Loc, between Chon Thanh and Lai Khe. The VC 5th Division was to initiate the offensive by capturing Loc Ninh, a district capital north of An Loc on QL 13, and afterwards to move through Cambodia to Route 1 and Saigon.[11]

Scattered incidents continued throughout MR III after the fall of FSB Lac Long, but no clear pattern emerged to the ARVN indicating the role Binh Long Province was to play in the VC/NVA plans. As late as 4 April, the ARVN high command authorized the redeployment of three ranger groups from Tay Ninh to Phu Bai in MR I. This action was met with approval by those who argued that incidents occurring in MR III were only VC/NVA attempts to tie down government forces thus preventing reinforcement of more critical areas.[12]

In the early morning hours of 5 April, the VC/NVA launched major attacks in previously quiet Binh Long Province. An Loc began to receive indirect fire and a hostile ground force threatened Quan Loi Airfield, located approximately seven kilometers northeast of An Loc.[13] Almost from the inception of the attack, the situation at the airfield looked grim. Because of the size of the opposing force, USAF and VNAF helicopters evacuated 138 special forces defenders including eight Americans because the site was considered "less defensible" than An Loc or Loc Ninh.[14] The two remaining ARVN infantry companies were unable to secure the airstrip, ending even helicopter activity at that location. The position soon fell.[15]

Loc Ninh, a little settlement of 4000 Montagnards and South Vietnamese "with little political, economic, or military importance" received the major thrust of the attack that morning.[16] Heralded by scores of shells from howitzers, rockets, and long range artillery pieces, at least two regiments, supported by tanks, attacked in mass at 0530. Throughout the day, the enemy pressed ground attacks from the west, southwest and northwest. The defenders, isolated in two compounds at either end of the town, along a small airstrip, aided the FACs in directing the massive TACAIR effort.[17]

Throughout the day and into the evening, the ground forces continued to pressure the two compounds. All of their attacks were beaten back, largely by U.S./VNAF TACAIR and gunships. Enemy casualties mounted rapidly, "mostly killed by air (KBA)."[18] In spite of this heavy air support, the VC/NVA moved close to the compounds. By 2330 Captain "Zippo" Smith, an American adviser in one of the compounds, cleared a Spectre AC-130 gunship to fire inside his compound.[19] The following morning Loc Ninh still had not fallen. Major General James T. Hollingsworth, Commanding General, Third Regional Assistance Command (TRAC), told General Creighton Abrams, COMUSMACV, that the town would have fallen early on 5 April had it not been for the "magnificent support of the 7th Air Force and the brilliant direction of a young Army captain, Smith."[20]

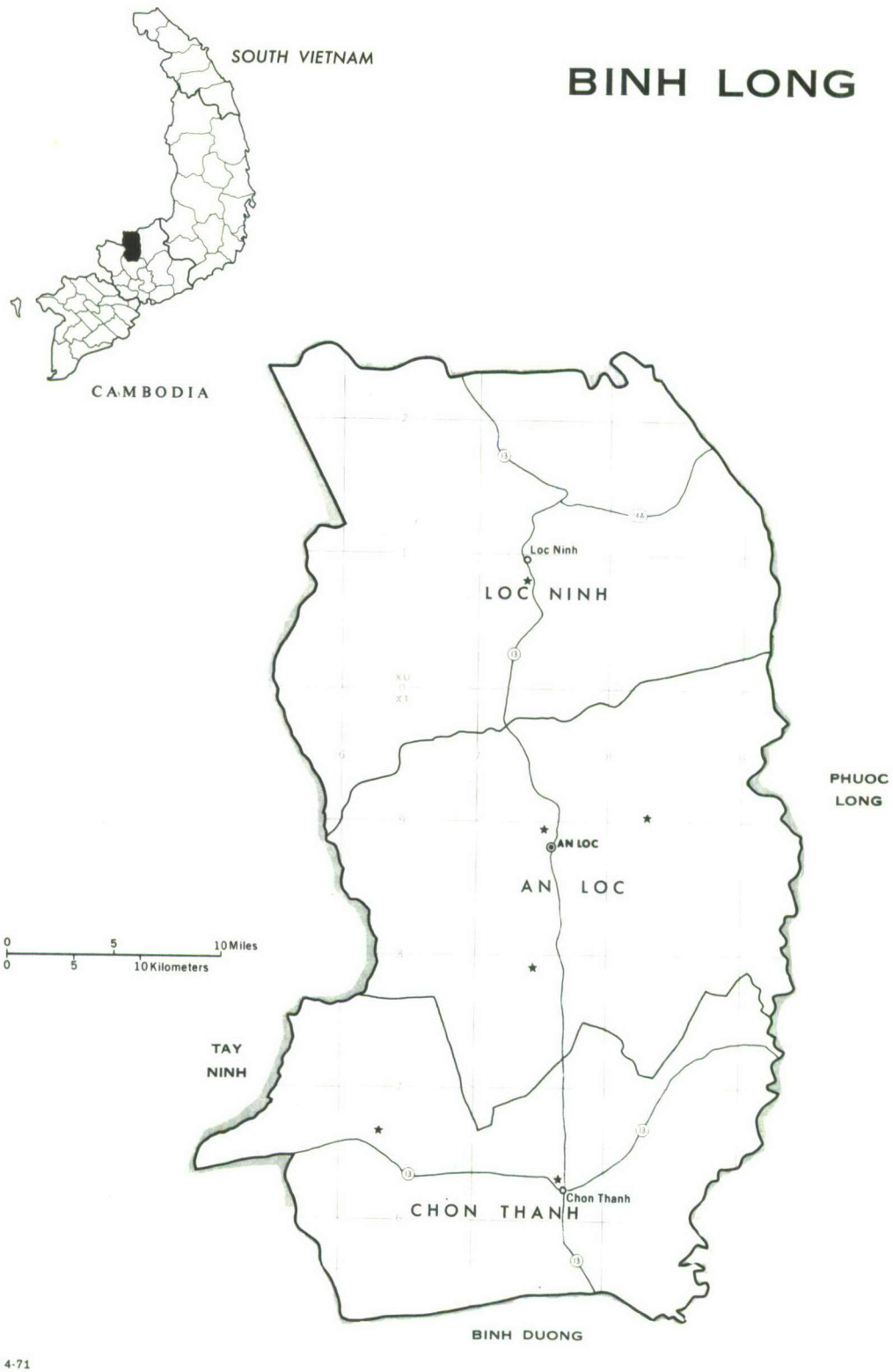
The following day brought no relief from the hostile fire and attacks by the VC/NVA. By noon, at least three major ground assaults had been stopped by TACAIR and gunship fire. From the viewpoint of the ground commanders, the air support provided was outstanding in every way. Major General Hollingsworth told of one afternoon assault when the enemy troops tried to cross the runway from east to west and were scattered by "well placed CBU strikes." When the enemy tried to get through the defenses on the east side of the command post compound, gunships "slaughtered" them in the wires. He estimated that the "better part" of the VC regiment operating on the west side of Loc Ninh had been "blown away by TACAIR strikes."[21/]

While the air support was satisfying to the ground command, some of the pilots operating over Loc Ninh made comments suggesting two operational problem areas. The pilot of one AC-130 Spectre wrote angrily at being permitted to fire for a brief time and then being shouldered aside waiting for higher priority TACAIR to expend. Wave after wave of TACAIR appeared with the result that this pilot did not get to fire again on that mission. In his view, the control system was "saturated by airpower." The USAF FAC on this mission recalled later that this Spectre just could not have done the damage to the enemy that heavy bombs and napalm were obviously doing. Although the Spectre pilot's comments were born of frustration and, in this case probably not justified, they were an early indication of command and control problems to develop at An Loc.[22/] A second comment on the use of air power related to the introduction of new

systems into the theater without familiarizing control and operating elements of the weapons' capabilities. When one Spectre pilot told his FAC that his Spectre's flare launcher was broken, the FAC assumed that the Spectre could not fire and told him to return to base. When the pilot quickly assured the FAC that his aircraft was still operational, the FAC permitted him to work the target, but the point was that this FAC did not know the gunship's capabilities even though he was responsible for guiding the Spectre in using its weaponry.[23/]

While the battle raged on the ground, the government of South Vietnam and the ARVN command had problems arise as well. Due to the multiplicity of actions all over South Vietnam, reinforcements in large numbers were not immediately available for Loc Ninh. And, even if they had been, mass transportation by slow moving aircraft would have been perilous at best. By noon of the sixth, the total reinforcements for Loc Ninh--three ARVN companies--were in place.[24/] On the political side, the Saigon government officials expressed "official concern" and ordered the Saigon police on "full alert."[25/]

Early in the morning of 7 April, the VC/NVA again launched massive attacks against the four companies of ARVN remaining in the two compounds. Manpower for the attack was drawn from an estimated 6,500 enemy troops of the 5th and 9th Divisions stationed in Binh Long Province, but concentrated around An Loc. Supported by 75mm recoilless rifle and 122mm rocket fire and spearheaded by tanks, human "wave upon wave" attacks flowed and



Binh Long Province

FIGURE 4

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ebbed near the compounds under the damming firepower from TACAIR units.[26] In spite of this aerial support, it appeared to the crews in the air that the situation looked "grim" for the people in the compound." If someone didn't "get the men out before nightfall" they would be overrun "for sure."[27] In the compound at the south end of the runway, the situation became so desperate that the two Americans called in air strikes "directly on top of their own compound" in a final effort to stop the attack. By 0800, the position was overrun and Captain Smith, already dazed by a mortar round, was presumably captured while talking to General Hollingsworth on the radio.[28]

As of 1630, some ARVN units in the north compound area were just barely holding on but hostile forces were moving virtually at will throughout the area. Resistance to a total takeover was coming entirely from a variety of air strikes including gunships. Finally at about 1830, as the camp was being completely engulfed by hostile forces, many personnel in the north compound escaped the area and fled into a nearby rubber plantation.[29]

Thus, after 1830, the action began to gravitate south toward An Loc. An attempt to pick up the survivors from the north compound by helicopter failed when ground to air fire precluded the rescue. With aerial escape unlikely, the men joined the dozens of other ARVN and American personnel scattered between Loc Ninh and An Loc streaming on foot toward An Loc. Close behind them came VC/NVA troops and tanks looking for and attacking isolated bands of ARVN troops.[30]

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During this very fluid action, the evading forces depended almost entirely on TACAIR for their protection. These aircraft roamed over the area and struck targets pointed out by FACs and radioed in by some of the elements on the ground. An American infantry adviser to the 18th Division, Captain Marvin C. Zumwalt, USA, estimated that only 790 of 1000 troops in the area reached An Loc, but those who did so made it because of TACAIR. And Captain Zumwalt had good reason to know. While talking to a FAC directing gunship support, he was wounded in the face by an exploding mortar round and sustained a broken jaw. The wounds restricted his breathing, and he was ordered to remain hidden with about 15 ARVN wounded to await medevac. The main body of troops then pushed on toward An Loc leaving the men with four weapons and limited ammunition. 31/

The air support provided this group serves as an example of why the ground forces held their Army and Air Force counterparts in such high professional regards. Spectres came on station and flew continuous cover, putting down rings of fire 350-400 meters from the wounded men. When one gunship had to leave station, another moved in providing continuous cover. 32/ Finally at about 1100 on 8 April, the "Dust-off" medevac helicopters were able to rescue them. After intensive USAF preparation of the surrounding area, the three light helicopters flew through heavy fire and landed on the road next to the ditch. Upon takeoff the primary pickup ship took a hit on the main rotor, fuel cells, and tail boom, but still was able to fly to Lai Khe and safety. The trip was a harrowing one, flying at tree-top level to minimize ground fire and possible further injury to the ARVN

hanging on to the skids of the aircraft. At least one AK 47 round pierced the helicopter, further wounding an American NCO.[33] The pilot has already been awarded the Silver Star and has been nominated for the Medal of Honor for braving such fire. In an aircraft designed to lift a maximum of four men, he carried out 12.[34]

The air role at Loc Ninh made the battle a costly one for the VC/NVA even though air power could neither win the battle nor operate smoothly. Desperate situations call for desperate measures, and this included sending massive TACAIR over the district capital as quickly as possible. Possible problem areas noted by Spectres in the first day's action over Loc Ninh intensified because of increased air traffic. One Spectre crew noted that the target area was just "too congested to work."[35] While Spectre would continually have to wait for higher priority aircraft to expend, to step aside because of ground requirements, or to abide by FAC decisions on what ordnance could best serve the ground forces, some congestion might be mitigated by improvement in command and control. The complaint voiced by another pilot that "there appears to be no coordination between GI and VNAF FACs," was directly related to the same problem. Streamlining command and control procedures would likely serve to enhance the use of weapons available as well as to reduce the possibility of inadvertent air losses because of collision or flying into "friendly" ordnance.[36]

The complaint voiced by a Spectre crew on the first day of the battle concerning a FAC not understanding Spectre turned out to be a genuine

problem rather than an isolated incident. On 7 April, the commander of a Spectre asserted that none of the FACs over Loc Ninh that day understood the capability of the Spectre PAVE AEGIS system "to deliver ordnance accurately." At General Slay's request, the Spectre pilot briefed the FACs in general terms over Loc Ninh.[37] Before the week was over, the 21st TASS Sundog FACs were formally briefed by AC-130 Spectre crews on Spectre and the PAVE AEGIS. Informal and candid "give and take" after the formal briefing gave the two groups of dedicated professionals a chance to listen to each other's problems. Later AC-130 mission reports and FAC interviews reflect increased understanding and mutual respect for each other's abilities.[38]

The fall of Loc Ninh suggested that An Loc was the next target, and allied officials were highly concerned. Following this defeat, General Hollingsworth warned all elements in MR III that the VC/NVA would be certain to continue south on QL 13. Thus, effective at 1900 on 7 April, he placed all U.S. elements on yellow alert and warned each to "improve defensive positions to withstand heavy attacks by fire and possible direct fire from 75mm tank guns." Further, he directed that commanders "buck up the U.S. reporting" because "solid information" would be essential for sound decisions.[39] In addition, Hollingsworth recommended that General Minh reinforce An Loc with more troops. While U.S. TACAIR would "continue to slow the advance" of hostile forces on An Loc, he felt that there had to be "maneuver battalions on the ground."[40]

The ARVN command quickly reorganized ground forces around An Loc as General Hung was under "intense pressure" with the fall of Loc Ninh and the loss of the 9th Regiment there. The forces deployed around the city included the 1st and 2d Battalions of the 8th Regiment on the north and northwest, the 3d Ranger Group on the northeast corner and most of the east side, the 7th Regiment on the west and south of QL 13, and Sector Forces occupying the south and southeast. The second line of defense, or security line, was to include the Regional Forces camp 600 meters west of the southwest corner where the Province Chief had his headquarters. The 1st Battalions of the 52d and 48th Regiments were to be the third line of defense, or reserve, stationed around the artillery in the center of town.[41/]

On 7 April, a meeting of the National Security Council in Saigon tried to decide what areas were most crucial and needed reinforcements. General Nguyen Van Minh, the III Corps Commander, stated that the equivalent of four enemy divisions--the VC 5th and VC 9th Divisions, the NVA 7th Division, and three independent regiments--were operating in his area. Minh argued that the attacks in both MR I and MR II "were diversionary and that Saigon was the real target." President Thieu decided to support General Minh and gave him both the 21st ARVN Division, until that moment the major government force in the Delta, and the elite 1st Airborne Bridate, the highly touted palace guard.[42/]

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During the next few days, enemy activity in MR III underscored General Minh's anticipation of sustained action there. On 8 April, the VC/NVA assaulted the radio relay station on Nui Ba Den (Black Virgin Mountain) in Tay Ninh Province. The following day, the station, used as the principal radio relay for Sundog FACs operating in MR III, fell. The airborne brigade moving up QL 13 toward An Loc ran into heavy resistance indicating new concentrations of hostile forces south of An Loc.[43/] In addition, NVA AAA batteries around Loc Ninh were observed being moved toward An Loc and increasing numbers of tanks were spotted in the area including a T-54, the first such sighting in MR III.[44/]

The government forces met increased enemy activity with increased air power, concentrating on tanks, hostile forces, and moving supplies and equipment. To reduce the time required to make these strikes, the Binh Long Province Chief relinquished his authority to approve air strikes to the Commanding General of the 5th ARVN Division although coordination with the civilian government continued. To disrupt enemy organization, TACAIR struck targets such as the communications center of the 9th VC Division near Quon Loi. Due to the fluid situation in the An Loc area, the effectiveness of the TACAIR was difficult to quantify but, on 12 April, 200 enemy troops killed by airstrikes were discovered four kilometers southwest of An Loc.[45/]

Colonel William Miller, USA, Senior American Adviser in the area at the time, wrote of the impact of the fall of Loc Ninh and events following

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on An Loc. As he drove through the provincial capital, he said, "the message was written on all the faces of the civilian and the military. The civilians were arriving from surrounding areas, yet An Loc was still a ghost town." The people all stayed in bomb shelters or tried to flee further south. All knew the attack was coming. An ARVN officer who was captured by the VC and escaped after the fall of Loc Ninh said his captors told him they were going to take An Loc at "any" cost.[46/]

On 12 April, President Thieu visited Binh Long Province to survey the battlefield situation and to emphasize his role as commander in chief. He made a public statement that district capitals might be abandoned, but that provincial capitals were to be defended at all costs. Colonel Miller stated that for Thieu, An Loc was "a Bastogne, a place where a stand or die defense would decide the fate of the enemy offensive closest to the national capital."[47/] When the actual battle for An Loc began on the following day, U.S. Ambassador Bunker pointed out that the battle had to be considered of "major psychological importance" because of Thieu's public statements.[48/]

By the night of 12/13 April, "ringed by enemy regiments, battered by enemy artillery, roofed with anti-aircraft fire with defenders driven into the perimeter of the town itself," the VC/NVA considered An Loc ready for capture. Artillery was heavy all day on the twelfth and throughout most of the evening until it reached a "crescendo" after 0300. At 0530, the indirect fire touched off the ammunition dump and POL storage areas. At 0730, out of the northeast, two dozen tanks including PT-76s led a major ground attack against An Loc.[49/]

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At 0800, as the noise of indirect fire diminished, the rumble of T-54 tanks was heard in the streets of An Loc. The tanks rode in "cockily" with turrets open and commanders in view. Led to believe that the VC already occupied the city, the crews were exercising great care so that they would not shoot troops in the streets. They thought their mission was a ceremonial one--to go to the Provincial Chief's residence and run up the North Vietnamese flag. The ARVN troops in the streets quickly disposed of this myth by immobilizing the lead tanks with M-72 Light Anti-Tank Weapons (LAWs). Cobra helicopter gunships also took a heavy toll of the tanks with FFAR rockets. Thus the first attack was blunted through a combination of enemy ignorance and aggressive action by allied forces.[50/]

A second ground attack from the northwest began at 1015. ARVN airborne troops moving from the south to relieve An Loc met battalion sized resistance about the same time, thereby stopping the relief column. By 1330 the invading forces, including tanks, controlled the airstrip on the northeast in addition to the northern half of An Loc itself. At this time, General Hollingsworth received an inquiry from the Senior U.S. Adviser to the ARVN 5th Division concerning withdrawal of all American advisers as had been past policy in such situations. Hollingsworth decided to keep key American advisers at An Loc and Army advisers later said that they thought this decision was a big one in the allied success in holding the capital.[51/]

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Over the battlefield, continued tactical air strikes kept the VC/NVA from maintaining the momentum necessary to overrun the defenses. This was in spite of intense AAA fire from .51 caliber and suspected 23mm and 37mm weapons. Cobra gunships did a magnificent job supporting ground troops against tanks until high density AAA forced their withdrawal. A testimony to this was heard over a FAC's radio when he cancelled a TACAIR sortie on a tank with the comment "oops they got another one!"[52] Time after time TACAIR stopped tanks, destroyed supply vehicles, and repelled invaders. Of the 369 verified enemy killed on the thirteenth, 200 were killed by air. Even the B-52s contributed to the tactical situation. For example, one combined attack from the northwest happened to be passing through an ARC LIGHT target box when the strike occurred. The attack dissolved as three or four tanks were destroyed and an estimated 100 attackers were killed. Major General Hollingsworth reported to General Abrams that "massive air support of all types tipped the scales in our favor."[53]

While the ground command was again laudatory about the use of air power, the pilots felt that some confusion existed and that improvements should be made. The massive TACAIR over a small battleground area required special care in maintaining command and control. On 13 April, one Spectre pilot reported that[54]

> *mass confusion reigned supreme most of the time we were in the area. We were finally told by Sundog 36 to hose down the area near Hon Quon Airfield. We did. It was interesting because a flight of VNAF A-1s kept flying through our shooting orbit.*

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The following day a new system of command and control, reducing confusion and increasing tactical efficiency, was instituted. To prevent situations like the Spectre pilot described above, VNAF FACs were assigned to a specific sector and they handled VNAF TACAIR within their area. Three FACs were assigned to the USAF operating areas over An Loc. One of these FACs, usually the most experienced, flew high above the action as a command and control or "King" FAC. The "King" kept apprised of the ground situation and received all TACAIR allocations from the III Direct Air Support Center (DASC). The other two FACs functioned as regular operating FACs except that they received TACAIR sorties from the "King" FAC rather than directly from III DASC. This system resulted in a more efficient and effective use of TACAIR because it was more responsive to situation changes.[55/]

At 0430 on the 15th, the VC/NVA again shelled government positions in An Loc with 155mm howitzer and 122mm rocket fire beginning a new drive on the capital. Initial armor and ground attacks shattered against the combined strength of TACAIR and determined ground defenses. A second attack at 1000 appeared more successful. Enemy troops reached the wire to the southeast, and heavy AAA including .51 caliber and 23mm as well as suspected 37mm and 57mm AAA made "flying most gamey" in the words of General Hollingsworth.[56/] Nevertheless TACAIR flew all day over An Loc. When 10 reserve tanks rolled against the defenses at 1400, TACAIR and ground units destroyed nine. The massive TACAIR effort continued throughout the night, and by morning the heavy enemy pressure in the general area appeared "to have been defused by heavy airstrikes."[57/]

Although the defenders did not realize it at the time, the determined enemy initial attack phase against the An Loc defenses was over by 16 April. A week later General Minh, MR III Commander, claimed that An Loc's "worst crisis" was on 13 and 15 April when enemy tanks entered the town. With those days behind, Minh informed Thieu that he was "winning" and that his winning was "essential" to the defense of Saigon. This confirmed the earlier opinions of Ambassador Bunker and others.[58/] Thus with the first major attack phase at an end, the siege of An Loc had begun.

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CHAPTER II

THE SIEGE

The reduced enemy ground force activity in the area around An Loc after 16 April was not the end of the campaign for the provincial capital, but only the beginning of a new phase. A noncommissioned officer from the 271st Regiment of the VC 9th Division, captured by ARVN on 13 April, told his captors that COSVN planned a three-day attack on An Loc. If this attack failed, the plan called for the VC/NVA troops to withdraw and to "shell An Loc as heavily as possible."[59] Later events were to bear out this revelation. The COSVN reprimanded the VC 9th Division Commander for his failure to take the city, and steadily increasing indirect fire announced the new battle phase to government forces and refugees huddled in the city.[60]

On 17 April, Col Miller, in a report to General Hollingsworth, correctly assessed the new phase about to begin. He noted that the VC/NVA were reinforcing their bunkers and had firmly entrenched artillery pieces, mortars, and AAA in fortified positions all around An Loc. In spite of heavy personnel losses resulting from U.S. and VNAF air strikes, the enemy seemed determined to continue the campaign. Miller believed that the anti-government forces would "use strangulation and starvation tactics--then attack in force."[61] The siege about to take place was conceived in the classical pattern of the history of warfare and failed simply because air power provided sufficient leverage to keep hostile forces at bay, supply the city, and eventually to break the siege itself by assisting ground forces to relieve the city.

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Early government hopes for breaking the siege hinged on the success of the ARVN forces moving north on QL 13 toward An Loc. Originally the 21st ARVN Division was committed up the highway to reinforce the An Loc battlefront and to provide a blocking force to protect Saigon should the provincial capital fall. When the battle for An Loc degenerated into a siege, the 21st Division was to smash the hostile forces south of the capital and to send relief troops into the beleaguered city. The NVA 7th Division located south of An Loc proved to be tough and resilient enough, however, to stall the government relief column on the highway.[62] Even TACAIR, B-52 strikes, and artillery firepower termed "outstanding" by the TRAC commander, were unable to hasten the movement of the relief forces against the determined NVA troops.[63] Elements of the ARVN 1st Airborne Brigade, with an artillery battalion consisting of six 105mm howitzers, were airlifted over the deadlocked forces to new positions located southeast of An Loc. These positions were quickly scuttled by hostile forces and the battery was completely destroyed.[64]

The destruction of this battery was another facet of the COSVN siege tactics. In addition to keeping ground forces from being reinforced, the VC/NVA also systematically destroyed government artillery capability, reducing ARVN counterattack potential to almost nothing. In retrospect, early enemy attacks on firebases resulting in the destruction of many artillery pieces were probably part of the overall strategy. At Loc Ninh, the initial attacks seized the artillery fire base protecting the town and the ammunition storage area fell quickly.

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On 16 April, an ammunition storage area at Lai Khe, south of An Loc on QL 13, was struck by indirect fire resulting in the destruction of 8000 rounds of ammunition for 105mm and 155mm howitzers as well as destruction and damage to artillery pieces there. The attack on An Loc itself captured or destroyed much of the ARVN ordnance the first day. The pieces remaining in ARVN hands were effective at first, but they received the heaviest part of enemy fire. This resulted in all but one of the defenders' 105mm howitzers being destroyed and the destruction of virtually all the ammunition for the other pieces. This left only 60mm and 80mm mortars to serve the ARVN during the siege.[65/]

While the ARVN artillery was quickly silenced by destruction or lack of resupply, the hostile force's use of indirect fire increased steadily causing havoc in the city. The steel and explosive hail fell into An Loc at a rate of nearly 1300 rounds per day during the first two weeks of April and then increased. The field reports of "sporadic fire" came to mean incoming rounds in the neighborhood of 1000 per day. To produce this fearsome barrage, the VC/NVA used a variety of weapons and ammunition including 155mm and 105mm howitzers, 122mm and 107mm rockets, and assorted other mortar and recoilless weapons. This weaponry came from various locations. Some was abandoned by fleeing ARVN forces, captured by the enemy, and hidden before TACAIR could destroy it. Others were hauled in from the north through Cambodia. TACAIR did attempt to spot and destroy these weapons before they were returned to use against friendly positions. On 17 April, a FAC spotted four trucks hauling four 155mm howitzers south toward An Loc. Weather

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temporarily precluded TACAIR strikes, but a Spectre engaged the vehicles. Shortly thereafter TACAIR arrived and assisted Spectre in destroying the four trucks and artillery pieces. In spite of this and similar preventive actions, a large number of pieces arrived at An Loc undetected until their muzzles began to flash.[66/]

Surrounded by artillery, anti-aircraft weapons, and ground troops, general conditions in the city steadily deteriorated. In addition to the government military forces in An Loc, there were approximately 10,000 civilians, mostly refugees, who added to the already serious water, sewerage, food, and shelter problems. The VC/NVA fully realized that these civilians greatly complicated the problems of the defenders of An Loc, and they made every effort to guide additional refugees into the city and to keep all the civilians confined to the besieged area. Major Raymond Haney, a U.S. adviser to the ARVN 5th Infantry Division at An Loc, related that a French/Vietnamese priest and, later, Buddhist monks, attempted to evacuate civilian refugees to the south. On both occasions the VC/NVA shelled the refugees, driving them back into the city. Haney saw the aftermath of the shelling--fallen refugees "laying in the ditches like cordwood."[67/]

Under such conditions, morale of the defenders had to be strengthened if the enemy siege was to fail. This was to prove an enormous task. Shortages of food and water would have been a sufficient detriment to morale in themselves. Perhaps even more eroding on morale, however, were medical and sanitation problems. At first all the seriously wounded were kept in a

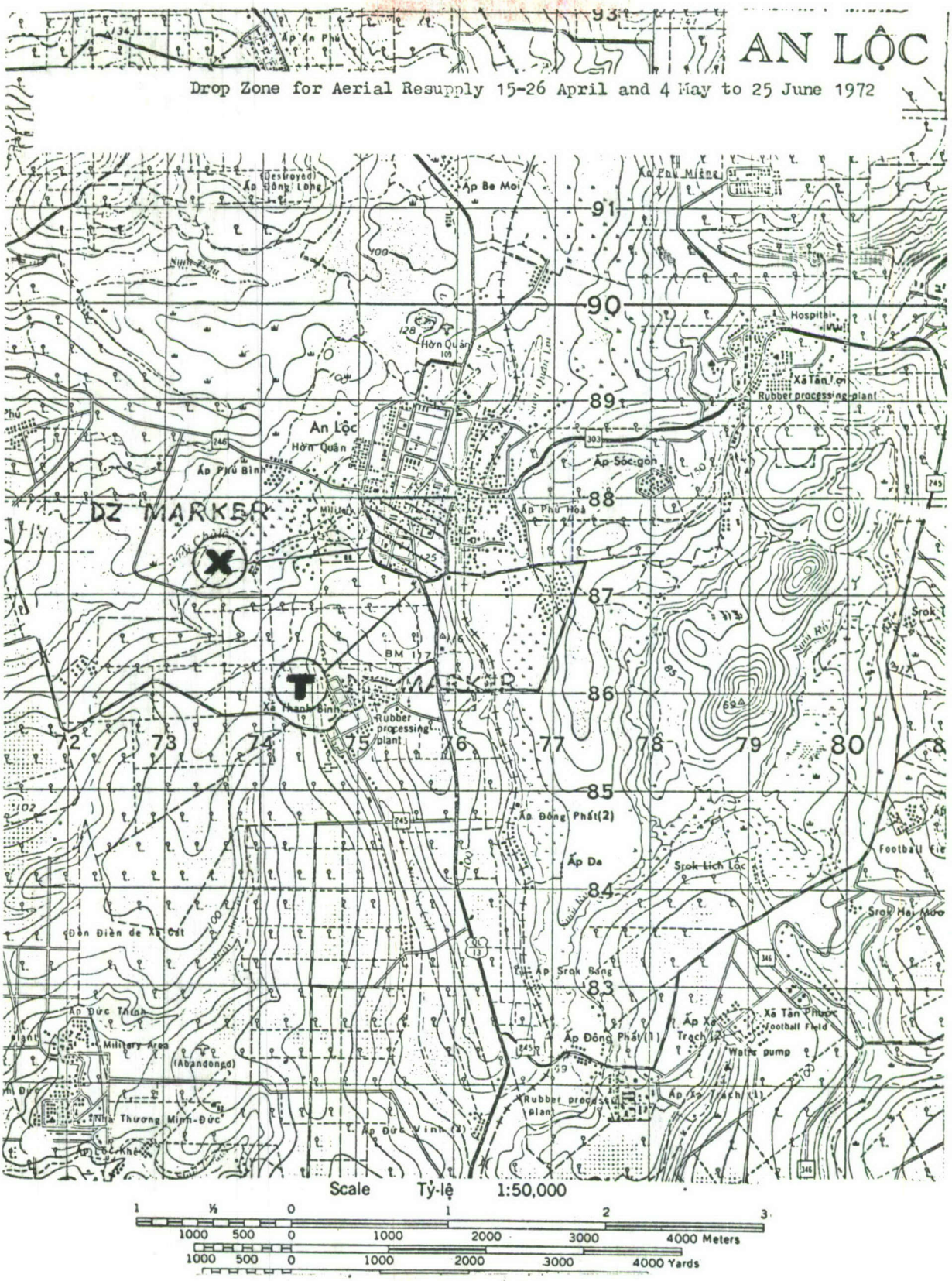
hospital--military and civilians alike. On the night of 13 April, the hospital and its 300 patients became the target for hostile 105mm and 155mm shells, resulting in the total destruction of the hospital and most of the patients as well. With no hospital facility available and medicines in short supply, wounds sustained during shelling and battle did not receive adequate medical care at An Loc. Unable to be medevaced out because of the intense AAA, the ARVN troops watched their wounds redden, fester in the heat, and turn gangrenous. Commanders and buddies could only try to keep flies away from the wounds and hope that no more of them would get hurt. To sustain a serious head, chest, or stomach wound was almost always a death sentence. Innumerable cases of disease, including cholera, spread quickly among the defenders imprisoned in the bunkered shelters for hours at a time during intense shelling. Under such conditions, even the barest minimums of sanitation could not be achieved and accumulated filth hastened the spread of disease and misery. The untreated wounds, diseases, and indirect fire led to so many dead that it became necessary to resort to mass burials in shallow graves using lime dropped from aircraft.[68/]

Intensifying the problems, the shortages and the inconveniences, the pain and the apprehension, was the shelling, day after day, minute after minute. The accurate enemy guns destroyed almost everything of material value to the defending forces. Even when the ARVN gun crews attempted to confuse the hostile gunners by constantly shifting positions of government guns, the new positions were quickly spotted and shelled. Most enemy observation points were from positions outside the defense perimeter.

While they poured shiper fire into the defense positions, hostile troops on rooftops in the northern part of An Loc relayed information to VC/NVA. Within the defense perimeter six young women were discovered with radio transmitters concealed in their brassieres. Accused of relaying information to enemy gun crews, the women were tied up and left "in an impact area where NVA artillery subsequently killed them."[69/]

The point of discussing the conditions on the ground in the besieged city is to show why the ground commanders so desperately sought aerial support for resupply and medical evacuation. Unless these two things could be achieved, An Loc was lost. Intelligence reports indicated that the VC/NVA were counting on the rapidly accumulating morale problems to force surrender of the city and to encourage ARVN desertion. At this time, Colonel Miller asserted that the enemy "enjoyed" the fact of no resupply and no helicopters landing. He asserted that "come hell or high water, both should be accomplished."[70/]

From the first days of the battle, allied commanders realized the importance of aerial resupply, but the problem was considered to be more of a logistical management one rather than one in which supplies would have to be "fought through" to the defenders. The first days' experience did little to change this apparent view. From 7-19 April, the Vietnamese and American CH-47s and VNAF C-123s and HU-1B helicopters flew 93 sorties delivering 301 tons of supplies. Unless one of these supply missions aborted prior to drop, all consigned goods were received by the government



Drop Zone for Aerial Resupply
15-26 Apr, 4 May-25 Jun 72

FIGURE 5

forces on the ground and none were lost. The slow moving aircraft, however, proved a prime target for enemy gunners. Three U.S. CH-47s sustained minor damage from mortar fire in the landing zone and, when a VNAF CH-47 was destroyed by hostile fire on 12 April, helicopter supply ended. The VNAF C-123s flew 39 low level paradrops between 11 and 18 April. On the 40th sortie, the C-123 was hit by ground fire and crashed three kilometers southwest of An Loc. Because of the high risk environment, the government forces halted all low level C-123 resupply attempts.[71/]

Already on 15 April, while the C-123s were still making a valiant attempt to resupply An Loc, Hq MACV requested the USAF to initiate the first of what was to become an extensive series of air drops to the besieged ARVN forces. The first five missions were planned as low altitude container delivery system (CDS) daylight drops using USAF C-130s. The loads contained ammunition, rations, and medical supplies and were to be delivered to a 200X200 meter soccer field drop zone in the southern part of the city. While these five drops were satisfactory in terms of delivery, all aircraft suffered moderate to severe damage from ground fire. On 18 April, the fifth C-130 was struck with AAA fire, and went down west of town. This air loss terminated the daylight low level drops with C-130s.[72/]

Unwilling to risk C-130 aircraft and crews on low level missions any longer, the Air Force decided to attempt resupply using the Ground Radar Aerial Delivery System (GRADS). Flying at a relatively "safe" altitude of 6000-9000 feet, the aircraft was vectored to a Computed

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Aerial Release Point (CARP) by a ground radar station (MSQ-77). Upon arrival, the aircraft accomplished a high altitude drop with a low opening parachute (HALO), the chute fully deploying at a predetermined point (usually 500-800 feet) above the ground. In eight missions between 19-23 April, the GRADS failed due to parachute malfunctions of every type imaginable. Some bundles smashed into the ground, but most drifted outside the defensive perimeter to succor the enemy. Malfunctions were traceable directly to Vietnamese packers who did not have the technical background or experience necessary to handle the more sophisticated packing techniques required for HALO procedures. Reluctantly the Air Force returned the C-130s to the low level CDS technique on 23 April.[73/]

Until the siege of An Loc, the USAF had found the CDS to be not only workable but very efficient. The C-130s would fly 15-20 miles at 230-250 knots indicated air speed until they were within one to two miles of the drop zone. The aircraft then "popped up" to an altitude of about 700 feet released their loads, and then descended to entry level and departed the area at a high rate of speed. To be successful, this system required an element of surprise and a relatively permissive environment, neither of which existed at An Loc. The VC/NVA ground forces were able to predict the path of the incoming aircraft by plotting locations received from ground observers strung throughout the area around An Loc. Surrounding the provincial capital and located on all possible air approaches to the city, heavy small arms, .51 caliber machine gun, and AAA fire were easily directed at the C-130s. Enemy gunfire could be especially effective over

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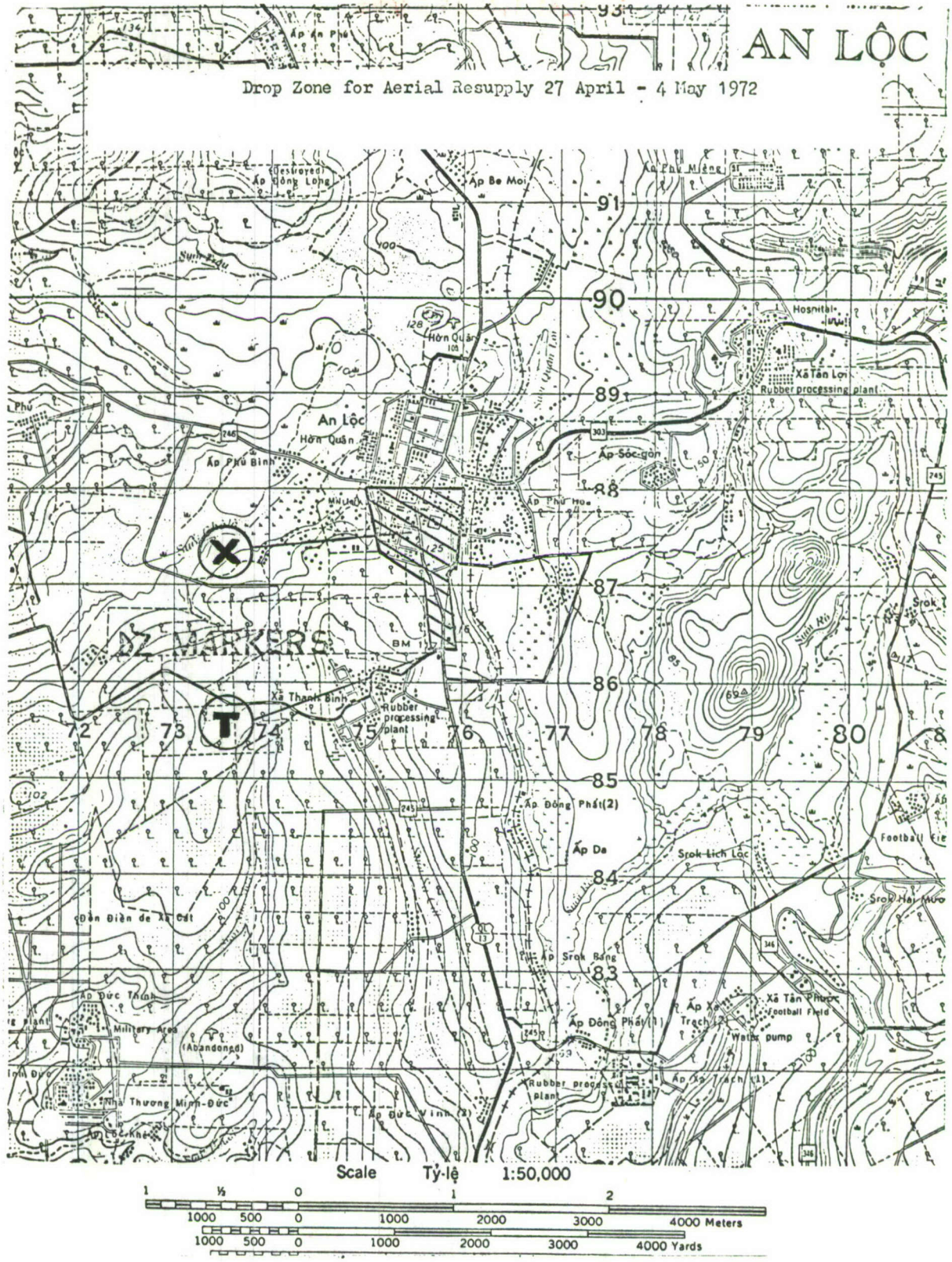
the drop zone where all the C-130s had to pass at speeds as slow as 130 knots. Even when FACs coordinated tactical suppression missions along the same track the C-130 was to follow, only reduction--not elimination--of AAA was effected. The result was entirely predictable: 100 percent of the aircraft employing CDS techniques received battle damage.[74/]

Initial CDS deliveries elicited a cautious optimism on the part of General Hollingsworth. He thought that the first drops had "a fair degree of accuracy," but wasn't sure of the recovery rate, especially during night drops. From his point of view, daylight low level drops were more "desirable" because the ground forces would have a better chance to spot and recover the supplies.[75/] On the morning of 26 April, a C-130 on a CDS run was struck by ground fire, exploded, and crashed. Thus the 374th Tactical Airlift Wing abandoned the CDS daylight drops and scheduled all the remaining CDS deliveries at night.[76/]

While the night missions involved somewhat less risk for the aircrews, the effectiveness of resupply plummeted. On the night of 27/28 April, the ground commanders reported that one last VNAF C-123 high altitude mission resulted in only one of eight drops on target and only six bundles out of 116 recovered. Night CDS missions fared little better. On 1 May, General Hollingsworth asserted that during the period 15-30 April less than thirty percent of the USAF C-130 tonnage had been recovered by ARVN forces. VNAF supply drops had even less success.[77/]

The reasons for the low recovery rate were many and complex. Due to the constricted position of the defenders, the available drop zone was smaller than the one recommended in standard Air Force guidelines. Near misses often resulted in a total loss of supplies because the government forces did not have adequate control and security over the area surrounding the drop zone. Nightdrops magnified these problems considerably. Aircrews required a visual sighting of the drop zone to be effective and ordinarily had trained on drop zones with standard lighting--lights located on timing points, leading edge, trailing edge, and point of impact. Makeshift ground arrangements failing, crews dropped portable runway markers which the ARVN placed on the field. The northern end of the field was lighted with an "X" and desired impact point with a "T". Even with these lights in operation, the many lights and fires in An Loc confused the crews looking for a small zone while under intense fire.[78/]

Other aircraft in the inventory tried to give the C-130s the best possible chance to make successful CDS drops but they did not resolve the basic problems. Already mentioned was TACAIR suppression of ground fire preparatory to the low level run. The second attempt was an innovation first used at An Loc. FACs had earlier discovered here that when the infrared covers were removed from the 2-KW light on the AC-130s, the white light could be used to mark strike targets when all flares were expended. This same basic system was used to help the supply planes find the drop zone. The AC-130 located the zone through various methods and then on request illuminated the drop zone immediately prior to drop to give the



Drop Zone for Aerial Resupply
27 Apr-4 May 72

FIGURE 6

C-130 a reference point. AC-119 Stingers were also used in the illuminating role. Showing the lights for as little as five seconds vastly improved drop chances for the gunships to be struck by ground fire and missiles because the light attracted ordnance both literally and figuratively. Thus this method was discontinued at An Loc.[79]

For the reasons cited above, CDS deliveries were as much as one kilometer off target on many occasions, but even many deliveries on or near target were not recovered either.[80] During the night drops, ground parties and FACs had difficulty in observing the bundle either descending or after landing. In an attempt to correct this problem, small high intensity "Flashers" were attached to each bundle but proved unsatisfactory when the flashing lights appeared as small arms fire and blended in with the battle landscape. Later small flashlights, sealed in plastic, were attached to the bundles, but they could not be seen due to low intensity. Thus many bundles were found as quickly by the hostile forces as by the defenders. Where bundles were easily observed, enemy artillery zeroed in on them causing havoc among recovery groups.[81]

The unsatisfactory aerial resupply program tended to make fear of shortages a self-fulfilling prophecy. Occasionally (and no one knows how often), when supplies were found by ARVN, they did not report recovery, but hoarded what they found. This condition was more than routine stockpiling but was caused by undisciplined men acting in desperation because of hunger and disease. Fights often occurred between ARVN troops over supplies and there are documented cases of armed troops refusing to turn over bundles to

centrally constituted supply authorities. Outside the defense perimeter the VC/NVA needed supplies for survival also. Thus furious fire fights occurred over stray bundles falling between the opposing forces. This is not to suggest that aerial resupply was a success, and the failure was distribution on the ground, because this was not the case. Rather, the ineffective aerial supply led frightened units and individuals to believe relief would never come, and personal survival became a dominant thought in a confused situation with discipline deteriorating all the time. This ground distribution situation was resolved only after the aerial resupply problem was solved and discipline was reinstituted.[82/]

Frustration was everywhere--in the air and on the ground--over the seemingly hopeless task of supplying the city. As the days went by, direct fire grew heavier and was increasingly more accurate. This heavy fire contributed greatly to the poor drop and recovery results, and ground commanders were concerned that drops were becoming more harmful that helpful to their cause. The classic example was that of a VC officer captured on the east side of town by ARVN defenders. While being interrogated, the officer requested a can of fruit cocktail because he said he had become accustomed to eating it since some American drops had been recovered by his unit. A U.S. officer who witnessed the scene, and who was subsisting on brackish water, canned fish, and rice, found the request extremely depressing.[83/]

The low point for the aerial resupply mission was reached on 3 May. The previous night seven drops had been scheduled into An Loc. When the

first fell 700 meters from the drop zone, the remaining drops were cancelled. Just before midnight on 3 May, a C-130 on a CDS run was apparently hit and crashed. On the following day, Colonel Miller told General Hollingsworth that it would be better to cancel aerial resupply until a better system could be developed. Thus, on 4 May, all planned low level CDS drops were cancelled and a renewed effort began on high altitude drops. Throughout the entire siege, but especially through 4 May, the C-130 crews served with great professionalism and bravery. In spite of heavy defenses and an inadequate delivery system, the crews managed to fight some supplies through to An Loc, helping keep the defenders in place. General Vogt, among others, highly praised their heroism. Improved techniques such as GRADS would capitalize on the C-130 crews' dedication to duty.[84/]

On paper, the GRADS program using the HALO drop seemed to be a workable procedure if technical problems cropping up on the combat tests could be solved. In response to Hq MACV's request for assistance, Army and Air Force paradrop experts flew to Vietnam. Quality control personnel from CCK, Taiwan began trouble shooting procedures to isolate the reasons for the malfunctions. The Army sent 76 packers from the 549th Quartermasters Aerial Resupply Company in Okinawa. The advisery people corrected some major problems on the spot and instigated new procedures. This, combined with the use of experienced Army riggers and packers, immediately improved the quality of aerial resupply.[85/] When sufficient equipment was not available for all HALO drops, a high velocity system was instituted, and it proved to be the most accurate of all drop systems used at An Loc. This method also

resulted in a limited dispersion of its 16 bundles, usually in an area 100 X 150 meters, allowing easier recovery. The major disadvantage was the relatively rapid rate of descent (approximately 128 feet per second) which caused damage to goods on impact. Experiments and test drops revealed what could be successfully dropped. For example, rice in boxes, fuel in barrels 2/3 to 3/4 full, and M-16 ammunition landed intact. However, fuel drums flattened, bags of rice split and, when a chute holding 105mm ammunition malfunctioned, primary and sympathetic detonations lasted for hours.[86/]

The immediate improvement in aerial resupply was noted on the battlefield by the ground commanders. On 5 May, General Hollingsworth wrote that three HALO drops containing 24 bundles were attempted. Although only 50 percent of the chutes opened properly, at least only one bundle was recovered by hostile forces.[87/] His comment on the next day's drops that "most of the supplies did land inside the perimeter" indicated that ground commanders were concerned not only that they were supplied, but also that the enemy was not. The next days continued to show improvement in parachute effectiveness and supplies recoverable. By 8 May, General Hollingsworth discussed air drop in the tone of a commander expecting and receiving aerial support: 88 tons dropped, 68 tons recovered, 19 tons lost to malfunctions, one ton outside the zone. The problem of aerial resupply, if not completely solved, was acceptable and improving so that the TRAC Commander could turn his attention to other demands.[88/]

The heavy AAA that restricted aerial resupply also substantially precluded medical evacuation. The quickest and most effective method previously used had been with specially equipped helicopters manned by MEDEVAC trained crews. The heavy, intense AAA and accurate artillery, however, created an environment in which VNAF crews either were "reluctant to land helicopters in order to pick up wounded or seemingly deliberately landing on LZs where no wounded were waiting."[89] As discussed before, the presence of seriously injured over long periods of time was most detrimental to morale. That some helicopters were able to land only served to intensify the problem. For example, the U.S. helicopters generally were able to remove a wounded American in a reasonable length of time; the VNAF were not. On occasions when a VNAF helicopter did land, the walking wounded and even healthy ARVN climbed aboard the helicopter or clung to the skids in a desperate attempt to leave, causing one such helicopter to crash because of overloading. One American officer who helped carry a litter patient out to the loading zone said that he couldn't explain his "disappointment" when the helicopter left with men in far better condition than the man he was carrying.[90]

On 3 May, as a result of a personal request by General Minh, General Hollingsworth agreed to provide, on a one-time basis, a U.S. mission commander and a single U.S. lead ship for a combined medevac operation at An Loc. He hoped to demonstrate to the VNAF that successful medevac was possible at a reasonable risk if proper leadership, planning and execution existed. Colonel John Richardson planned the mission and led four VNAF

helicopters in at treetop level. The mission succeeded, bringing in 36 fresh troops and taking out 42 wounded with only insignificant small arms fire encountered. General Hollingsworth hoped that the demonstration had notivated the VNAF toward better performance because he believed that much of III Corps' difficulties stemmed from the VNAF's unresponsiveness prior to the demonstration. For a few days, his hopes were rewarded as the VNAF took three or four ships a day in and out of An Loc.[91/]

The VC/NVA observers around An Loc could easily see the rapidly increasing effectiveness of aerial resupply and the tentative but positive attempts to medevac in spite of the heaviest ground fire they were able to muster. Between 4 and 9 May, GRADS missions resulted in the dropping of 492 bundles with a 94 percent recovery rate. With that rate of accuracy, the limiting factor on supplies became the number of missions flown, and not the tenacity of the VC/NVA air defense.[92/] These deliveries helped more than the physical situation. Major Ingram asserted that the successful drops "had almost an undefinable impact in raising their [the ARVN defenders'] morale, giving them hope and raising them from a total situation of frustration to one of confidence."[93/]

Outside the city, the VC/NVA were being pushed into a new battle situation. The literally thousands of air sorties flown against their positions had disrupted their supplies, decimated their troops, and made it difficult if not impossible to stem a general decline in their combat capability. Now that the An Loc defenders appeared to be in a position to start getting

stronger because of the recent improvements in aerial resupply, only one hope for success at An Loc remained--a smashing attack to overcome the city before it could become too strong through reinforcement and resupply.

[redacted]

CHAPTER III

BREAKING THE SIEGE

The situation at An Loc during the first days of May was somewhat confusing. Prisoner interrogations and other intelligence sources indicated that the VC/NVA were disengaging and moving to other areas. On the other hand, the 21st ARVN Division was making little or no progress up QL 13 in spite of air support including B-52 strikes, and indirect fire into defense positions continued to average well over 1000 rounds per day.[94/] On 6 May, a prisoner from the VC 9th Division informed his captors that his commander had been reprimanded for failing to take An Loc and that the commander of the VC 5th Division had boasted that he could take An Loc in three days. Although no specific date was mentioned, the implication was soon. Further reports suggested that the 174th and 275th Regiments of the VC 5th Division would attack from the east supported by the 271st and 272d Regiments of the VC 9th Division.[95/]

The boast of the 5th Division Commander to take An Loc reflected the COSVN determination to succeed at An Loc and also the general level of enthusiasm and desire COSVN tried to sustain among all invading troops. One prized award given to individual Viet Cong troops was the "Determined To Win Warrior."[96/] The finding of enemy dead chained to their weapons was another facet of this general tone. Men chained inside their tanks to their positions were reported by both Howard Truckner of ABC and columnist Joseph Alsop. Even General Hollingsworth personally observed the remains of one

[redacted]

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NVA soldier "whose hands were tied to his .51 caliber machine gun."[97] The western world understandably reacted in horror to these stories. One possible explanation was offered by two POWs from a tank unit. One indicated that the tank chaining "was done ceremonially and individuals had been prompted to volunteer for the chaining ceremony as a mark of distinction," and many did. Further, many tankers "had their arms tattooed with slogans such as "Drive Fiercely" and "Attack Deeply." Whether the individual VC were as determined as the POW inferred or whether the VC officers found it necessary to chain men to make them fight, the end result was the same for the defenders--the VC were not going to leave An Loc without further struggle.[98]

The defenders at An Loc were equally determined to triumph, but felt their position was being undermined by the thousands of shells exploding in their area daily. With no counter-artillery support available, the ground commanders sought maximum air support to suppress the fire. When General Hollingsworth heard that Spectre gunships were to be taken away from An Loc because the AAA risk had become too great, he protested the action in a message to General Abrams. The loss of Spectre, he feared, would multiply the already fearsome barrages. He asserted that Spectre "was invaluable in its ability to pick up, lock onto, and destroy enemy mortar positions which are employing 'hugging' tactics too close to friendly units to be vulnerable to TACAIR and B-52 fire." He said that Spectre was "an ideal weapon" not only to locate but also to destroy such positions. Further, Hollingsworth said that Spectre was "the best system

I know of to detect and destroy the trucks that are used nightly hauling ammo resupply to the enemy positions." Just a day later, Spectre would be doing yeoman duty in helping repel another major attack on An Loc.[99]

At 0030 on 11 May heavy artillery fire directed against An Loc removed all doubt about VC/NVA intentions. Major Ingram said that the barrage was so heavy that to leave your bunker was "certain death."[100] Captain Moffett said that the noise[101]

> *kept going up to a crescendo . . . it sounded like somebody was popping popcorn-shaking it just all over the city . . . and about 4 or 4:30 it stopped-bam-just like somebody dropped down a baton. Everything stopped at once.*

The contrast between rounds every five seconds climaxing an over 7000 round barrage and the relative quiet that followed brought great apprehension. But inexplicably the enemy paused before attacking while VNAF and USAF TACAIR streaked toward the city.[102] At 0500 a combined tank and infantry attack struck with fury at defense perimeters and quickly established salient in the ARVN defenses in both the northeast and western sections of town. Colonel Ulmer, who replaced Colonel Miller as Senior Adviser to the ARVN 5th Division, wrote that the VC/NVA strategy was to continue to drive into these two salients. With this tactic, the enemy hoped to link up and thus split the ARVN defenders into two enclaves. The ARVN commander's response to this tactic was to rapidly shift his 5th Airborne Battalion between the two salients, preventing their link and holding them in place until air power could help eliminate the salients. In addition

to these two major thrusts, tanks and heavy troop contacts were reported all over the perimeter.[103/]

The forceful attack by the VC/NVA was met by a spirited and effective defense. ARVN troops who learned the effectiveness of M-72 LAWs against tanks in the April attacks not only stood their ground but sought out tanks to engage. By noon these ground troops had destroyed seven tanks, principally with their LAWs. Cobra gunships equipped with 2.75 inch FEAR rockets engaged other tanks, destroying or immobilizing four more.[104/] When the first waves of hostile forces moved forward, FACs directed whatever ordnance was available to them to slow the attacks. For example, when a reported battalion of enemy troops or approximately 500 men threatened to overrun the 36th Ranger Battalion, the FAC ordered "Daisy Cutters" dropped 200 meters in front of the ranger positions. The resulting blasts halted the attack and turned back the hostile troops.[105/] The TACAIR pilots responding showed great bravery and professionalism as well. In the midst of the battle, TACAIR received a distress call from General Hung's command bunker, under point blank range fire from a NVA tank. Lt Colonel Gordo Weed answered the call with his A-37 equipped with two 250 lb. bombs. On the first pass the first bomb scored a direct hit on the tank, but--the bomb was a dud! The tank stopped firing at the bunker, but it was not immobilized. Again braving a hail of 37mm and .51 caliber ground fire that had already downed one A-37, he released his second bomb as well. The resulting explosions destroyed the tank and routed its supporting infantry troops.[106/]

The very successful day for TACAIR on 11 May was also a very costly one. As part of their general attack plans, the VC/NVA had added additional AAA batteries to an already impressive array. One U.S. Army captain on the ground said he had "never heard so much 37mm and 23mm firing" in his life as he heard that morning. The enemy had clustered the weapons for self protection as well as to shoot down allied aircraft. At one location were four or five 37mm and the same number of 23mm weapons all surrounded by .51 caliber weapons. One A-37, one Cobra, and two FAC operated O-2s fell to the murderous fire by late afternoon.[107/]

One source of air support on 11 May was not at all hampered by the intense AAA. The huge B-52 bombers in planned and diverted missions dropped tons of bombs in target boxes containing attacking enemy troops as close as 600-800 meters to defensive positions. On one occasion, a large enemy force had inflicted heavy casualties on the eastern perimeter and was engaged by the 81st Ranger Battalion. A B-52 strike on a hill containing the enemy force virtually annihilated it, ending the attack. General Hollingsworth reported that many enemy were fleeing from ARC LIGHT boxes "only to be attacked by air and ground fire." The coordination of B-52 strikes and TACAIR "allowed us to punish the enemy severely."[108/]

By 1630 on 11 May, the battle for An Loc was still raging. The VC/NVA held the two salients although unable to close them. At the same time, the attacking forces kept up constant pressure on the ARVN through tank thrusts, ground attacks, and steady fire into ARVN positions by mortar

and artillery pieces. The government forces had already confirmed over 200 hostile dead, but General Hollingsworth estimated that the actual count might have gone to five times that amount. The tactical emergency was still in force and TACAIR, gunship, and B-52 sorties were planned through the night and into the next day.[109]

The success of the B-52s despite the heavy AAA fire combined to point up a problem area for air and ground forces never really resolved. When the American A-37 went down, FACs called off strikes in the immediate area including the diversion of a B-52 strike. One U.S. Army captain on the ground felt that the momentum of the battle had swung to the defenders and that the planned B-52 strike would have "annihilated" the VC 5th Division, but that the opportunity was lost.[110] This procedure was not liked by the Senior Adviser to the ARVN 5th Division from a tactical point of view, but he recognized the desire to rescue the downed airman and offered no alternate proposal. One FAC noted later that pilot faith in all possible being done to effect a rescue if they went down was absolutely essential to morale and thus made combat pilots more effective.[111]

On the morning of 12 May, a maximum amount of aerial strike support worked to blunt intensified ground attacks and to reduce the two enemy held salients. By 0500, two PT-76 tanks were destroyed and TACAIR moved against ground forces surging from the north. This movement blunted, TACAIR concentrated on methodically attacking enemy advances. VNAF A1 Skyraiders armed with 250 lb. bombs and Spectre gunships with the PAVE

AEGIS 105mm system aboard concentrated on the western salient. In the northeast, the VC/NVA salient was so narrow that only the accurate fire of the Spectre armament could be used. The Spectre used its equipment with spectacular results. One tactic involved ground placement of Claymore mines on the perimeter of the salient. Spectre then used its 105mm howitzer to drive the VC out of bunkers and to get them moving with the cannon fire to seek cover. Those VC not hit from the air ran into the automatic Claymores and detonated them.[112/]

While the ARVN seemed to be holding successfully on the ground the second day of the renewed attack, things took an ominous turn in the air. During the day, several possible sightings were made of Soviet-made SA-7 STRELA missiles being fired at F-4s and FACs. At 1837, an AC-130 Spectre reported five such missiles fired at him. The first four exploded 1000 feet below the aircraft. The fifth was on a light path to miss the aircraft, but jinked into the AC-130.* Although there was extensive damage, the aircraft was able to return to base.[113/] Because of the already serious AAA hazard, Cobras were operating with difficulty and FACs had already had their minimums raised to avoid the AAA. In addition, the A-37 low level napalm strikes had also been stopped. Now the SA-7 threatened other low level aircraft and techniques as well.[114/]

*Later investigation determined that the missile homed in on the 2KW covert light which is in the same frequency spectrum as the infrared homing head of the "Strella." The LLLTV operator on the gunship inadvertantly acquired the oncoming missile as it was fired and tracked its approaching trajectory. The missile simply veered to follow the light beam, and struck the aircraft just aft of the 2KW light. All crews were subsequently apprised of the incident and no longer attempted to track the missiles.

During the night of 12/13 May, heavy attacks continued, spearheaded by tanks. Almost all tanks used here in May were PT-76 light amphibious models suggesting that earlier campaigns in MR III had decimated the NVA medium tank resources.[115] The VC/NVA chose to attack on this night because of extremely bad flying weather. With no TACAIR available, the ARVN defenders found themselves under direct fire from tanks from the north and east, threatened by troop movements from the west, and under general pressure from the south. The "key factor" in blunting this attack were six B-52 strikes after which "direct fire from the tanks stopped" and did not resume for the rest of the night. In addition to an unknown number of enemy casualties, the B-52s destroyed two tanks and an ammunition dump.[116] When the weather improved slightly after midnight, Spectre began to fly, engaging troop concentrations and equipment. And, through all this time, artillery rounds increased in numbers until they were impacting in An Loc at the rate of one every five second.[117] In spite of the tanks, troop movements, and artillery support, no ground attack materialized. General Hollingsworth cited Spectre's "magnificent performance" during the marginal weather. In the final analysis, however, he thought that the B-52 strikes "spoiled another apparent enemy effort to seize An Loc."[118]

On 14 May, a USAF O-2 aircraft on a FAC mission over An Loc was shot down by an SA-7, STRELA missile. With a second confirmed hit on a USAF aircraft in three days, new procedures had to be instituted in the SA-7 threat area. In the opinion of USAF experts in May, although the SA-7 was used like the U.S. Army Redeye missile, it was "operationally and

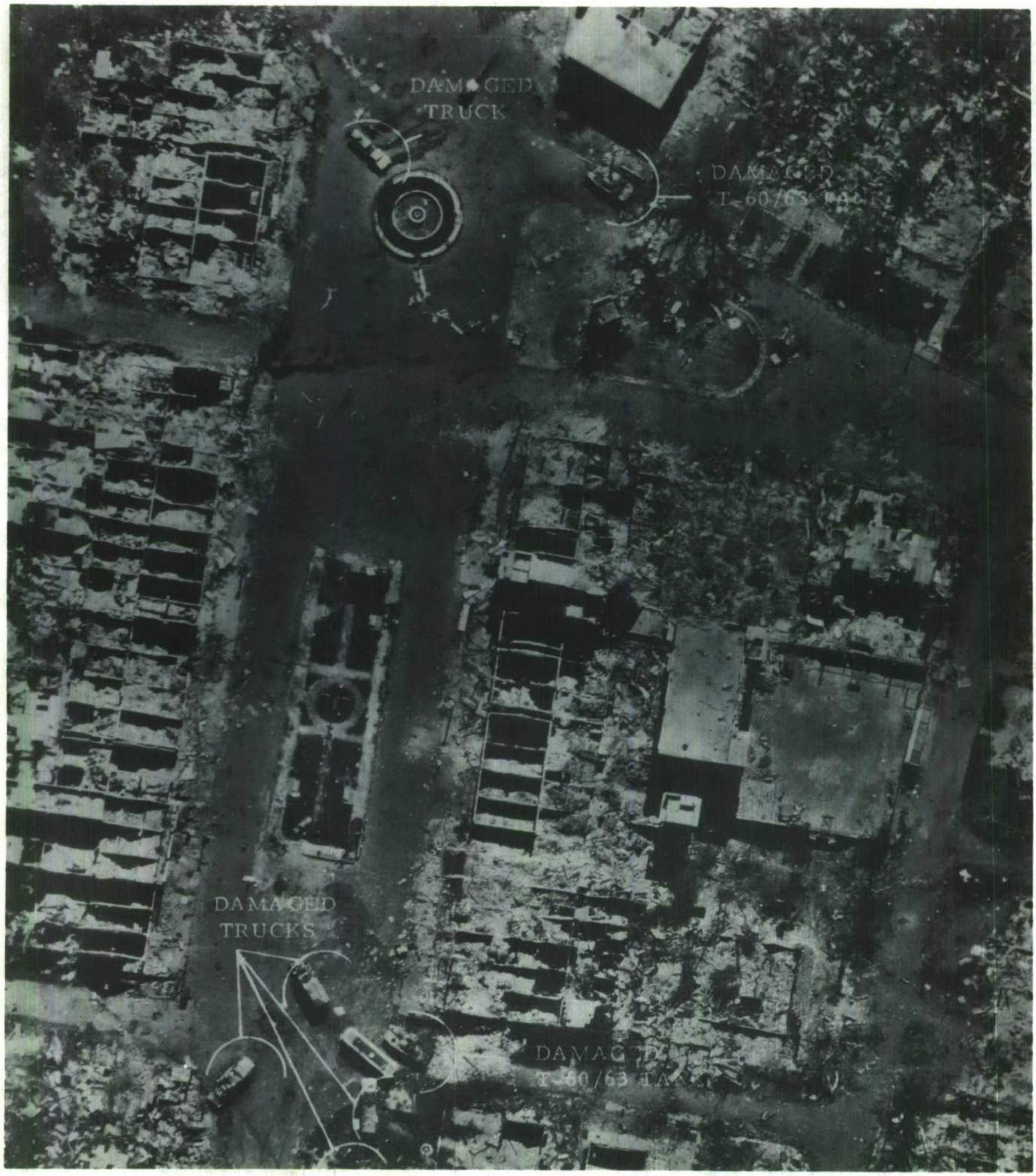
physically similar to the AA-2 ATOLL/Sidewinder 1A reduced to one-half scale." Designed for low, slow flying targets, the missile launch envelope was dependent on target velocity. At the time, 7000-9000 feet was estimated as safe for slow targets (helicopters and FACs) and 6000 feet for higher speed aircraft such as A-1s and C-130s.[119] Since the missile's seeker assembly was directly proportional to the IR signature of the aircraft, emergency measures put into operation included hard turns toward the missile thus shielding the aircraft's IR signature and the dropping of flares with a strong IR signal to decoy the missile away from the aircraft. As a general safety measure slow moving aircraft were restricted to operation at 7000 feet or higher depending on the aircraft and its mission. For example, while the FACs flew at 7000 feet, 10,000 feet was instituted for C-130 aerial resupply missions.[120]

The high altitude restrictions in known SA-7 high threat areas caused immediate and material changes in tactical air support for the forces at An Loc. The AC-119 Stinger was an immediate casualty to the SA-7 envelope because it was only effective up to 4500 feet (3500 feet optimum) with its miniguns (7.62mm machine guns) and up to 6500 feet with its 20mm cannon. Above these altitudes, the respective bullets began to tumble and to lose their penetrating qualities.[121] The Cobra helicopter gunships, as all other helicopters, were also restricted from the known SA-7 areas. Perhaps most notable was the impact on the FACs. Although their recommended altitude was 3500 feet, many FACs flew lower on special reconnaissance missions. Now these pilots had to use binoculars while flying at twice

twice the recommended optimum altitude for FAC operation, even when firing marking rockets for TACAIR. The pilots did not like these inconveniences which also reduced their effectiveness, but quickly adjusted to the new operating altitudes.[122/]

While the shelling of An Loc continued at an extraordinary rate--3025 rounds on 13 May, 2038 on 14 May, 2690 on 15 May, 1980 on 16 May--the VC/NVA ground attacks on the city decreased in frequency, intensity, and duration. Overall, the action seemed to be shifting somewhat to the south--the VC 5th and VC 9th Divisions possibly disengaging--while the NVA 7th Division continued to stall the relief column south of An Loc.

The 16th of May demonstrated in microcosm the general trend the battle of An Loc was beginning to take in the air and on the ground. The tactical airlift of supplies was continuing at a satisfactory rate and no outstanding deficiencies were noted, except for medical supplies. U.S. Skyhook helicopters delivered two 155mm howitzers to a point south of An Loc that placed the guns within range of the entire defense perimeter. In another attempt to help break the relief forces through, an ARVN infantry battalion was airlifted to a position nine kilometers south of An Loc near QL-13.[123/] In addition to these movements, steady air power support of ground objectives continued to erode enemy equipment, personnel, and morale. On the night of 15/16 May, an AC-130 Spectre engaged tanks south of An Loc, destroying two. The B-52 bombers pounded suspected and known enemy troop locations causing havoc and many casualties. Few firm enemy casualty statistics could



Battle Damage Inside An Loc, 18 May 72

FIGURE 7

be ascertained at this time due to the unstable ground situation. One indication, however, was provided by a report from the commander of an NVA battalion who, because of the B-52 attacks, requested "permission to withdraw" from the area. The An Loc defenders called for additional TACAIR strikes on the suspected position.[124/]

On the ground, the ARVN defenders began finally to show more vigor in patrolling and reconnaissance missions in spite of heavy incoming artillery. For example, one patrol successfully flanked the VC entrenchment in the western salient although it was unable to drive the VC from their bunkered positions. In another action, an element of ARVN rangers captured and immobilized a twin 57mm anti-aircraft gun mounted on a T-54 tank chassis. The weapon was identified later as a ZSU-57/2 and was the first one seen in MR III.[125/] The unaggressive hostile response to these patrol actions and the report that TACAIR could not find "any targets in the immediate vicinity of the town" seemed to represent a new phase in the battle.[126/] General Hollingsworth reported that information available to him indicated that decimated enemy units had withdrawn "from the immediate vicinity of An Loc as a result of the heavy losses inflicted by TACAIR and B-52 strikes."[127/]

Although the level of hostile effort against An Loc itself steadily decreased, the NVA 7th Division continued to interdict QL-13. Progress of the relief column was painfully slow at best, and on many days no progress was made at all. Enemy action along the highway became no more

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than a stubborn holding action; fewer attacks were made on the government forces, and when attacks did occur, they quickly dissipated. For example, on 23 May, troops and tanks were spotted moving south toward the ARVN column. Spectre engaged the tanks and destroyed three by 0400; by 0600, the "attack" ended before it really began.[128] The NVA troops along the highway declined in effectiveness under constant harassment from the air. Two captured NVA 7th Division officers indicated that their units' casualties were very heavy, some companies of the 209th Regiment down to only ten men. Constant allied bombardment, coupled with other hardships, was causing major breakdowns in enemy morale and fighting spirit to the extent that some troops were "no longer responding to orders from superiors." Another POW report indicated that the NVA 7th Division received 360 replacements in May, but none during the first eighteen days in June. The troops received rice only once each day and "morale was low due to fear of B-52 strikes, sickness, and poor leadership."[129]

In spite of these problems encountered by the interdicting forces, the relief column still moved too slowly to suit American advisers. General Hollingsworth felt that ARVN was just not trying hard enough. He considered the C-130 heavy drops to the ARVN 15th Infnatry Regiment "to be a misuse of assets" because it was "inefficient" and it degraded "the incentive for the 21st Division to open Highway 13." Thus he requested the drops be halted, but COMUSMACV did not concur, and the drops continued.[130]

For the city of An Loc, enemy stubbornness in the capital and on the highway, plus bad weather inhibiting TACAIR, prolonged the formal siege.

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Lt General Nguyen Van Minh, Commanding General of MR III, had no doubt about the eventual outcome, however. With over 3100 ARVN and 1500 territorial forces troops combat effective at An Loc, his principal concern was getting the more than 1000 wounded medevaced out of the city.[131] On 12 June, the last of the VC/NVA were driven from the town itself and on 14 June, reinforcement of An Loc with 1650 fresh troops by U.S. helicopter was completed. With things seemingly under control, General Minh delcared the siege "over" on 18 June.[132]

South of An Loc the battle still continued. Finally, on 23 June, General Hollingsworth reported that the 46th Regiment had made it through to An Loc along QL-13. ARVN sources reported that the enemy had anticipated an ARVN force coming south from An Loc to aid the relief force. The NVA had set up an interdiction to stop this movement on QL-13 just prior to an ARC LIGHT strike. Two strikes, 15 minutes apart, had been planned for the area and the results were devastating. Caught in the open and without warning, the NVA force simply dissolved. Hollingsworth asserted that these B-52 strikes "proved to be decisive" in getting the 46th Regiment through.[133] This action did not mean that the highway was then permanently opened, for small pockets of resistance in heavily bunkered positions continued to sporadically interdict the highway for weeks to come. The mainforce units were gone, however. Intelligence sources noted that the headquarters of the VC 5th Division had moved to Cambodia, north of Svay Rieng and that main elements of the VC 9th Division were heading west toward the Cambodian

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border.[134/] Thus on 26 June, the pockets notwithstanding, General Hollingsworth reported to General Abrams that "unless we receive our share of replacements designated for COSVN, the campaign is over."[135/]

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CHAPTER IV

CONCLUSION

The course of events on the first day at An Loc dictated the parameters of the struggle to emerge during the ensuing weeks. By driving the government forces into a small area in the southern part of the city, the VC/NVA were able to completely surround the defenders with troops and gun positions. This action then set two conditions destined to inhibit aerial support of the ARVN. First, the ARVN's area of operations and limited combat effectiveness outside their defensive perimeter greatly reduced the drop zone possibilities for aerial resupply. Second, the VC/NVA were able to mass sophisticated AAA, supplemented eventually by SA-7s, around the small area to restrict aerial resupply by conventional helicopter and low level CDS techniques. Further, these ground to air defenses limited and then precluded effective mission fire support by Cobras and Stingers. In addition, loss of ARVN artillery support resulted in the air arm assuming total responsibility not only for resupply but also for providing firepower to help suppress attacks and to break VC/NVA strength and morale around the city in order to end the siege itself.

The small area of operations and the amount of air support required intensified the normal battle zone command and control problems for the Air Force. Over the battle area, the principal responsibility for controlling airstrikes, coordinating airspace, performing visual reconnaissance, and coordinating aerial resupply fell to the USAF FAC. Some of the special duties of the FAC included controlling some VNAF TACAIR; advising aircraft

[redacted]

of "safety" hazards such as AAA and impending B-52 strikes; coordinating special mission aircraft such as Cobras, Stingers, and Spectres; following the ROE; and avoiding known civilian areas. Each FAC kept track of the overall situation by talking to U.S. Army advisers on the ground via FM radio, contacting III DASC via VHF through a radio relay station (call sign: Rash Control), and the other four FACs in the An Loc area by UHF radio. In his "spare" time, the FAC had to keep track of as many as ten sets of aircraft above him, all with different ordnance, capabilities, and times on target. It was no wonder that the commander of the 8th SOS judged the FACs "almost superhuman."[136/]

Even for the "almost superhuman" FACs, conditions at An Loc dictated a change. It was virtually impossible for FACs to keep up with the myriad of sorties and contacts that had to be accomplished and still provide each ground commander the most effective support the Air Force was able to provide. The Seventh Air Force solved this problem by assigning one FAC as the Command and Control or "King" FAC. Flying high over An Loc, the "King" maintained contact with ground commanders thus keeping himself apprised of the changing field conditions. He also kept in contact with the airborne TRAC Commander or Deputy Commander who gave the FAC advice on ground conditions and support for additional TACAIR requests if required. The city of An Loc was divided into two working areas with one FAC responsible for each area. All incoming TACAIR sorties were assigned to the "King" by III DASC. The "King" then reallocated this TACAIR to one of the two FACs working the city below him. If the airspace over the city itself was saturated, the "King" would reassign the overload TACAIR to one of the two FACs working south of

An Loc. Both Army and Air Force commanders were most pleased by the effectiveness of this system.[137] Overall the FACs were highly rated by everyone. In the words of the U.S. Senior Adviser to the ARVN 5th Infantry Division, the FACs "accomplished virtually the impossible" and were "leading contenders for the 'Most Valuable Player' award."[138]

The high intensity AAA, but especially the introduction of the SA-7 at An Loc, forced the Air Force to modify standard aerial resupply procedures and to reassess the use of gunships in tactical situations. In both cases, temporary adjustments were made which proved viable by the conclusion of the battle. However, both would lead to Air Force study on permanent modifications of techniques and equipment to enhance future effectiveness of the systems in tactical warfare situations.

The failure of the low level CDS technique at An Loc brought frustration but few supplies. Army ground commanders could not understand why the Air Force could not resupply the city effectively. Air Force officers were concerned that supplies dropped often were not recovered. A joint meeting of C-130 pilots and U.S. Army advisers was called to discuss the problem. Brigadier General John R. McGiffert II, Deputy Commander, TRAC, was present at the meeting and said that the session did much to "clear the air." Army officers learned for the first time, for example, that heavy ground fire occasionally set loads of ammunition or fuel afire in the cargo areas. Immediately ejected, these loads contributed to the poor delivery record by the low level CDS technique.[139] Even though more sympathetic to Air Force problems, the Army was very anxious for an improved supply system. At the same time, the Army ground advisers tried

to establish more efficient distribution procedures for those supplies that did reach the defenders.[140/]

Meanwhile, as soon as the CDS resupply seemed to be inadequate, the Air Force immediately had begun to introduce other techniques as recounted earlier. Since Army and Air Force experts had to be flown into Vietnam from other areas and since only limited high altitude equipment was available in the theater, the Air Force was not able to resolve the problem as quickly as it would have liked. On 3 May the aerial resupply had reached the nadir. On the following day HALO drops began which immediately raised optimism for success which was subsequently borne out.[141/]

On another level, an SA-7 conference held on 11-12 May by the USAF Tactical Fighter Weapons Center discussed the impact of the SA-7 on aerial resupply. The conference recommended that if airdrop techniques became critical, Hq TAC should "deploy a C-130 AWADS (Adverse Weather Delivery System) squadron to SEA for use in high altitude airdrops and low altitude airdrops in instrument meterological conditions."[142/] As a result of the airdrop problems at An Loc and other areas, the 61st TAS deployed ten AWADS equipped C-130E aircraft between 21 and 24 May 72 to run combat tests on the system.[143/] Although "only two aircrews had completed any type of high altitude airdrops" and tactics for AWADS airdrop were "oriented primarily" toward standard CDS low level tactics and procedures, test emphasis was placed on airdrops from altitudes above the effective ranges of 37mm AAA, and SA-7s.[144/] Test drop zones were also reduced by 1/2 to 1/3 of the recommended size in AFM 3-4. The test team concluded that, based on its

tests and on experiences such as An Loc, AWADS training should be revised to include high altitude techniques, and that a study group should review AWADS employment results in detail.[145/]

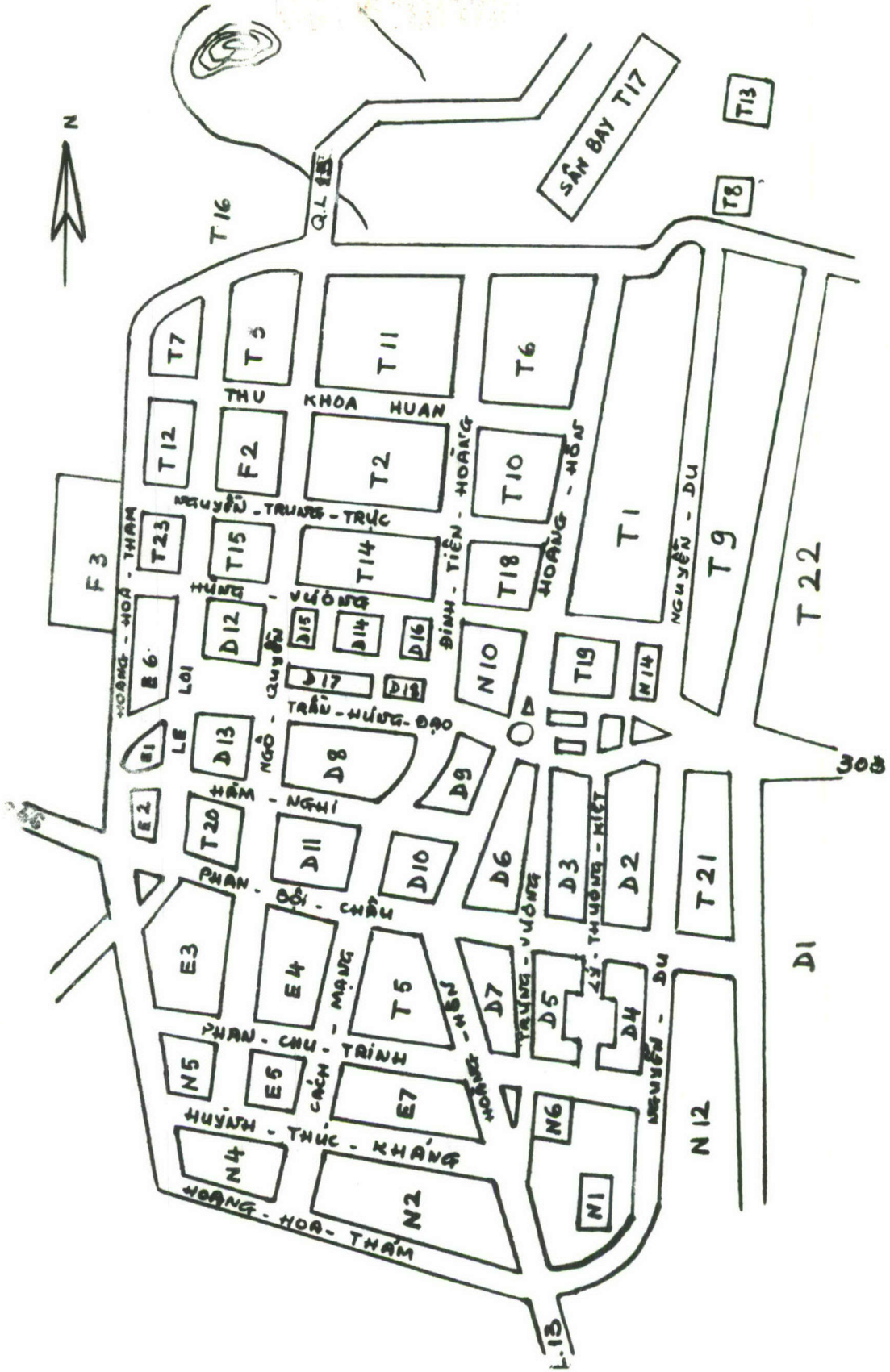
The second major change brought about by the high intensity AAA and the SA-7 at An Loc was in the use of gunships. The initial and primary role for the AC-119 in Southeast Asia was "close air support for troops in contact." Working at its normal operational altitude of 3500 feet over An Loc, the Stinger's 7.62mm miniguns and 20mm cannon were very accurate.[146/] One Army adviser at An Loc asserted that the Stingers were "a great weapon. You just move them around like pointing your finger." Unfortunately, the Stinger required a relatively permissive air environment that did not exist at An Loc. Forced up and away from the highly defended city, the Stingers performed area reconnaissance and sought targets of opportunity. In these roles, the aircraft proved most effective in impeding the flow of supplies to the VC/NVA forces around the provincial capital.[147/]

Just prior to An Loc the AC-130 Spectre's mission role was "night interdiction and armed reconnaissance with less emphasis on close air support of troops in contact," because of technical improvements which had developed the Spectre into the most effective truck killer in the USAF inventory.[148/] It was at An Loc that the emphasis shifted from interdiction to support of troops in contact and close air support. The AC-130's 105mm howitzer was very accurate and highly effective. One Army officer recounted that Spectre crews were provided with a map of the city. This resulted in one pilot reporting that his instructions from a ground commander might be "go north along the main street for three blocks, turn

east there, and hit the second house from the corner."[149] The Army was high in praise for Spectre. The Senior Adviser to the ARVN 5th Infantry Division reported that Spectre aircraft "were responsible for breaking up numerous assaults before they got started." The ability of the Spectre PAVE AEGIS to destroy buildings within 10-20 meters of friendly troops was "especially advantageous." In his summary, Colonel Ulmer recommended that Spectre "be further developed as a conventional part of the USAF limited war weaponry" and that lightweight X-Band beacons become a standard issue for every TOC.[150]

The more conventional TACAIR provided superb support as had been expected; the AlEs, A-37s and F-4s performed their roles with distinction. While not as accurate as slower moving aircraft, the F-4s' greater capacity for armament was prized by ground commanders. Brigadier General McGiffert found it "a tremendous weapon" and most valuable against AAA and troop dispersions outside of the town itself. The AlEs were more accurate, but could not carry the same punch as the F-4s. All in all McGiffert thought the "A-37 proved to be the very best compromise" for close air support at An Loc and General Vogt stated that the work of the 8th SOS and its A-37s was "absolutely spectacular."[151]

While some problems were encountered in the use of TACAIR at An Loc, adjustments made by Seventh Air Force either solved the problems or at least mitigated their effects. One was the difficulty in keeping TACAIR on station at all times. The U.S. Navy practice of launching 18-20 aircraft at the same time not only overloaded the FACs, but also caused gaps



FAC and Spectre Street Map of An Loc

FIGURE 8

in TACAIR coverage. The Air Force attempted to insure aircraft such as A-37s were on station between these flights, but this was not always possible.

Another solution was to refit, rearm, and return the TACAIR to the combat area in as little time as possible. The action taken here was to provide a turn-around facility manned by experienced and dedicated personnel. Bien Hoa was such a facility. One noteworthy two hour period on 2 June may suggest the efforts expended. On that day, six USAF F-4s were expected at 1540 to join four F-4s already on the ground for servicing and munitions loading. At the same time, however, three A-7s, two A-6s, and six Navy F-4s arrived with no advance warning for the same services. By 1735, all 21 aircraft had been serviced and were either in the air or taxing for takeoff. Efforts like this one turned in by the men of the 377th FOL greatly enhanced TACAIR effectiveness at An Loc.[152/]

Another problem that emerged was that U.S. Army Advisers at the user level did not always have a working knowledge of the capabilities, uses, and limitations of the various munitions available from the Air Force. The comment above by Col Ulmer on beacons is instructive. The I-band (x-band) beacons had been provided to Army units at An Loc, but the Army did not learn to use the beacons effectively until late in the campaign. For example, during the first onslaught at An Loc a Spectre arrived on the scene to find the weather poor. The Spectre commander then queried Col Miller as to whether he had an x-band beacon. At first Miller said no, but in a few minutes he called the Spectre crew and said he found a

box with "a bunch of electronics gear in it" in his bunker. After confirming that the beacon was the proper one, Col Miller asked for a few minutes to "read the instructions and set this baby up." Once he had set it up the battery was too weak to run the system. The point was, of course, that the ground forces didn't even know the system existed and therefore were not prepared to use it in combat. Another example was that of an Army ground adviser who refused F-4 support on one occasion because he didn't understand the fuze settings on the ordnance. While there were many examples of this type, the problem was not critical in the overall scope of the campaign and largely solved itself as Army personnel gained experience in working with the new Air Force weapons. One Army after action report suggested that in a campaign like this in the future it would be useful to have an Air Force team brief the ground advisers on weaponry available.[153/] In retrospect, in spite of these problems, the Air Force was able to make adjustments and thus Col Ulmer judged TACAIR to be "a major contributor to the successful defense of An Loc."[154/]

The B-52 was used extensively in the tactical situation at An Loc and received only the highest praise from Army officers involved in the campaign.[155/] Over 700 ARC LIGHT missions were flown in April and May, primarily in support of An Loc. Although accurate post-strike assessments of the missions were not available due to battle conditions, hundreds of VC/NVA personnel were killed and many tanks and other military equipment were destroyed by the B-52 raids.[156/] The 3d Ranger Group reported that ARC LIGHTs not only destroyed enemy troop formations, but when employed close to the city virtually eliminated mortar and AAA until the VC/NVA were able to move up replacements.[157/]

In addition to inflicting substantial material losses, the B-52s had an enormous psychological impact on the enemy as well. When VC/NVA units moved into a village for support, the villagers often tried to move out because they feared their community "would be subject to B-52 strikes."[158] Prisoners reported that their leaders told them B-52s were used only against civilian targets and not against troops in the field. When struck out in the open by ARC LIGHTs, mass confusion resulted with VC/NVA withdrawing from the field, ending the attacks, and sometimes requesting permanent withdrawal from the areas involved.[159]

Originally conceived as a weapon for strategic use, the B-52 proved extremely valuable to the ground commander's needs in the battlefield situation at An Loc. On planned missions, the 5th Division TOC proposed target boxes and forwarded the proposal through channels for approval. These target boxes were often planned as close as "800 meters from potential friendly troops." The schedule of approved requests usually was received by the ground commander by 1800 for the following twelve hours. Once the B-52s were in the air, missions were not cancelled unless the FAC called for an abort during a search and rescue attempt. (This occurred once at An Loc).[160] From the Army commander's point of view, the B-52 became increasingly important because the ARC LIGHTs could be diverted to a higher priority target if required. Less common was the Ground Target Change (GTC) that was made a minimum of three hours prior to launch. Brigadier General McGiffert said that the GTCs became so effective because of the tremendous cooperation shown by the SAC ADVON personnel in making the B-52

missions responsive and flexible. By the end of May, McGiffert recounted that almost ninety percent of all B-52 missions at An Loc were GTC.[161/]

The "Heavy Arty" warning of impending B-52 strikes brought two problems to the forefront. Safety requirements dictated all TACAIR be cleared from the target box twenty minutes prior to drop. Ground commanders sometimes spoke of this time requirement with frustration because all TACAIR left the areas. The Senior Adviser to the ARVN 5th Infantry Division recommended "shortening the 'clear area' time to five or ten minutes" and "providing prompt 'all clear' notification."[162/] The other problem was that no warning was sufficient unless all aircraft were able to receive it. On occasion, FACs working over An Loc did not receive "Heavy Arty" warnings. One Army adviser related that Sundog 34 was notified he was in an ARC LIGHT box and was told to move out. The FAC acknowledged "Roger," the adviser continued, but "about that time the B-52 struck--anyway you could hear the bombs going off and that's the last we heard of him. So I feel he was caught in the B-52 strike."[163/] While this incident was not substantiated, FACs did cite cases when they found themselves hoping for the best in the midst of an ARC LIGHT strike. One FAC pilot pointed out that a "Heavy Arty" warning could be missed if the proper equipment was not turned on or if a FAC were flying in an area where radio transmissions were weak.[164/] One suggestion was for the B-52s to provide encoded warnings "to FAC and aircraft controllers well in advance of strikes" so that all would know more precisely the time and location of ARC LIGHT strikes.[165/]

There was no surrender ceremony at An Loc. The defenders had shown unexpected stamina and had held; the VC/NVA units, badly crippled by airstrikes, slowly drifted toward Cambodia. Although unable to mount any serious attacks, small pockets of VC/NVA continued to interdict the major highway into An Loc, forcing aerial resupply to continue. Inside the city, nothing was preserved; "the stench of garbage and death" pervaded the air. Every vehicle in the city stood devastated.[166] Ninety-five percent of An Loc was destroyed, the rest damaged. Perhaps some seventy percent crumbled before the ceaseless indirect fire, while ten percent of the destruction resulted from airstrikes, the remaining from ground combat.[167]

An Loc was a battle fought with massed forces, intense firepower, and sophisticated equipment "representative of a midintensity conventional war situation."[168] The biggest mistake on the part of the VC/NVA was their underestimation of the role of air power in such a situation. Convinced they could inhibit or even restrict air support by AAA and SA-7s until they could overrun the provincial capital, they could not anticipate that Air Force adjustments to the new situation would result in even more effective firepower through increased use of B-52s and other TACAIR support innovations.[169] Thus in the final analysis, air support was "the predominant factor in swaying the balance of power over a numerically superior, well equipped enemy force" at An Loc.[170]

APPENDIX I

USAF COMBAT LOSSES: MR III 1 Apr - 30 Jun 72*

DATE	ZULU TIME	TYPE A/C	MISSION	CAUSE	CREW STATUS
16 Apr	0629	F-4D	Strike	gf	1W/1R
18 Apr	2012	C-130	Log	gf	3I/3R
25 Apr	2030	C-130	Log	gf	6M
1 May	1113	A-37	CAS	gf	1R
2 May	0900	AC-119	Recon	37mm	3M/7R
3 May	1552	C-130	Log	gf	6M
11 May	0130	02	FAC	37mm**	1M
11 May	0630	02	FAC	37mm**	1M
11 May	0003	A-37	CAS	23mm	1K
14 May	0645	02A	FAC	SA-7	1R
5 Jun	0200	02A	Recon	gf	1I

*This list was extracted from USMACV (MACDO-21), Working Paper, "Hits and Losses for USAF Aircraft," 1 Jan 72 - 1 Jul 72, undtd (S).

**The 21st TASS considers these two losses as possibly due to SA-7s, but the rockets were not confirmed.

APPENDIX 2

OPERATIONAL COMBAT EVALUATION

ON

THE ADVERSE WEATHER AERIAL DELIVERY SYSTEM (AWADS)

AUGUST 1972

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APPENDIX 2

OPERATIONAL COMBAT EVALUATION
ON
THE ADVERSE WEATHER AERIAL DELIVERY SYSTEM (AWADS)

1. INTRODUCTION

a. This report contains an operational evaluation of the Adverse Weather Aerial Delivery System (AWADS) conducted during combat operations in Vietnam between 21 May - 15 July 1972. The areas covered in the evaluation include: the initial training required to meet operational commitments, the deployment and employment of the 61st TAS into combat aerial delivery, aircraft and equipment reliability, supply and maintenance support, and recommended improvements in the equipment and training for the employment of AWADS aircraft.

b. AWADS DESCRIPTION. AWADS is a multi-purpose avionics system designed to assist aircrews in performing aerial delivery missions under conditions of low visibility or darkness. This system provides the capability to position aircraft without assistance from ground aids, for an accurate aerial delivery (113 meters design aircraft position parameter). The AWADS package consists of a multi-function forward looking radar (X and Ka band), coupled with a computer to provide automatic Computed Air Release Point (CARP) computations and guidance to the CARP. It includes station keeping equipment (SKE) to allow aircraft to maintain fixed separation in formation under night and adverse weather conditions. Further detailed information of this system is contained in TAC TEST Reports 70A-037A and 71A-024A.

c. AWADS TRAINING. The initial aircrew training concepts to operate AWADS equipped C-130's are oriented toward low level (500 ft AGL) and mid-level (3500 ft AGL) navigation, with a transition to standard drop altitudes (600 ft for the Container Delivery System (CDS) - 1000 ft for personnel and equipment). The quality and quantity of this training is fully adequate to provide the skill level required for these operations. The required training of 12 navigation legs, airborne radar approaches, and station keeping equipment (SKE) indoctrination are well balanced to provide an excellent base for improvising new procedures when necessary.

d. DEVELOPMENT AND EMPLOYMENT OF 61ST TAS. The 61st TAS deployed a command element, 20 aircrews, and 10 AWADS equipped C-130E aircraft to Tan Son Nhut Air Base, RVN, between 21 and 24 May 72. Upon arrival, immediate training requirements and programs were initiated to (1) employ aircrews in Ground Radar Aerial Delivery System (GRADS) using the MSQ-77 ground radar for directing mid and high level drops (6500 to 11,000 ft AGL); (2) to conduct mid and high level AWADS airdrops; and (3) to improvise techniques to overcome the design limitations of AWADS equipment (see TAC TEST 71A-024A).

The GRADS airdrop checkout started on 22 May, and all 40 assigned crews were trained by 18 June 72. GRADS training consisted of one observation ride for the pilot, navigator, and loadmaster. This was followed by one supervised drop, and an unsupervised successful drop for the entire crew. A flight check and written examination was then administered to all crew members to insure standardized procedures, compliance with PACAF, 374th TAW, and 61st TAS theater training objectives, and also to enhance operational safety.

AWADS employment commenced on 1 June 72, after aircrew training and reliability of aircraft positioning had been established in comparison with GRADS. Significant results were achieved in AWADS releases using the natural Offset Aiming Point (OAP), radar beacon, and SKE procedures. Unit aircrew proficiency and knowledge in AWADS was greatly increased.

The flexibility of having three procedures (AWADS, SKE, and GRADS) allowed crews to transition from one procedure to another to overcome equipment malfunctions. This feature increased the probability of mission success and completion.

2. EVALUATION FACTORS

a. PERSONNEL: During the evaluation, 40 qualified aircrews were used to accomplish the GRADS drops. From these 40 aircrews, 12 qualified AWADS aircrews were selected to operate the AWADS equipment. Navigators alternated on an equal number of airdrops and drop zones for each system used. The 61st TAS provided 16 different AWADS equipped aircraft based on a daily scheduling availability.

b. WEATHER: Weather conditions during the airdrops varied from clear at drop altitude to the ground, clear at drop altitude with an undercast, and solid weather from drop altitude to the ground. Turbulence also varied from light to moderate, particularly while flying under instrument conditions.

c. WINDS: Altitude winds varied in direction, and velocities from 1-40 knots were encountered. During the latter part of the evaluation,

wind shears between the ballistic fall and drop altitude caused a significant variance in impact distance, particularly when high velocity chutes (85-120 FPS rate of fall, two 15 ft or one 22 ft ring slot) were employed. This wind shear condition did not cause a significant impact miss distance when high altitude low opening (HALO) chutes (220 FPS, one 15 ft ring slot drogue with one G12D opening at 500 ft) were used. The twofold CARP problem encountered in HALO deliveries has been identified in TAC TEST REPORT 71A-024A.

d. CIRCULAR ERROR AVERAGE (CEA): The overall CEA of both GRADS and AWADS was determined by 4, 12, and 16 bundle airdrops made from 6500 to 11,000 ft AGL. The distance between the desired and actual point of impact was estimated by an experienced ground observer.

e. DROP ZONE DIMENSIONS: Because of the fluid tactical situation, DZ dimensions varied significantly from the criteria established in AFM 3-4 and the recommended interim DZ sizes found in TAC TEST 71A-024A.

f. BRIEFINGS: Prior to airdrop missions, crew briefings highlighted the complex mission specifics, enemy activity in the DZ area, and weather. An increased emphasis was placed on navigator radar studies with respect to the Offset Aim Point (OAP) and predicted scope interpretation.

3. EVALUATION RESULTS, DISCUSSION, AND RECOMMENDATIONS

a. AWADS OPERATIONAL EMPLOYMENT:

(1) Tactics for AWADS airdrops are oriented primarily toward standard MCM 55-130 CDS low level tactics and procedures. However, combat

drops conducted were from 6,500 to 11,000 ft AGL. The most common drop altitude of 10,000 ft was raised to 11,000 in high threat areas to avoid 37mm anti-aircraft fire and to obtain assurance of SA-7 SAM avoidance. Future airdrop tactics must be examined in the event similar hostile threats force an increase in altitude.

(2) While GRADS releases require an exact ground speed, altitude, and track to assure accuracy, this is not necessary for AWADS releases. Therefore, weather and enemy fire can be avoided more readily using AWADS because changes in track, airspeed, and altitude are allowed through computer computations. Also, in the event of computer/radar failure on one aircraft during a drop, AWADS aircraft have an alternate mode of dropping by utilizing SKE and standard 2,000 ft formation trail tactics as developed by TAC.

(3) Advantages seen in AWADS airdrops warrant renewed investigation in the use of higher speed releases, recomputation of CDS flap settings to attain optimum gravity extraction values and aircraft altitudes, and improvements to the aircraft empennage structure to support higher airspeeds. The use of airspeeds of approximately 130-135 KIAS at 10,000 to 15,000 ft MSL with aircraft weights of 150,000 lbs is not desirable.

(4) Examination of current load ballistics must be conducted to improve drop accuracy and to expand the potential of airdrop capability. Load rigging techniques and equipment, such as the A22 containers, must be improved to sustain increased descent velocity and impact speeds experienced in high altitude airdrops.

(5) During periods of heavy rain showers, the Ka Radar became unusable, and most offsets did not show on X-Band radar. Because of this problem, the first drop at Kontum was made with the use of a ground radar beacon. The location of the drop zone, with respect to friendly forces, demanded the beacon be placed 300 yards prior to the leading edge. Using beacons with a large output (300 watts) caused radar scope "ringing" at 2 NM which hindered the navigator's adjustments of the crosshairs. To eliminate this problem, the 201X mini-ponder beacon (5 watts) was used and found to be highly satisfactory. This mini-ponder beacon also has a coded two pulse transmission which is extremely useful with crosshair placement in AWADS aircraft. However, when using a beacon for offset aiming, beacon time delay is a factor which must be considered. If the beacon placement is prior to the DZ and the CARP is beyond the DZ, as was the case at Kontum, radar crosshair placement must stop as much as 1 1/2 minutes from release. The computer must then be allowed to dead reckon (DR) for that length of time. This caused the beacon offset impact miss distance to be a little larger than the average radar return offset impact miss distance. It is recommended that future radar beacon drops be made only with the 201X mini-ponder to eliminate the "ringing" effect on the radar scope. Also, careful consideration should be taken in the placement of the beacon with respect to the DZ in order to minimize the beacon delay effect.

(6) From 16 total DZ's, 10 were examined and radar offsets were picked for AWADS use. The remaining six DZ's are under study and awaiting tactical reconnaissance photography for closer examination by the intelligence

and radar strike section. Most of the offsets used may be picked from 1-50,000 or 1-25,000 scale charts without the use of photography. However, in the case of An Loc where a natural return could not be found and a man-made return had to be used, photography was used to update charts and to determine if the proposed offset within the city had been destroyed by enemy action. In order to maximize the Ka-Band radar energy near the offset, it was most desirable to have an offset that was 4,000 yards or more from the target. If the offset was in the target area, the navigator would lose the return at 1 to 1 1/2 minutes from airdrop release, allowing the computer to DR to the release. This type of offset did cause the impact miss distance to be larger than the average, but was acceptable in most cases. Offset range bearing data measured from the chart was found to be within acceptable limits when the target and offset were on the same chart (1-25,000 or 1-50,000 scale). However, errors up to 400 yards or more were found when the target and offset were on two different charts. This problem was eliminated with the use of Sentinel Lock data obtained by the AWADS radar strike section. It is recommended that Headquarters TAC conduct an in-depth study of the target materials and data available or needed for AWADS employment on a world wide basis.

(7) The use of SKE in a resupply role was excellent. If one AWADS aircraft had a computer or radar failure, it could follow another AWADS aircraft and use SKE to complete the drop. This capability was found to be useful in cutting the time for a group of aircraft to return to base. SKE could also be used for GRADS, allowing the time on the site to be cut in half; thus eliminating long and expensive orbit times.

b. SUPPORT OPERATIONS

(1) The failure of the 61st TAS to deploy with proper intelligence radar strike support personnel caused a 10 day delay in the implementation of AWADS into aerial delivery in SEA. The intelligence section was later manned from existing PACAF resources, and the radar strike section was manned with 61st TAS aircrew personnel. To avoid such delays in future AWADS employments, it is recommended that an intelligence and radar strike section be positioned within the squadron to allow immediate response to the worldwide tactical situation.

(2) Other factors causing delays were lack of proper equipment and material essential to AWADS targeting. Charts used in the selection of Offset Aim Point data were not immediately available upon arrival at Tan Son Nhut AB, but were later obtained. Errors in the charts caused large miss impact scores with GRADS. This was later solved with Sentinel Lock (ACIC) data which was used to devise offset aim point information for the AWADS employment. It is recommended that Headquarters TAC complete an in-depth study of targeting equipment and support required for AWADS to sustain a worldwide operation.

(3) In the present AWADS training program, high altitude airdrops are not addressed. All aircrews within the 61st TAS have received adequate training to support low altitude airdrop operations. However, at the time of deployment, only two crews had completed any type of high altitude airdrops. These were conducted under test conditions. Thus, during the initial employment, crews were being trained under combat conditions. It is recommended that the AWADS training program be increased to include four

high altitude airdrops, with one high altitude airdrop added to the interim AWADS continuation training. Also, navigator proficiency in computerized radar techniques must be increased by additional radar training during and after UNT.

(4) The manning for the deployment of the 61st TAS AWADS was sufficient, except for three areas. First, a radar strike section must be developed to handle daily planning for numerous targets in a fluid tactical situation. The manning should include two trained 1545 AFSC personnel to provide 24 hours operations. This section should not be manned from assigned crew resources. Second, the intelligence section should be assigned to the squadron and manned with one 8044, 20670, and 20650.

(5) A stabilized personnel management program to identify qualified C-130 AWADS navigators and to retain them in an operational AWADS unit is essential now. A procedure using an AFSC identification shredout designator would allow personnel planners sufficient data to eliminate expensive training, loss of sophisticated skills, and also improve the combat readiness posture of TAC AWADS units.

c. AWADS MAINTENANCE. Significant material failure and repair data covering the AWADS equipment field repair capability and spares requirements have been developed. Specific failures and limiting factors have been submitted to allow material analysis. A resume of failures from 15 May - 15 July by LRU is provided:

UNIT	NUMBER OF MALFUNCTIONS	UNIT	NUMBER OF MALFUNCTIONS
IP 987 Nav Scope	19	CPU 43 CADC	2
RT 974 X-Band	7	PP 3214 Con/Pwr	16
RT 975 Ka-Band	7	CP 641 Computer	10
*IP 988 Pilot Ind	8	SDC	4
*O-1552 Sweep Gen	8	**AS 2246 Antenna	7
AM 6225 ECA	3		

AWADS equipped C-130's launched 480 missions from Tan Son Nhut AB with ten late takeoffs and zero aborts, for a reliability rate of 97.9%. The ten delays were charged as follows: maintenance - 4, operations - 4, and rigging - 2.

d. EQUIPMENT LIMITATIONS

(1) The current method for updating the rate of fall in the AWADS computer is a low-altitude approximation which results in significant errors in adjusted rates of fall for high-altitude airdrops. To eliminate this error, the navigator manually computes the adjusted rate of fall using mean altitude and temperature and enters it into the computer. To insure that the computer uses this adjusted rate of fall, the navigator inserts the standard day temperature for the true drop altitude into the computer to overcome any formula deficiency.

*The IP-988 and O-1552 are married units and adjustments must be made simultaneously.
**All GNORS aircraft (2 for 12 days total) have been attributed to antenna failure. No spare antennas were deployed with the 61st TAS.

(2) The display and ground clearance altitude of the AWADS computer is derived from pressure altitude information supplied by the central air data computer (CADC). Significant errors in computer altitude information could have contributed to errors in computer release point solutions and aircraft release positions if corrections had not been applied. To correct this error, the navigator ascertained the D value for the aircraft drop altitude and converted this value to an altimeter setting by adding it to 29.92. This value was then inserted into the computer. The display altitude now read true altitude and eliminated sighting angle and total time of fall computation errors.

(3) In airdropping loads with high velocity chutes, the ballistics are entered into the computer as they are normally, except for rate of fall. An adjusted rate of fall is entered as stated in paragraph (1) above. When employing HALO type chutes, the procedures outlined in TAC TEST 71A-024A were used except for rate of fall. Again, the adjusted rate of fall is entered as stated in paragraph (1) above.

(4) The AN/ASN-24 (V) navigational computer determines the wind at altitude. A 70 percent factor of this altitude wind was used as the ballistic wind for all computer CARP computations. In most cases, this factor was sufficient to put the first four bundles within 100-200 meters of the desired point of impact. An adjustment was then applied to the offset aim point range and bearing to correct for any error in the ballistic wind and to move the second 12 bundles closer to the point of impact. It is interesting to note that one knot of wind error would cause the load to drift 50 meters off target when using high velocity chutes.

(5) The computer is allowed to compute the CARP using the 70 percent wind factor except when a wind shear is found to exist. If a ballistic wind of more than 4 knots and 60 degrees from the computer ballistic wind if found, a different procedure is used. The navigator plots the actual CARP using the ballistic wind found on climbout or reported by other means. A standard set of ballistics known as airborne radar approach ballistics are inserted into the computer. The range and bearing from the computed CARP to the Offset Aim Point is then measured and inserted into the computer as an offset. The computer then positions the aircraft for release at the navigator's computed CARP.

(6) It is recommended that a ballistic wind component be added to the computer program now under revision. This item had been investigated and rejected because of the reliance on availability of drop zone sizes to meet the criteria established in AFM 3-4. Changing the range and bearing of the offset to overcome present ballistic wind computer program deficiency is not a desirable method. These ballistic computation errors have been recognized in TAC TEST 71A-024A and are under revision at this time.

(7) The APQ-122 Ka-radar posed a problem because of its narrow beam width which produced a small band of video when at altitudes above 8,000 AGL. This factor, coupled with the 15 degree down tilt antenna limitation, does not allow the navigator to track a target during a release which is under 4,000 yards from the aircraft. Most offsets were chosen beyond 4,000 yards to allow the navigator to track the offset throughout the release.

(8) The effect of weather on the Ka-band radar was noted on many occasions and found to be extreme in the area of heavy rain showers. Often the navigator is required to use X-band radar for initial crosshair placement, and then switch to Ka-band radar within 60 seconds to make the final crosshair placement.

e. CEA AND CEP ANALYSIS. The overall CEA of 123.4 meters for 362 GRADS drops was a highly acceptable CEA for the system. In order to have an index to rate AWADS, we used the GRADS drops as comparison. The overall CEA for AWADS after 49 drops and prior to beginning airdrops at An Loc was 112.8 meters. The An Loc airdrop posed a particular problem because the offset was 450 yards from the target and was lost 1 minute prior to release. The computer would have to DR up to release time with no corrections from the navigator. The second problem encountered at An Loc was wind shear. By the time a suitable solution for wind shear was designed, the CEA was increased by six 400 to 600 meter scores. The overall CEA for AWADS after 96 airdrops was 172 meters. A quantitative and qualitative analysis has been completed covering AWADS airdrop releases and aircraft positioning error. The mean average of all AWADS scores thru 15 July was 172 meters. Resolution of these scores, parallel and perpendicular to the aircraft axis, showed a 10 meter forward and 35 meter right bias to the center of the drop pattern. The 10 meter longitudinal offset was almost exactly duplicated and thus substantiated by a lateral study of 250 GRADS drops made from the same aircraft using similar loads. This was probably caused by inaccuracy in computations for air forward travel distance to load exit. The 35 meter error is not readily explainable, but is significant.

It is possibly due to computer ballistic wind determination error, since a parallel GRADS analysis showed symmetery about the planned impact point to within 0.8 meters in the lateral direction. The standard deviation of the drops about the mean impact point, parallel to the aircraft, was 172 meters and displayed a slight elliptical tendency for AWADS. The use of ground troops to render accurate reports may have affected the validity of our statistical analysis. However, the large number of drops addressed should cancel the adverse affects and permit useful interpretations of these results. The full details of the study will be available upon return of the 61st TAS.

f. DROP ZONES. The DZ sizes used in GRADS and AWADS drops were as much as 1/2 to 1/3 smaller than the recommended size as prescribed in AFM 3-4, or the interim, size recommended by TAC TEST 71A-024A. In some cases, the DZ dimensions varied and became smaller under combat conditions which posed a problem. Bundles with a missed impact distance of 150 meters from the desired point of impact became unrecoverable. As in the case of An Loc, after the first correction was computed the ground commander would have each aircraft move his impact point so as to resupply each individual combat unit. This was done to aid him in his recovery and transportation problems, and also to limit the exposure time of his men to hostile enemy fire. The average size of all DZ's used by GRADS and AWADS was 420 X 470 meters, while the average size of all the DZ's used by AWADS was 340 X 520 meters. The following is a list of DZ sizes in meters used by the AWADS aircraft:

LOCATION	SIZE	LOCATION	SIZE
An Loc	500 X 500	Kontum	300 X 600
Ben Het	300 X 600	Minh Thanh	100 X 100
Chi Linh	300 X 500	Svey Rieng	IP Coord Only
Dak Pek	200 X 700	Xuyen Moc	300 X 500
Dak Seang	200 X 600	*Hoc Mon	400 X 900

g. FLYING HOURS REQUIRED-AWARDS VERSUS GRADS. The flexibility allowed by the AWADS self-positioning capability became readily apparent when flying hours during AWADS and GRADS airdrop missions were compared. The problem of acquiring radar time from the MSQ-77 sites, because of the relative priorities established for strike aircraft (fighters and B-52's) versus aerial resupply, were the primary reasons for the difference in flying hour requirements. A review of Kontum airdrops revealed that higher priority missions caused several aircraft to divert for refueling and then return to the drop area. At Kontum, the average flying hours per AWADS mission was 2.7; thus a saving of 2.1 hours over GRADS missions was realized. Another example was provided at An Loc where the average GRADS mission was 2.4 hours, while AWADS missions were 1.2 hours. These flying hours requirements held true throughout the various drop zones served. Use of AWADS airdrops improved the efficiency of the tactical airlift force.

*Used as a DZ for ARVN and for test drops.

4. SUMMARY

a. The successful application of AWADS in combat validates the accuracy and reliability of this system in comparison with other airdrop systems. Further, it allows a new flexibility in tactics, provides alternatives to increase mission reliability, and can operate without ground based assistance. Consequently, the stated limitations present in AWADS warrant new investigative efforts.

b. It is recommended that Hq TAC or TAWC convene a study group to review in detail the AWADS employment results and identified problem areas. Corrective action to these problems is essential to assure immediate response and success of AWADS on a worldwide employment.

FOOTNOTES

1. USMACV, Perintrep, Apr 72, p 6 (S).

2. Intvw (S), Maj Paul T. Ringenbach, Capt David K. Mann and Mr. Mel F. Porter with Gen John W. Vogt, Commander, 7AF, 12 Nov 72.

3. MACV COORDS, "Information Brief: Binh Long Province," Jul 71 (U) and Joseph Alsop, "The South's Heroic Defense of An Loc, "Stars and Stripes," 30 May 72 (U).

4. Project CHECO, The USAF Response to the Spring 1972 NVN Offensive: Situation and Redeployment 10 Oct 72 (TS). The information synthesized from this report is classified no higher than secret. Intvw (C), Maj John Cash and Capt Peter Melly with CWO Davis, G2 Order of Battle Section, Hq TRAC, 23 May 72 (hereafter cited as Davis Intvw).

5. Ibid.

6. USMACV, Perintrep, Apr 72, p4, (S), USMACV Commander Center (CC) "Duty Officer's Log, "31 Mar 72-1 Apr 72 (C).

7. USMACV (CC), "Duty Officer's Log," 1 Apr 72-2 Apr 72 (C); 7AF Daily Intelligence Briefing, 2 Apr 72 (S); (Hereafter cited as 7AF DIB).

8. Controlled American Source (CAS) "Situation Report," FVS-29, 163, 2 Apr 72 (S). (Hereafter cited as CAS Report.)

9. Davis Intvs (C).

10. ARVN III Corps and MR III General Staff J2 (Bien Hoa Interrogation Center), "Expolitation Information Report #226/TTTVBH/BS," 27 Mar 72 (C).

11. USMACV, Perintrep, Apr 72 (S), p3, Davis Intvw (C); Maj John Cash, USA with CWO David B. Johnson, OB Specialist for Northern MR III and Cambodia, 23 May 72. (Hereafter cited as Johnson Intvw).

12. Intvw (C), Maj Hitti, USA with Maj P. Bentson, Asst G3, TRAC, 26 May 72. (Hereafter cited as Bentson Intvw.)

13. 7AF DIB, 5 Apr 72 (S), CAS Report FVS-29,197, 5 Apr 72.

14. Bentson Intvw (C), MACV J3, "Report of Significant Activities," 6 Apr 72 (C). Quotation from Bentson.

15. USMACV (CC), "Duty Officer's Log," 6 Apr 72 (C).

16. Charles Black, "Hanoi's Troops Good Soldiers," Columbus (Ga.) Enquirer, 19 May 72 (U). A narrative/interview with Col William Miller, USA, Senior American Adviser at An Loc. (Hereafter cited as Miller Intvw).

17. Bentson Intvw (C); Col William Miller, USA, "Draft: After Action Report," undated. (Hereafter cited as Miller, "After Action Report").

18. CAS Report FVS-29,203, 6 Apr 72 (S).

19. AC-130 Mission Report (Spectre 10), 5 Apr 72 (C); Project CHECO microfilm roll #662 (S) contains all the AC-130 Mission Reports cited in these footnotes.

20. Maj Gen James F. Hollingsworth, CG TRAC, to Gen C. Abrams, "Daily Commander's Evaluation," 051000H-061000H Apr 72 (C). (Hereafter cited as "Backchannels").

21. CAS Report FVS-29,205, 6 Apr 72 (S); "Backchannels," 061000H-071000H Apr 72 (C).

22. AC-130 Mission Report (Spectre 05), 6 Apr 72 (C); Intvw (C), Maj Paul T. Ringenbach with Capt Robert Shumway (Sundog FAC, CHICO 07), 21st TASS, 22 Sep 72. (Hereafter cited as Shumway Intvw).

23. AC-130 Mission Report (Spectre 15), 6 Apr 72 (C).

24. "Reports/Comments on TACAIR: MR III" included in a report titled "Application of Air Power in South Vietnam: Apr 72 thru Jun 72," undtd, sent by Maj Gen Alton D. Slay to Lt Gen Eade, DCS/Plans & Operations. This is a series of comments on air power drawn from an assortment of Army and Air Force documents and observers. (S). (Hereafter cited as "Application of Air Power").

25. CAS Report FVS-29,205, 6 Apr 72 (S).

26. CAS Report FVS-29,211, 7 Apr 72 (C); 7AF DIB, 7 Apr 72 (S).

27. AC-130 Mission Report (Spectre 11), 7 Apr 72 (C).

28. Bentson Intvw (C); Col W. F. Ulmer, Jr., (MACTR-5), "After Action Report, Binh Long Campaign," 20 Jun 72 (FOUO). (Hereafter cited as Ulmer, "After Action Report."). "Backchannels," 061000H-071000H Apr 72 (C).

29. Bentson Intvw (C); Debriefing of Maj Thinh upon his arrival at An Loc (C), 4 Apr 72. (Hereafter cited as Thinh Debriefing); CAS Report FVS-29,214, 7 Apr 72 (C).

30. USMACV (CC). "Duty Officer's Log," 7 Apr 72 (C); Miller, "After Action Report (C);" Bentson Intvw (C).

31. USMACV (CC), "Duty Officer's Log," 7 Apr 72 (C); Intvw (C), Maj John Cash, USA with Capt Marvin C. Zumwalt, Infantry Regiment of the 18th ARVN Division, 18-19 Apr 72. (Hereafter cited as Zumwalt Intvw).

32. AC-130 Mission Reports (Spectres 10 and 17), 7 Apr 72 (C).

33. Zumwalt Intvw (C).

34. Zumwalt Intvw (C). "Backchannels," 081000H-091000H, Apr 72 (C); Stars and Stripes, 9 Apr 72 (U).

35. "Backchannels," 061000H-071000H Apr 72 (C); AC-130 Mission Report (Spectre 01), 7 Apr 72 (C).

36. AC-130 Mission Report (Spectre 09), 8 Apr 72 (C).

37. AC-130 Mission Report (Spectre 02), 7 Apr 72 (C).

38. Shumway Intvw (C) and a survey of AC-130 Mission Reports (C) during the crucial periods of the battle for An Loc.

39. Msg (C), CG TRAC to all US Elms MR 3, 7 Apr 72.

40. "Backchannels," 071000H-081000H Apr 72 (C).

41. Miller, "After Action Report," (C). Sector Forces are Regional and Popular Forces under the control of the Province Chief.

42. "Backchannels," 071000H-081000H Apr 72 (C).

43. 7AF DIB, 8 Apr 72 (S); CAS Report FVS-29,243, 9 Apr 72 (S); CAS Report FVS-29,231, 9 Apr 72 (S); CAS Report FVS-29,251, 12 Apr 72 (S); CAS Report FVS-29,279, 14 Apr 72 (S).

44. CAS Report FVS-29,231, 9 Apr 72 (S); CAS Report FVS-29,257, 12 Apr 72 (S).

45. CAS Report FVS-29,243, 9 Apr 72 (S); CAS Report FVS-29,244, 10 Apr 72 (S), Ulmer, "After Action Report," pp 22, 10, 11, (FOUO); CAS Report FVS-29,231, 9 Apr 72 (S); CAS Report FVS-29,251, 12 Apr 72 (S).

46. Thinh Debriefing (C).

47. Miller Intvw (C).

48. Msg (C) Bunker to SECSTATE, "Thieu Visits Front and Emphasizes his Role as Commander-in-Chief," 15 Apr 72.

49. Miller Intvw (C).

50. Ibid; 1/Lt Richard Joslyn, "Narrative Input for Army Greenbook, 3d Bde (Sep), 1st CAV DIV (AM), 1 July 1971 to 30 April 1972," 19 May 72 (U).

51. 7AF DIB, 14 Apr 72 (S); CAS Report FVS-29,273, 13 Apr 72 (S); "Backchannels," 121000H Apr 72 (C); Debrief Deputy Senior Adviser (Capt Moffett) to 3d Ranger Group at An Loc from 8 Apr-31 May 72 with Hq TRAC staff, early Jun 72 (C), (Hereafter cited as Moffett Debrief); Bentson Intvw (C); Intvw (C) Maj John Cash with Maj Raymond Haney, Inf Adviser at An Loc, 19 Apr 72. (Hereafter cited as Haney Intvw).

52. Intvw (C), Lt Peter Melly with Maj Larry McKay, CO 79th ARA at 3d Bde, 1st Air Cav, 26 May 72; Bentson Intvw (C); Col William Miller to Brig Gen James F. Hamlet, CG 3d Bde, 1st Air Cav (Airmobile), Subj: "Battle of Loc Ninh (An Loc)," 13 May 72 (U).

53. USMACV (CC), "Duty Officer's Log," 13-14 Apr 72 (C); "Backchannels," 131000H-141000H Apr 72 (C).

54. AC-130 Mission Report (Spectre 17), 13 Apr 72 (C).

55. Shumway Intvw (C). For a more detailed explanation of the command and control problems over An Loc see Chapter IV.

56. CAS Report FVS-29,290, 15 Apr 72 (S); CAS Report FVS-29,299, 15 Apr 72 (S); "Backchannels," 141000H-151000H Apr 72 (C).

57. CAS Report FVS-29,299, 15 Apr 72 (S).

58. CAS Report FVS-29,412, 24 Apr 72 (S); Msg (C) Bunker to SECSTATE, 15 Apr 72.

59. CAS Report FVS-29,279, 14 Apr 72 (S).

60. Charles Black, "An Loc is Key to Saigon," Columbus (Ga.) Enquirer, 17 May 72 (U).

61. Col Wm Miller, quoted in Ulmer, "After Action Report," p 12 (FOUO).

62. MACV J3, "Report of Significant Activities," 15 Apr 72 (C); Bentson Intvw (C).

63. "Backchannels," 161000H-171000H Apr 72 (C).

64. Ulmer, "After Action Report," p 13 (FOUO); CAS Report FVS-29,316, 18 Apr 72 (S).

65. Ulmer, "After Action Report," p 29 (FOUO); 7AF DIB, 17 Apr 72 (S).

66. USMACV (CC), "Duty Officer's Log," 16-17 Apr 72 (C); Davis Intvw (C).

67. Haney Intvw (C); Ulmer, "After Action Report," p 47 (FOUO).

68. Major Ingram in Hq TRAC Debriefing, undtd, p 14 (C); CAS Report FVS-29,358, 20 Apr 72 (S). Ulmer, "After Action Report," p 34 (FOUO).

69. H. Lee Braddock, Chief Pacification Studies Group, "Debriefing: An Loc Siege Experiences of two Vietnamese Research Cadre of the MACCORDS Pacification Studies Group," 27 Jun 72 (U) (Hereafter cited as Braddock "Debriefing"); 7AF DIB, 21 Apr 72 (S).

70. 7AF DIB, 22 Apr 72 (S); quoted in Ulmer, "After Action Report," p 14 (FOUO).

71. Ulmer, "After Action Report," p 37, 38 (FOUO).

72. Lt Col Allen R. Weeks, 7AF DO-235, (Airlift Section), "Combat Airdrop Report, 15 April 1972 - 15 July 1972," undtd, p 1 (C); (Hereafter cited as "Combat Airdrop Report"); American Advisers to ARVN 5th Div at An Loc, "Daily Log," 18 Apr 72 (C).

73. "Combat Airdrop Report," p 2-3 (C); CAS Report FVS-29,376, 21 Apr 72 (S).

74. Ibid; tab 1, p 3.

75. "Backchannels," 241000H-251000H Apr 72 (C).

76. "Backchannels," 251000H-261000H Apr 72 (C); 7AF Director of Information news release "C-130 Crews Create Lifeline to An Loc," 1 Jun 72 (U).

77. CAS Report FVS-29,488, 30 Apr 72 (S); "Backchannels," 301000H-011000H May 72 (C).

78. AFM 3-4 requires a larger CDS zone than was available; "Combat Airdrop Report," and p 2, tab 1, p 3, 4 (C).

79. 16th SOS Working Paper Draft for the squadron history Apr-Jun 72 (S) p 20, 21; Stinger Mission Report #5228, 25 Apr 72 (C) reviewed at 18th SOS, NKP, RTAFB.

80. CAS Report FVS-29,536, 3 May 72 (S); "Backchannels," 271000H-281000H Apr 72 and 011000H-021000H May 72 (S).

81. "Combat Airdrop Report" tab 1, p 5 (C).

82. Intvw (C) Maj John Cash with Maj Kenneth A. Ingram, Sr. Arty Adviser to the 5th DCAT at An Loc from 1-3 May 72, 1 June 72. (Hereafter cited as Ingram Intvw).

83. Ibid. (C); "Backchannels," 021000H-031000H May 72 (C). Hq TRAC Debrief of Capt Moffett and Maj Ingram, undtd, p 9 (C).

84. Ingram Intvw (C), Vogt Intvw (S).

85. "Combat Airdrop Report," tab 2, p 2, 3 (C).

86. Ulmer, "After Action Report," p 40, 41 (FOUO); "Combat Airdrop Report," tab C, p 2 (C).

87. "Backchannels," 041000H-051000H May 72 (C).

88. Ibid; 051000H-061000H May 72 (C).

89. Ulmer, "After Action Report," p 27, 28 (FOUO).

90. Intvw (C) Maj Cash with Capt Moffett, 3d Rgr Gp Adviser at An Loc, 1 Jun 72; Moffett Debrief (C).

91. CAS Report FVS-29,547, 4 May 72 (S); "Backchannels," 031000H-041000H May 72 (S).

92. 7AF (DOLCE/Lt Col Weeks) Form 4, Col R. J. Downs, Director of Airlift to 7AF DO, undtd (U).

93. Hq TRAC Debriefing of Capt Moffett and Maj Ingram, undtd, p 9 (C).

94. 7AF DIB, 5 May 72 (S); CAS Report FVS-29,604, 8 May 72 (S).

95. 7AF DIB, 7 May 72 (S).

96. USMACV (MAC DI12-41), Bulletin No. 49,444. "Captured Enemy Documents," 28 Jun 72 (C).

97. Msg (U) Bunker to SECSTATE, 16 Jun 72; Joseph Alsop in Stars and Stripes, 29 Apr 72 (U). "Backchannels," 301000H-011000H 4 May 72 (S).

98. Braddock, "Debriefing," p 2 (U).

99. "Backchannels," 091000H-101000H Apr 72 (S).

100. Ingram Intvw (C).

101. Moffett Debrief (C).

102. Ibid.

103. Ulmer, "After Action Report," p 17 (FOUO); 7AF DIB 11 May 72 (S).

104. 7AF DIB, 11 May 72 (S); Brig Gen James F. Hamlet, USA, Memo for Gen Wm Maddox Jr, "Destruction of Armor by Helicopters," 18 May 72 (S).

105. Moffett Debrief, p 20 (C).

106. Intvw (C) Lt Peter Melly with Lt Col Gordo Weed, C.O. 8th SOS, 14 Jun 72. (Hereafter cited as Weed Intvw).

107. Moffett Debrief, p 21 (C); CAS Report FVS-29,653, 11 May 72 (S).

108. Intvw (C) Lt Peter Melly with Maj Munsch, G3 TRAC, 23 May 72, (Hereafter cited as Munsch Intvw); Moffett Debrief, p 45 (C); "Backchannels," 111000H-121000H May 72 (C).

109. USMACV J3, "Report of Significant Activities," 12 May 72 (C); "Backchannels," 111000H-121000H May 72 (C); CAS Report FVS-29,653, 11 May 72 (S).

110. Moffett Debrief, p 22 (C).

111. Ulmer, "After Action Report," p 24 (FOUO); Shumway Intvw (C).

112. Ulmer "After Action Report," p 17 (FOUO); Maj Kenneth A. Ingram, Division Artillery Team Adviser, ARVN 5th Division, Debriefing, 10 Jun 72 (C). (Hereafter cited as Ingram Debrief); Hq TRAC Debriefing of Capt Moffett and Maj Ingram, undtd, p 6 (C).

113. Intelligence Report for 12 May 72 (0500H-1500H) (S) and Night Intelligence Report for 12/13 May 72 (S). Both located on Project CHECO Microfilm roll #637 (S) also Letter: Hq PACAF (DOOF/Lt Col Kyle), subj: CHECO Report, Battle for An Loc (U), dated 11 Jan 1973 (S).

114. CAS Report FVS-29,665, 12 May 72 (S); Shumway Intvw (C); "Backchannels," 121000H-131000H May 72 (C).

115. CAS Report FVS-29,665, 12 May 72 (S).

116. CAS Report FVS-29,669, 13 May 72 (S); USMACV (CC) "Duty Officer's Log," 13 May 72 (C).

117. 7AF DIB, 13 May 72 (S).

118. CAS Report FVS-29,675, 13 May 72 (S); "Backchannels," 121000H-131000H May 72 (C).

119. TACTICAL ANALYSIS BULLETIN, Vol 72-2, 1 Jul 72, p 2-4 (S), quotation on p 2 and CMDR, 21st TASS, Lt Col J. Morgan, 16 Nov 72 (U).

120. Ibid., p 4, 5.

121. Intvw (C) Capt P. Melly with Stinger crew members at Bien Hoa AB, 26 May 72; Project CHECO Report, Fixed Wing Gunships in SEA, 30 Nov 71 (S), Figure 11.

122. Shumway Intvw (C) and Maj G. Lange, Chief Airlift Operations, Hq MACV.

123. CAS Report FVS-29,726, 17 May 72 (S); CAS Report FVS-29,719, 16 May 72 (S).

124. USMACV (CC) "Duty Officer's Log," 16 May 72 (C); CAS Report FVS-29,732, 17 May 72 (S).

125. Ulmer, "After Action Report," p 16, 17 (FOUO); CAS Report FVS-29,719, 16 May 72 (S).

126. CAS Report FVS-29,744, 18 May 72 (S).

127. "Backchannels," 181000H-191000H May 72 (C); CAS Report FVS-29,764, 20 May 72 (S); CAS Report FVS-29,772, 20 May 72; 7AF DIB, 21 May 72 (S).

128. 7AF DIB, 23 May 72 (S).

129. CAS Report FVS-30,107, 21 Jun 72 (S); CAS Report FVS-30,128, 23 Jun 72 (S).

130. "Backchannels," 221000H-231000H and 231000H-241000H May 72 (S).

131. CAS Report FVS-29,777, 21 May 72 (S).

132. CAS Report FVS-30,048, 15 Jun 72 (S); "Backchannels," 081000H-091000H Jun 72 (S).

133. Ibid., 221000H-231000H Jun 72 (S).

134. CAS Report FVS-29,882, 31 May 72 (S); CAS Report FVS-30,148, 25 Jun 72 (S).

135. "Backchannels," 251000H-261000H Jun 72 (S).

136. Ulmer, "After Action Report," p 23 (FOUO); Shumway Intvw (C); Weed Intvw (C).

137. Shumway Intvw (C); Intvw (S) Maj Walter Scott Dillard, USA, with Brig Gen John R. McGiffert II, Deputy Commanding General, TRAC, during the battle of An Loc 10 Oct 72, (Hereafter cited as McGiffert Intvw); Ulmer, "After Action Report," p 24 (FOUO).

138. Ulmer, "After Action Report," p 23 (FOUO).

139. McGiffert Intvw (S).

140. Ingram Intvw (C).

141. Ibid., "Backchannels," 041000H-051000H May 72 (C).

142. USAFTFWC, SA-7 Tactics Conference Report published in the USAFTFWC, TACTICAL ANALYSIS BULLETIN, Vol 72-2, 1 Jul 72, p 22 (S).

143. "Operational Combat Evaluation on the Adverse Weather Aerial Delivery System (AWADS)," Aug 72 (C), p 2. Because of the limited distribution of this study, it has been included as an appendix to this report for reference purposes.

144. Ibid., p 7, 4.

145. Ibid., p 7, 14.

146. Project CHECO, Fixed Wing Gunships in SEA (Jul 69 - Jul 71), 30 Nov 71, p 31 (S), (Hereafter cited as CHECO, GUNSHIPS.)

147. Moffett Debriefing (C); Ulmer, "After Action Report," p 25 (FOUO).

148. CHECO, GUNSHIPS, p 35, 61 (S).

149. Hq TRAC Debrief of Capt Moffett and Maj Ingram, undtd, p 4 (C); Intvw (S) Maj J. C. Thomas with Lt Col R. F. Kelsey, 16th SOS staff officer and pilot on the PAVE AEGIS weapon system, 5 Jul 72.

150. Ulmer, "After Action Report," p 25, 26 (FOUO).

151. McGiffert Intvw (S); Vogt Intvw (S).

152. Otas A. Sleep, Lt Col, USAF to "Men of the 377 FOL," Bien Hoa, 2 Jun 72 (U).

153. 16th SOS Quarterly Historical Report, Apr-Jun 72, "Beacon Offset Firing," (S); U.S. Army Advisers to ARVN 5th Division, "After Action Report Draft" (C).

154. Ulmer, "After Action Report," p 26 (FOUO).

155. McGiffert Intvw (S); Also see Abrams Msg (C) (150851Z May 72) to CDR 8AF which states in part, "There is no question that the B-52s have been a major factor, and in preventing the enemy's accomplishment of most of his major goals."

156. SAC ADVON, "SAC ADVON Monthly Activity Report for April 1972," 5 May 72, p 4 (S), and "Extract of SAC ADVON Monthly Activity Report for May 1972," p 4, Jun 72 (S).

157. Richard J. McManus, Lt Col, USA to Brig Gen McGiffert, "Activities Report, 3d Ranger Group, 8 Apr-20 May 72," p 4 (U).

158. USMACV (MACDI 12-41), "Captured Enemy Documents," Bulletin No. 49,329, 17 Jun 72 (C).

159. CAS Report FVS-29,863, 28 May 72 (S); CAS Report FVS-29,726, 17 May 72 (S).

160. Ulmer, "After Action Report," p 25 (FOUO); Intvw (C) Maj J. Cash and Lt P. Melly with Col Franklin, Senior Adviser to 21st ARVN Division, 25 May 72. Col Franklin confirmed that the Army requested B-52 strikes closer than 1000 yards from friendly troops.

161. McGiffert Intvw (S).

162. American Advisers to ARVN 5th Div at An Loc, "Daily Log," 15, 18 Apr 72 (C); Ulmer, "After Action Report," p 26 (FOUO).

163. Moffett Debriefing, p 26 (C).

164. Shumway Intvw (C).

165. Ulmer, "After Action Report," p 25 (FOUO).

166. Maj Kenneth Ingram quoted in "Report Few NVA Left in An Loc," Stars and Stripes, 2 Jun 72 (U).

167. Braddock, "Debriefing" (U).

168. Ulmer, "After Action Report," p 50 (FOUO).

169. Intvw (C) Maj J. Cash with CWO Davis, TRAC G2 OB Section at TRAC Hq, 23 May 72.

170. Quote from Ulmer, "After Action Report," p 51 (FOUO). The view that air power was primarily instumental for the failure of the VC/NVA to take An Loc can be found in numerous sources. For some examples see McGiffert Intvw (S); Hq TRAC Debrief of Capt Moffett and Maj Ingram, undtd p 1 (C); Franklin Intvw (C), p 3; McManus to McGiffert, "Activities Report, 3d Ranger Group," p 4 (U); "Backchannels," 131000H-141000H Apr 72 (S); and Vogt Intvw (S).

GLOSSARY

AAA	Antiaircraft Artillery
ARC LIGHT	(S) B-52 Operations in SEA
ARVN	Army of the Republic of Vietnam
ATC	Air Target Change
AWADS	Adverse Weather Aerial Delivery System
CARP	Computed Aerial Release Point
CAS	Close Air Support
CBU	Cluster Bomb Unit
CDS	Container Delivery System
COMUSMACV	Commander, U.S. Military Assistance Command, Vietnam
COSVN	Central Office for South Vietnam (Headquarters for all VC activities in South Vietnam)
DAISY CUTTER	(S) MK-82 (500 pound HE) or MK-84 (2000 pound HE) bomb with fuze extended; designed to explode at the surface to kill personnel and defoliate
DASC	Direct Air Support Center
FAC	Forward Air Controller
FFAR	Folding Fin Aerial Rocket
FSB	Fire Support Base
GRADS	Ground Radar Aerial Delivery System
GTC	Ground Target Change
HALO	High Altitude Low Opening
IR	Infrared
LAW	Light Anti-Tank Weapon
LZ	Landing Zone
MACV	Military Assistance Command, Vietnam
MEDEVAC	Medical Evacuation
MR	Military Region
PAVE AEGIS	System employing a 105mm howitzer on an AC-130E gunship
POW	Prisoner of War
ROE	Rules of Engagement

SPECTRE	Call sign for AC-130 gunships
STINGER	Call sign for AC-119K gunships
TAC	Tactical Air Command
TACAIR	Tactical Air
TAS	Tactical Air Squadron
TOC	Tactical Operations Center
TRAC	Third Regional Assistance Command
VC	Viet Cong
VC/NVA	A mixed force of Viet Cong and North Vietnamese regulars
VNAF	South Vietnamese Air Force

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