points not to be met or to be reduced. Due to the effectiveness of our actions, the enemy logistical-management system was eroded."

The IAF Commander agreed:

"Khe Sanh was the beginning of the end for the communists in their military operations in South Vietnam. And there is no question that air was responsible for the enemy setback at Khe Sanh. During the Tet Offensive, when the enemy got to Saigon and was not able to get the popular uprising he hoped for and the government didn't collapse, the result was an emotional and psychological strengthening of the government as well as a weakening of the enemy."

May and August Offensive, 1968

The enemy's experience during the Tet offensive led him to reassess his strategy and tactics. Realizing that his forces could not afford another such offensive, he believed the propaganda success could be furthered by sustaining pressure on the Allies. The VC/NVA therefore became more selective in the choice of targets, staggering his blows both in time and place.

This strategy was carried out during the second enemy offensive during May and June. Intelligence sources indicated the offensive was to take place in later April, but that aggressive Free World Military Assistance Forces (FWMAF) and RVNAF spoiling actions forced a delay. Many enemy units were noted moving on Saigon on 3 and 4 May. The attacks began shortly thereafter, with more troops committed than in February. A total of 27 VC/NVA battalions were scheduled to attack Saigon/Tan Son Nhut. Of these, only elements of nine were able to enter the city, with
the main fighting centered around Tan Son Nhut and in Cholon. By early June, only sporadic contact continued as the Allied troops mopped up the scattered enemy survivors. The enemy attempted some degree of coordination with attacks-by-fire (ABFs) throughout the Republic, but his offensive efforts were focused on Saigon and largely preempted.

During the May-June fighting, airpower again contributed to enemy setbacks. Total attack sorties by USAF/USMC assets under single management rose 29.4 and 53.3 percent, respectively, over the April figure. Many of the strikes were flown against the VC/NVA holed up in Saigon. The ARC LIGHT program overflew the 1,800-sortie-per-month program by completing 1,854 sorties during May, the majority of which struck enemy LOCs in western II Corps.

Enemy-initiated activity returned to a low level during the latter part of June and through July. In the first half of August, he prepared for the third in his series of "general offensives," with troop replacement and resupply activity. Beginning on 18 August, attacks by fire and ground assaults took place initially in III Corps, and spreading throughout much of Vietnam during the remainder of the month. According to intelligence sources, the attacks in outlying areas, such as at Duc Lap in western II Corps, were designed to draw Allied units to the fringes and expose the population centers to direct assault. The main objectives appeared to be Da Nang in I Corps and Tay Ninh in western III Corps, the latter to force an opening toward Saigon.
Heavy contact occurred in central I Corps from 20 August until early September. The plan for a "crushing blow" against Da Nang was prevented as the Allied forces located and destroyed the attack units. Scattered but heavy fighting also took place in western II and III Corps, with the single most prolonged assault at Duc Lap CIDG camp just inside the RVN/Cambodian Border. Before the offensive was ended in September, the enemy was unable to achieve any of his objectives; he suffered heavy casualties, as friendly ground forces and airpower blasted VC/NVA troop concentrations and captured substantial amount of war materiel. That the offensive was much less intensive than planned was seen in the fact that, as one U.S. source said, "the enemy KIA figure passed 25,000 without anyone knowing for sure whether a 'third offensive' had taken place."\(^{16/}\)

**In-country Interdiction**

Starting immediately after Tet and continuing throughout 1968-1969, the Air Force, Navy, and Marines carried out a series of interdiction campaigns along the western border of South Vietnam where the Lao road net joined the RVN national highway system. During the first half of April 1968, 7AF tactical aircraft conducted a moderate interdiction operation in the A Shau Valley south of Khe Sanh (Projects GRAND CANYON and BUFFALO). A total of 834 missions were flown in the valley and along Route 547 leading east out of the valley. Since Free Strike Zone clearance was not granted, these operations were designated close air support rather than interdiction.
Later in the same month, the first Specified Strike Zones (SSZs), named Bravo and Uniform, were established near Route 14 in the vicinity of Kham Duc. Since blanket military and political clearance was obtained to frag strikes into these SSZs and to have them controlled by Forward Air Controllers, these were the first true in-country interdiction campaigns. The objective was to prevent the NVA from linking Route 966 in Laos with Route 14 in RVN.

On 12 May, the Special Forces Camp at Kham Duc was evacuated by US/ARVN forces. Although the camp was under attack by two enemy regiments, the decision to abandon it was made voluntarily. The camp had already served its purpose as a forward observation post of enemy infiltration into the coastal plain. Like Khe Sanh earlier in the year, Kham Duc could have been held, but its retention would have tied up valuable ground forces at a time when the enemy was preparing for another offensive. Airpower provided the option of retaining or abandoning the camp. When the decision was made, airpower was responsible for the successful evacuation under heavy enemy attack. While C-130s, C-123s, and Army helicopters airlifted 1,400 people from the camp, 122 USAF and 16 USMC tactical air sorties kept the enemy from overrunning the post. In addition, B-52s dropped 3,450 tons of ordnance during the three-day period (11-13 May 1968). The evacuation of Kham Duc emphasized the importance of the Single Management System. With only a few hours notice, the air resources of three services were integrated into a smooth and successful operation.
Farther south, in the Tri-Border area where Cambodia, Laos, and South Vietnam joined, a combined Army/Air Force operation, TRUSCOTT WHITE, got under way early in April (Fig. 1). The purpose of this campaign was to use airpower and ground artillery to halt NVA construction of an extension of Route 110 into South Vietnam. Between 7 April and 29 June, ARC LIGHT strikes hit the road, while 1,420 tactical air sorties struck enemy antiaircraft emplacements. By May, road construction had stopped.

Three Specified Strike Zones were created in May around NVA LOCs in western South Vietnam: SSZ Victor in the A Shau Valley, SSZ Tango South of the valley, and SSZ Song Be, north of Bien Hoa in III Corps. SSZ Victor made the entire A Shau Valley and the surrounding mountains a Free Strike Zone where airstrikes aimed at attacking NVA troops moving through the valley from Khe Sanh. South and east of the valley, SSZ Tango straddled Route 614 (Yellow Brick Road), which ran from the valley onto the eastern coastal plain toward Da Nang. Constant pounding closed the road by August. SSZ Song Be was created in III Corps to attack enemy construction of a road from Base Area 351 toward Bien Hoa. Between 19 May and 24 October, FAC-controlled airstrikes closed the road and kept it unusable. Between the end of June and late October 1968, Seventh Air Force allocated an average of ten sorties per day to this in-country interdiction effort. The in-country interdiction program was not integrated with interdiction operations across the border in Laos to the degree desired by Seventh Air Force. Ground commanders did not grant sufficient clearances for SSZs, and the special intelligence center, which had been created at 7AF for
the NIAGARA campaign, was disbanded. Nevertheless, the creation of these few isolated SSZs was instrumental in blunting the enemy's second offensive in May 1968, and his third offensive in August.

The flexibility of airpower in-country was demonstrated in another way during 1968--in the defense of Special Forces Camps along the western borders of South Vietnam. A string of these Civilian Irregular Defense Group camps existed in remote areas to interdict enemy LOCs. Periodically these camps, which resembled American frontier outposts, came under attack. During 1968, COMUSMACV had successfully defended the camps with tactical aircraft and ARC LIGHT sorties. In August, the Special Forces Camp at Duc Lap in II Corps came under ground attack. The USAF flew 314 tactical air sorties and nine ARC LIGHT missions, and the enemy was driven off. Particularly impressive was the performance of the AC-47 Spooky gunships which remained constantly overhead for several nights. A total of 715 enemy were killed and the camp remained in friendly hands.

A month later, airpower saved another SF camp at Thuong Duc in I Corps, west of Da Nang. All the air assets in I Corps were mobilized to counter a sudden attack on the camp by two enemy regiments. There was a continual stream of airstrikes by USAF tactical aircraft, B-52s, and AC-47 and AC-130 gunships over Thuong Duc. In the words of the Senior U.S. Army Advisor to the Special Forces in I Corps: "There is no doubt about it. Without that support from FACs and fighters, we would not be in Thuong Duc today." The same result, along with similar laudatory
comments, was experienced at several other camps before the wet season brought an end to the attacks.

Out-Country Interdiction

Route Package I: More air interdiction throughout 1968-1969 took place outside South Vietnam, in Route Package I (RP I) during the summer of 1968 and in STEEL TIGER late in 1968 and through 1969. The partial bombing halt early in April 1968 released numerous sorties from the upper Route Packages of North Vietnam and permitted them to be concentrated in the NVN panhandle. During the first week in July, an integrated air, naval, and artillery operation (THOR) was directed against NVA field artillery and AAA positions just north of the DMZ in the TALLY HO operating area. The purpose of the operation was to neutralize the AAA threat against airborne FACs and to eliminate enemy artillery threats to the USMC supply lines just south of the DMZ. A total of 2,318 strikes and reconnaissance sorties were flown, and 8,363 tons of ordnance were delivered against enemy gun positions. In one week, 126 artillery positions, 399 AAA positions, and 2 SAM sites were destroyed. As a result, the airspace in lower TALLY HO became a relatively low-threat area.

One week later on 14 July 1968, an all-out interdiction campaign began in Route Package I and continued until all bombing of the north was halted on 1 November. The largest number of sorties in the history of the northern bombing campaign was flown in RP I during July and August--more than 14,000 in July and over 13,000 in August (Fig. 12).
These strikes were aimed at interdicting the main routes out of RP I into Laos and forcing enemy traffic onto the coastal plain, where it became more vulnerable to air attack. Six choke points on the two main NVN roads (Routes 15 and 137) leading to Mu Gia and Ban Karai passes were bombed daily, while at night they were hit with antipersonnel ordnance to hinder repairs. Route 15 was closed nearly all the time from September through October, and Route 137 was unusable 85-90 percent of the time in October. Truck traffic dropped 50 percent on these two routes and increased only 20 percent elsewhere in RP I. In the view of the 7AF Director of Intelligence, this interdiction campaign played a major role in disrupting the enemy's logistical preparation for a third offensive in August. At the same time, it paved the way for initiation of the MACV accelerated pacification campaign aimed at the destruction of the communist infrastructure in South Vietnam. In discussing the new pacification program in January 1969, the Commander, 7AF, noted:

"The accelerated pacification program could well be the final phase of the conflict in South Vietnam. It could not be initiated earlier because the security situation would not permit. It was initiated last fall because of the success of the air interdiction campaign in North Vietnam, which together with effective ground action in South Vietnam, rendered the majority of the North Vietnamese Army units ineffective and forced the withdrawal of many from South Vietnam."

**COMMANDO HUNT:** After North Vietnam was placed out of reach of U.S. airstrikes on 1 November 1968, the air interdiction campaign shifted from RP I across the Annam Mountain range to the COMMANDO HUNT area of the Lao
panhandle. Far from being an isolated effort, the COMMANDO HUNT campaign was tied directly to the in-country war. This connection was highlighted by the Commander, 7AF:

"The current air interdiction campaign in Laos could go down as one of the most significant actions of the war, and I emphasize that the North Vietnamese logistic flow through southern Laos must be reduced to a point where it cannot support offensive military actions by the communists in South Vietnam. Should the campaign fail to reach that objective, the result will be renewed military action by the communists in South Vietnam, with the objective of defeating the accelerated pacification program which is of such importance."

Located west of the DMZ and extending from the DMZ northward to 18° N and southward to 16° N, the COMMANDO HUNT region contained the major entry ways from NVN into Laos (Nape, Mu Gia, and Ban Karai Passes) and the key exits from Laos into I Corps. The goal of the COMMANDO HUNT campaign (15 Nov 68 - 15 Apr 69) was to reduce the NVA logistical flow by increasing the time it took the enemy to move supplies into RVN and by destroying trucks and other military supplies along the routes which led into the south.

Planning: Control of the COMMANDO HUNT operations was the responsibility of the 7AF Command Center. Task Force Alpha (TFA), located at Nakhon Phanom, functioned as an Infiltration Surveillance Center (ISC) to exploit sensor information developed by the IGLOO WHITE system.

To determine the criteria for force allocation, four categories of targets were established with the following order of priority:
### Type of Targets

<table>
<thead>
<tr>
<th>Type of Targets</th>
<th>Percent of air effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interdiction points</td>
<td>40</td>
</tr>
<tr>
<td>Truck parks and storage areas</td>
<td>33</td>
</tr>
<tr>
<td>Moving trucks</td>
<td>15-20</td>
</tr>
<tr>
<td>AAA Defenses</td>
<td>10-5</td>
</tr>
</tbody>
</table>

Ten interdiction or Traffic Control Points (TCPs) were selected where the LOCs ran through narrow passes or along mountain sides which, when closed, forced enemy traffic to back up into truck parks and storage areas, making it a better target for airstrikes. To the destruction of truck parks and storage areas, the U.S. devoted 35 percent of its tac air and most of the B-52 strikes. Since these storage areas, unlike other types of targets, could be struck at any time of the day and in most kinds of weather, they provided alternate targets for diverted aircraft, thereby increasing the flexibility of strike planning.

Air resources were integrated for the combined truck-killing campaign against the third category of targets. The F-4s and other jets kept the trucks off the roads during the day. Defoliation thinned out the thick jungle canopy along the routes, exposing enemy trucks at night to attacks by predominantly slower-moving aircraft (A-26s, A-1s, B-57s, and AC-123/130 gunships). By detecting vibrations of moving trucks, IGLOO WHITE sensors provided intelligence which assisted strike, FAC, and gunship aircraft to locate the vehicles. Included in the fourth category of targets (AAA) were weapons ranging in size from 12.7-mm to 57-mm, which were
located along the main route structure below Mu Gia and Ban Karai Passes and around Tchepone (Fig 10). The percentage of aircraft sent against these guns varied with the intensity of enemy AAA firing.

The Campaign: By May 1969, the COMMANDO HUNT campaign had passed through three distinct phases. Throughout the first phase, which lasted until the end of 1968, the TCPs received the major emphasis, and traffic was successfully blocked at the key interdiction points. At the same time, airstrikes against trucks, truck parks, and storage areas destroyed large quantities of enemy materiel. An average of 124 strike sorties each day and 40 each night (50 percent of the total) struck the interdiction points. By mid-December, it was estimated from sensor information, NVA truck movement had been slowed to the point the enemy required between six and eight days to move his supplies from Mu Gia Pass into South Vietnam—a journey that had taken two to four days one year earlier. The NVA gradually adapted to the situation by building bypasses and stationing work crews near the target areas to repair the closed roads. During the last two weeks of the year, enemy truck traffic was again on the rise.

The U.S. response came during the second phase of COMMANDO HUNT, January to February 1969, when more flexibility was introduced into the operation. Target priorities were made less rigid and could be changed when necessary to counter enemy reactions. New interdiction points were established and a higher priority was given to striking stockpiles behind
them. Nightly strikes on convoys and vehicles continued in an effort to reduce further the enemy's truck inventory and to funnel his traffic into more desirable strike areas. The Rules of Engagement were relaxed. Positive control areas, ten miles along the eastern border of Laos, were opened to interdiction strikes. FACs were no longer needed for attacks on TCPs. Special ARC LIGHT Operating Areas (SALOAs) were established in which multiple strikes could be made without the need for new validation for each strike. Greater reliance was placed on information derived from IGLOO WHITE sensors, which had the advantage over other intelligence sources of providing near real-time information on enemy traffic patterns, truck parks, storage areas, bypasses, and new routes.

Several of the techniques used during the second phase were refined during the final phase of the campaign (Mar-Apr 69). Important advances were made in the use of sensor information. Individual sensors were closely monitored, and interpreters were able to determine vehicle speed and predict when trucks would pass each subsequent sensor in the string. New storage areas and routes were pinpointed by the sensors. A modification was also made in the tactics used to attack interdiction points. Emphasis shifted from attacks on Traffic Control Points to attacks on Traffic Control Areas (TCAs). Special munition "packages" containing antipersonnel as well as antivehicular munitions were dropped in these areas to prevent enemy crews from moving in to repair the roads immediately after they were closed. Experiments with long-range navigation (LORAN) improved the package concept by allowing the munitions to be delivered regardless
Results: In the five months of the campaign, 67,094 tactical air
and 3,811 B-52 sorties were flown against LOCs, truck parks, storage
areas, moving trucks, and AAA in STEEL TIGER--nearly all in the COMANDO
HUNT area. Tactical air alone accounted for a daily average of 46 road
and bridge cuts. More than 4,300 trucks were destroyed and over 1,600
damaged. Analysts at 7AF estimated that only 18 percent of the enemy's
logistical input into Laos reached South Vietnam. The remaining 82 per­
cent was either destroyed (47 percent), consumed in the system (29 per­
cent), or put into storage (6 percent).

The effect on the enemy's activity in RVN was dramatic. Since his
Lao pipeline was plugged at the northern end, he had to supply his troops
in South Vietnam from the materiel already stored in Laos. His inability
to increase his stockpiles in South Vietnam prevented him from raising
the level of combat activity between January and April or from maintaining
the same level after the arrival of the southwest monsoon season in April.

These results were achieved through a combination of interdiction attacks
in the COMANDO HUNT area and combat operations in South Vietnam.

Gen. Creighton Abrams, Jr., COMUSMACV, later emphasized the partnership
between air interdiction and ground combat, and its success in this
campaign:

"The air effort in Laos during the dry season was to
interdict. In 1968, the program was successful. We
know this, because when the dry season was over /the
enemy/ didn't have enough supplies in SVN to meet his
purpose during the wet season. He, of course, planned for a certain amount of losses, but I think his losses exceeded what he had planned for his operations in upper II Corps and I Corps. In 1968, the effort was also successful because of a good combination of pressure on the ground, finding the enemy's supply and making him use it up, and the air interdiction in Laos."

Accelerated Pacification Campaign; Pacification and Development Plan

In April 1968, COMUSMACV reviewed developments from the time the enemy launched his Tet offensive. This review confirmed that the RVNAF and FWMAF had achieved a significant victory in stopping the enemy and restoring the situation. Plans called for relentless pressure on the enemy to achieve a major turn in the course of the war and emphasized control of population centers to deprive the enemy access to his traditional recruiting base. Captured documents revealed that continual pressure hit at the enemy's already flagging morale. The friendly strategy at this time was expressed by COMUSMACV who stated, "We must go after the enemy throughout the country; we must hound him and hurt him." 32

By the fourth quarter of 1968, certain effects of the coordinated air and ground operations were becoming apparent. Intelligence reports indicated the enemy was attempting to compensate for his tactical losses by turning his efforts into a political offensive, so as to salvage at least a political victory, and to expand the VC cadre and infrastructure. Accordingly, COMUSMACV called on each commander to enlarge his spoiling and preemptive operations, i.e., "attacks against the enemy Main and Local Forces, base areas, infiltration routes, LOCs, including an intensive
drive against the VC infrastructure and political apparatus aimed at eliminating them as rapidly as possible."

In essence, emphasis was placed on the elimination of the Viet Cong infrastructure (VCI) from the cities, villages, and hamlets comprising the major population areas of RVN. On the first of November 1968, the GVN, with the personal approval of President Nguyen Van Thieu, introduced a crash program to seize the military and political initiative while the enemy was in a vulnerable condition. This program was called the Accelerated Pacification Campaign (APC), a three-month effort expected to show results by Tet in February 1969. The APC was the "curtain-raiser" for the GVN Pacification and Development Plan which set policy guidance for 1969 and which was continued with equal emphasis into 1970. For air operations, this meant keeping attack pressure on the enemy.

Fourth Offensive

In addition to the highly successful out-country interdiction campaign, COMMANDO-UNT, airpower contributed to blunting the Fourth offensive through continued close air support of ground forces and in-country interdiction. During the first week of December 1968, 7AF began a successful interdiction campaign in the A Shau Valley. Immediately afterward, a ground operation (DEWEY CANYON) led to discovery of a huge amount of enemy materiel which had backed up because the enemy was unable to move in the valley. The COMMANDO HUNT campaign and the loss of supplies in-country were the primary reasons for the low intensity of the offensive.
in I Corps. In III Corps, from November through January, USAF provided close air support to Army spoiling operations which weakened the enemy's subsequent attacks on Bien Hoa and Long Binh in February. It was during the Fourth offensive that sensors were introduced into South Vietnam. On 1 March, the Deployable Automatic Relay Terminal (DART I) system began operations at Bien Hoa Air Base. In September 1969, the use of sensors in-country was extended to II Corps, when DART II was deployed to Pleiku Air Base to monitor enemy movement in the Tri-Border area.

The lack of aggressiveness displayed by the VC/NVA during the post-Tet 1969 offensive was testimony to the cumulative effect which years of bombing and artillery fire had upon the enemy. The enemy attacks which began on the night of 22-23 February 1969 were numerous and country-wide, but for the most part they were hit-and-run fire attacks--rocket and mortar firings against military installations. With these attacks, the enemy sought to inflict as much damage as he could with the least risk to his own forces, reversing his tactics of the preceding year when losses were subordinated to psychological impact. The cautious nature of enemy tactics was an indication of the degree to which he had been hurt during the first three offensives.

The enemy continued to build and repair his LOCs from Laos and Cambodia into RVN throughout 1969, and air attacks continued to interdict them. New Specified Strike Zones were created to correspond to the new LOCs in SSZs Sierra, Tango, Yankee, and Whiskey. Aircraft had a blanket
authority to cut roads and create landslides along the routes leading into I Corps. In II Corps, SSZ Zulu was created to interdict Routes 613 and 615. Because of the presence of friendly ground forces in the A Shau Valley and around Bien Hoa, the strike zones in the valley and near Song Be were discontinued.

Sortie Reduction

The U.S. policy of de-escalation, which began with the two bombing halts of 1968, was continued in 1969 under the new administration in Washington. Vietnamization and troop redeployment were announced in mid-year. The first effect of this cutback on air resources came on 26 August 1969 when the daily in-country rate for preplanned sorties was reduced by 17 percent—from 243 to 200 sorties per day. The daily total of in-country sorties dropped from 583 to 503. At the same time, the monthly ARC LIGHT sortie rate was reduced from 1,600 to 1,400, where it remained for the rest of the year. A further cutback took place on 1 September when USAF attack sorties were limited to 14,000 per month, but the reduction in sorties was not necessarily equivalent to a reduction in effectiveness. According to a COMUSMACV statement which accompanied the cutback:

"The number of aircraft planned for operations in each CTZ is dependent on where the greatest enemy threat exists at a given time and the necessity to use airpower with flexibility to counter that threat. Available assets will continue to be allocated in such a way as to counter the areas of greatest enemy threat throughout the entire SVN."
CHAPTER IV
ELEMENTS OF THE AIR WAR

New Aircraft and Modifications

The first six OV-10 Broncos, designed for use by the FACs, were deployed to SEA in July 1968 under the code name COMBAT BRONCO. They were attached to the 19th Tactical Air Support Squadron (TASS), under control of the III Direct Air Support Center (DASC), and were flown from forward operating locations throughout III CTZ. The evaluation was completed on 30 October 1968 and OV-10s were deployed to the I, II, and III CTZs, as well as in Thailand. In-country use was varied. The OV-10 provided its own flare light to assist in its primary functions of visual reconnaissance and tactical strike control. In April 1969, a test of the OV-10 in an armed FAC role via started as Project MISTY BRONCO. As a result of the program, the arming of all OV-10s was authorized on 5 June, and by the end of the year, the arming program was in high gear.

There were several significant modifications of existing in-theatre aircraft. The newest of the attack aircraft in South Vietnam was the B model of the A-37, which became operational in December 1969. This model had equipment for in-flight refueling and a modified wing, which enabled it to operate at heavier gross weights and take a 6G stress, as compared with 5Gs for the A-37A.

The workhorse of the fighters, the F-4, arrived in still another configuration in November 1968. The F-4E featured higher thrust J79-17
engines and an internally mounted 20-mm gun.

A major modification was made on the C-123 Provider with the addition of two jet engines to augment its reciprocating power. This program began in 1967, and by May 1969, all C-123s in SEA had been modified into the new model, the C-123K.

**Gunships**

At the beginning of 1968, the fixed-wing, side-firing gunship force in SEA consisted of 32 AC-47 Spooky aircraft, and one AC-130 Spectre was undergoing combat evaluation. By the end of 1969, the SEA gunship force was authorized 71 aircraft with 61 assigned, including 15 AC-47s for the VNAF. In South Vietnam, the dispersed basing of the gunships permitted a high degree of responsiveness to requirements of the four Corps areas. The following statistics show disposition of one SEA gunship force in late 1969:

**DISTRIBUTION OF GUNSHIP AIRCRAFT IN SEA**  
**NOVEMBER 1969**

<table>
<thead>
<tr>
<th>Base</th>
<th>AC-47</th>
<th>AC-119G</th>
<th>AC-119K</th>
<th>AC-130A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Da Nang</td>
<td>4</td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Pleiku</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phu Cat</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Tuy Hoa</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

49
Throughout 1968 and 1969, the AC-47 continued to be used primarily in base and hamlet defense and in support of troops-in-contact. The AC-119G Shadow G, with equipment similar to the Spooky, was introduced into SEA in December 1968. In South Vietnam, it was used predominately as an armed reconnaissance gunship. Like the Spooky, the Shadow G could not operate in marginal weather, but its added firepower, its night observation device (NOD), and its illuminator and fire control system gave it greater capability and flexibility. Under visual flight conditions, it was capable of offset firing. Through the computerized fire control system, the NOD was able to lock on a point and direct fire at that point or any nearby target, using the point as a reference.

In October 1969, the AC-119K, known as the Stinger, was assigned to bases in South Vietnam. Its primary role was interdiction in both

<table>
<thead>
<tr>
<th>Base</th>
<th>AC-47</th>
<th>AC-119G</th>
<th>AC-119K</th>
<th>AC-130A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phan Rang</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Bien Hoa</td>
<td>3</td>
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</tr>
<tr>
<td>Tan Son Nhut</td>
<td>15*</td>
<td>5</td>
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</tr>
<tr>
<td>Ubon</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Udorn</td>
<td>3**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* VNAF aircraft.
** TDY aircraft from among RVN bases.
Vietnam and Laos. The Stinger's performance far exceeded that of its sister gunship, the Shadow G. Two jets augmented its reciprocating engines and an infrared detector and beacon tracking radar were tied to the fire control system in the same manner as the NOD on the Shadow G, thus giving an all-weather attack capability that included offset.

The first AC-130A squadron was activated in August 1968. Combat evaluation made it clear that the sophisticated Spectre was a very effective night interdiction weapon, particularly as a truck killer. As a result, the squadron was used mainly in the out-country interdiction campaign in Laos. The Spectre squadron was organized as part of the 8th Tactical Fighter Wing and permanently based in Thailand. All other gunships were under the 14th Special Operations Wing with home stations in RVN.

In December 1969, a specially equipped AC-130A with two 20-mm and two 40-mm guns joined the Spectre fleet under Project SURPRISE PACKAGE (Fig. 19). This aircraft was the most sophisticated of the gunships and was equipped with the following special features: S-band ignition system detection, Low-Light-Level television (LLLTV), ground moving target indicator (GMTI) radar, electro-optical sensor capability for truck and AAA detection, LORAN, an inertial navigation system interfaced with a computer to store targets of opportunity instantly, a laser target designator and ranger for use with PAVE WAY equipped F-4Ds, a digital fire control system computer, and an improved analog fire control
system computer. The SURPRISE PACKAGE could detect, track, and destroy trucks, petroleum storage areas, and AAA guns from an operating altitude of 12,000 feet AGL. It was able to mark targets for its escort fighters both with gunfire, laser, and LORAN coordinates, perform as a HUNTER-KILLER, and use real-time sensor information from TFA by virtue of its secure voice capability. The Secretary of the Air Force, Dr. Robert C. Seamans, Jr., indicated the value of the weapons system when he said that he believed there was no more important use for the C-130 airframe than the gunship role, especially when configured as SURPRISE PACKAGE. He further proposed that the other AC-130s be converted to the SURPRISE PACKAGE configuration as soon as possible. As of 22 January 1970, gunships were accounting for 39 percent of all trucks destroyed and damaged in the interdiction campaign. The SURPRISE PACKAGE was well ahead of the other gunships, averaging 5.54 trucks destroyed or damaged per sortie, compared with 2.52 for the Spectre and .36 for tactical fighters.

The VNAF became an integral part of the SEA gunship force, activating its first AC-47 squadron in July 1969. The VNAF gunships provided firepower for base defense and support of ARVN operations, particularly in IV CTZ. A second VNAF AC-47 squadron was programmed for activation at Da Nang in the first quarter of FY 72.

The mixed gunship force was multi-mission capable. In the five years of its operation, it provided base defense, fire support for
troops-in-contact, and interdiction. Support of Special Forces Camps and troops-in-contact was the most frequent application.

New Weapons

There were a number of new and improved weapons introduced into the war during 1968 and 1969. Three missiles were introduced in 1968—the AIM-9E, an air-to-air missile with improved maneuverability, the AIM-7E/2, an improved version of the Sparrow missile, and the AGM-78A, an improved air-to-ground missile particularly suited for use against SAM sites.

The PAVE WAY I, laser guided bomb, was tested, found operationally suitable, and incorporated into the inventory. It was followed in early 1969 by PAVE WAY II, with an electro-optical guidance system which was designed for extreme accuracy.

The munitions available for the 1969-1970 Northeast Monsoon Campaign, COMMANDO HUNT III, formed the most versatile mix ever available to Seventh Air Force. These included a number of long-established weapons as well as the more specialized PAVE WAY and WALLEYE guided bombs, the FMU-72 fuse, and the M-36 incendiary cluster. The ROCKEYE II armor piercing munition was introduced in October 1969 as a flak suppressant and truck killer. The WALLEYE electro-optically guided bomb became operational in early 1968 and was found to be very accurate. The FMU-72 fuse was a variable time delay fuse with random delay settings up to 144 hours. It was especially effective when seeded concurrently.
with MK-36 mines. The M-36 incendiary cluster was particularly effective against trucks. The BLU-31/B, designed for cratering heavily fortified structures, and the 15,000-pound BLU-82B were tested for use in clearing large helicopter landing zones in forested areas.

To improve efficiency of munitions in theater, the Directorate of Air Munitions, Seventh Air Force, completed a study in March 1969 of the proliferation of munition types. The objective was to limit as much as possible redundant munitions and to eliminate those which had outlived their usefulness, so as to reduce system complexity. By the end of 1969, substantial progress had been made.

Support of Special Forces Camps

Special Forces Camps (also referred to as CIDG camps) were placed in a line running roughly north and south the length of Vietnam, mostly near the western border area. The strength of each camp was about 600—a majority of the force being Civilian Irregular Defense Group personnel, along with a small number of U.S. Special Forces Advisors. The isolated nature of these camps made them vulnerable to attack and also extraordinarily dependent upon airpower for fire and logistic support.

The organization of this support was spelled out in 7AF Operations Plan 443-69, which provided for camp defense and evacuation, if needed. A number of agencies were involved in the process. The key to the orderly functioning of defense of CIDG camps was the Direct Air Support
Center (DASC) in whose area the site was located. The DASC was responsible for coordination of the total air effort in support of the camps, as well as other air support within its area of operation.

The forward point of SF Camp defense was the FAC who, in many cases, lived with the Army and was most familiar with the SF Camp, its method of operation, terrain, defenses, and other vital information. He was also the airborne element of the defense force in radio contact with the SF Camp which had the most timely information on the situation during an attack.

Each Tactical Fighter Wing was assigned a number of SF Camps to support. These wings maintained special folders on each camp and kept all pilots current on camp status, possible primary targets, terrain, and other features. In addition, each pilot was required to overfly the assigned camps periodically and to remain current on landmarks, flight routes, and defense procedures.

When CIDG camps found themselves under heavy attack, such as at Kham Duc in May 1968, the Tactical Air Control Center worked closely with the Airlift Control Center and SAC units to insure that enough airlift, B-52s, and refueling resources were available. Fighter aircraft were diverted from their preplanned missions and scrambled as they were needed. All tactical airpower on the scene was controlled by the ABCCC, which coordinated closely with DASC, the Tactical Air Control Center.
Party, and the ALO to insure a smooth flow of all types of aircraft. Army resources were integrated by close coordination with Army CH-47 helicopter control aircraft and ground elements on the scene. As much of the total airpower in Southeast Asia as necessary was available for CIDG camp emergencies.

In the enemy's early 1968 onslaught, he was able to take Lang Vei and Kham Duc SF Camps. From that time through early 1970, however, none had been lost, although the enemy, apparently incapable of large scale attacks, continued his efforts against SF Camps (Bien Het, Phu Duc, Bu Prang, and others).

Tactical airlift was also a vital part of SF Camp support. During the last half of 1968, for example, more than 84 percent of the camp's logistical support was by airlift. This support was the responsibility of the 834th Air Division, which provided not only aircraft but also combat control teams for on-site traffic control, mobility teams for rapid on-load capability, and aircraft maintenance teams. The resources used were varied, depending upon size and capability of the landing strip at the SF Camp. A majority of the sites were supplied by the C-7, since it could operate from 1,000-foot runways. Resupply by airdrop was vital in combat situations.

Tactical Airlift

The C-130, C-123, and C-7A aircraft were used in tactical airlift operations. The C-130 operated in-country on rotational TDY from the
Philippines, Taiwan, Okinawa, and Japan, while the C-123s and C-7s were based in Vietnam. Nearly all cargo and passengers were carried by the C-130; the C-7A was used in short fields because of its short takeoff and landing (STOL) characteristics; and a number of C-7As were dedicated to specific Army units.

All of the tactical airlift in-country was controlled by the 834th Air Division, including the TDY C-130s. Airlift requirements were forwarded from users to MACV Traffic Management Agency (TMA), which levied requirements on the 834th. Certain mission priorities took precedence over scheduled flights, including tactical emergencies (actual or imminent contact with the enemy), emergency resupply, combat essential missions, and urgent medical evacuation.

In 1968, the tactical airlift force hauled a total of 130,000 tons on 38,000 sorties with 28,000 hours of flying time per month. The figures for 1969 were 112,000 tons, 34,700 sorties, and 25,700 hours. (Figure 25 lists tonnage, flying hours, and sorties by aircraft.) During two periods of high activity in 1968—February and March, October and November—the airlift force was augmented by the use of UC-123 (spray) aircraft in a cargo hauling configuration. The performance of the C-123 was considerably enhanced during 1968-1969 by the addition of two jet engines.

Special crisis situations graphically illustrate the critical nature of tactical airlift. In the 1968 siege of Khe Sanh, for instance,
without tactical airlift, the base would have been completely isolated.
Within the three-month period, January-March 1968, the 834th Air Division
delivered 12,400 tons of supplies both by airdrop and by landing under
extremely hazardous conditions. In addition, wounded personnel were
evacuated by airlift. New tactics, such as radar vectored supply drops
during Instrument Flight Rules (IFR) conditions were also perfected.

Tactical airlift in SEA steadily became more efficient. It was
absolutely essential to the support of the CIDG, to all the four Corps
Tactical Zones, and to the movement of ammunition, POL, and people.

General Brown, Commander, 7AF, spoke of tactical airlift as "critical
to everything that goes on in this war."

All-Weather and Night Operations

Operations at night and in bad weather conditions were critical
roles of tactical air support in Southeast Asia. To overcome the
operational problems, three approaches were in use in Vietnam at the
end of 1969: artificial light, COMBAT SKYSPOT, and the Marine's A-6A
Diane System.

Two basic types of artificial light were available. The primary
sources were flares of various kinds, dropped either by flares or gun­
ships, by the lead fighter in a flight, or in rare cases, by the FAC
himself. Both the F-100 and the F-4 had flares on the lead aircraft
standing night alert. The A-37 had not been modified for this mission
at the end of 1969, but a study was under way to determine its
The OV-10 and O-2 FACs were used to drop flares on occasion. The O-1 did not have this capability. The second type of light was the illuminator on the AC-119K.

This system was designed to improve visibility and target acquisition for use in close air support at night. It was not widely used because illuminators were on the AC-119K, operating out-country in a night truck killing role. In this role, the illuminator was not required. Operating with artificial light, the delivery parameters were generally the same as during daylight. Using the illuminator along LOCs would have highlighted the aircraft, making it extremely vulnerable to ground fire.

MSQ-77 radar, called COMBAT SKYSPOT, was the primary means of weather delivery and was also widely used at night. The Air Force required that COMBAT SKYSPOT drops be no closer than 1,000 meters to friendly troops. MSQ-77 radar sites were located throughout Southeast Asia and gave coverage to all of South Vietnam, except for a small portion of II CTZ. The operator would vector the aircraft to the target and provide a countdown for weapon release based on his radar presentation. A system similar to the COMBAT SKYSPOT operation was used by Marine aircraft in I CTZ; it used the same procedures, but the radar facilities were compatible only to Marine aircraft.

The Marine A-6S in I CTZ also had a bombing system called Diane, consisting of an airborne radar set, a mobile ground beacon, and a ground
located FAC. By using a known beacon location, the offset distance and bearing to the target were determined by the FAC and programmed into the aircraft's bombing computer. The radar operator could then use the beacon impulse as a radar target while the aircraft made its bomb run on the offset target up to 99,999 feet away. Using the Diane system, drops as close as 500 meters to friendly troops were allowed.

Weather minimums for visual bombing and support of TICs varied not only with aircraft type but also with terrain, troop situations, and ordnance carried. Generally, minimums ranged from a ceiling of 300 feet and 2 miles visibility for the A-1 to 1,500 feet and 5 miles for the F-4 and F-100. Lower weather conditions required the use of the all-weather procedures and equipment described previously.

Two other night and all-weather systems or procedures, LORAN and COMMANDO NAIL, were used in Laos but not in South Vietnam. The former capability was provided only on certain F-4s at Ubon RTAFB, while the latter used the airborne computer system on the F-4.

ARC LIGHT missions used two methods of ordnance delivery. About 95 percent of the time they used COMBAT SKYSPOT. The highly accurate, self-contained radar bombing system of the B-52 was occasionally used to bomb primary targets and a majority of the secondary targets.

Electronic Warfare and Reconnaissance

Electronic warfare and reconnaissance were performed by two aircraft, the EB-66 and the EC-47. The former was primarily an electronic countermeasure (ECM) aircraft while the latter contained extensive Airborne
Radio Direction Finding (ARDF) equipment. In addition, there were several other resources used out-country.

The Army OV-1 Mohawk was deployed in B and C Model configuration. The B Model was equipped with Side-Looking Airborne Radar (SLAR) and Moving Target Indicator (MTI) systems. The C model had infrared detection gear. These aircraft gave near-real-time readout of operational intelligence in the cockpit. The Navy RA-5C was equipped with an infrared mapping system and SLAR. It also carried its own ECM equipment for self-protection. Strategic intelligence was gathered by high flying U-2s and SR-71s, while the SC-147 drones were effective intelligence vehicles over heavily defended areas of NVN.

The activities of the EB-66 were many and varied. It provided ECM and threat warning for B-52 missions. It was used to identify, locate, and analyze the technical parameters of hostile radar environment. In 1969, the aircraft was equipped with a directional antenna system which was very effective in drone support. Another function of the EB-66 was detection of enemy Far Song missile guidance signals. In early 1969, there were 38 EB-66s in Southeast Asia, but the 41st Tactical Electronic Warfare Squadron (TEWS) was deactivated in October 1969 and the EB-66s in theater were reduced to 20. Several improvements in the electronic capability of the aircraft had been forecast, but they, too, were eliminated by the fiscal austerity of 1969. Activity was also curtailed by engine problems from April through June 1969. Nonetheless,
the EB-66 was still the primary ECM aircraft in Southeast Asia at the end of 1969.

The C-47 continued to add to its long list of accomplishments in Southeast Asia in its role as an ARDF platform in the EC-47 configuration. In 1968, a project known as COMBAT COUGAR was designed to satisfy the Field Force Commander's requests for ARDF to locate enemy transmitters. The information was passed by secure voice to Army Direct Support units as soon as possible. EC-47 operations were extensive, with 2,485 in-country missions flown in the fourth quarter of 1968. Plans at the beginning of 1969 called for an increase from 49 to 57 aircraft. The general austerity of 1969 did not affect the EC-47 program which, because of its low cost and overall success, was expanded. Frequency coverage was increased and by the end of the year, 6 aircraft had been sent to Nakhon Phanom RTAFB under Operation COMMANDO FORGE for use out-country.

In addition to the ECM function of the EB-66, there was a continuing need for integral ECM capabilities on fighter aircraft. Both the F-4 and F-105 were equipped with warning receivers against SAM and AAA threats in addition to ECM pods. Warning equipment was also installed in about 75 percent of the F-100s in theater. The VHF jammers were programmed for the F-105 but further testing and development were required.

At the beginning of 1969, only a limited number of 7AF tactical...
aircraft and approximately 50 percent of the ground control facilities were equipped for secure voice operations. The continued implementation of Tactical Secure Voice (TSV) was hampered by lack of modifications in F-4 and F-105 aircraft. Progress was made, however, and by the end of the year, about 600 aircraft, one-third of the total assigned, were equipped with TSV. Approximately 90 percent of the modification of ground facilities was completed.\footnote{78/}

There was still a definite requirement for electronic warfare and intelligence at the end of 1969, given the improvement of the NVN defense posture and the possibility of radar controlled defenses in Laos. COMUSMACV considered intelligence acquisition from all sources—human and man-made—a command responsibility equal to the employment of combat power.\footnote{79/}

Air Defense

There were three major components in the air defense system in South Vietnam: various radar sites throughout the country, the Tactical Air Control Centers, and the interceptor aircraft on alert at Da Nang and Chu Lai. With only minor changes, the system remained the same during 1968 and 1969.\footnote{80/}

For the purposes of air defense, South Vietnam was divided into two sectors, with the focal point at the respective TACCs. The North Sector (NS) TACC, code name MOTEL, was located at Da Nang, with responsibility for the area north of Pleiku. MOTEL was a computerized TACC.
which compiled radar information from various sources to monitor air
traffic in North Vietnam: Navy (Red Crown), Marine (Vice Squad), EC-121
(COLLEGE EYE), and Air Force (Panama at Da Nang, RVN, and Brigham at
Udorn, Thailand). The key to the operation was SEEK DAWN, a project
which employed computer data link to integrate the basically incompat-
ible Navy and Air Force radar. Vital information gathered at TACC
(NS) was also passed by communications line to the TACC at Tan Son
Nhut, which was the primary TACC for Vietnam and also responsible for
air defense from Pleiku south. Both TACCs received inputs from the
various radar sites throughout South Vietnam through the two main Control
and Reporting Centers (CRCs) at Da Nang (Panama) and Tan Son Nhut (Paris).
The activity of MIGs in the North was also monitored and evaluated for
any significant movement which might change the alert posture.

Primary air defense resources available to the TACCs were four F-4Es
at Da Nang (Gunfighter) and two Marine F-4s at Chu Lai (Love Bug). Two
of the Da Nang aircraft were on five-minute alert and the other two on
one hour alert. The Marine aircraft were on 15 minute alert. The
latter were also the primary MIGCAP aircraft. If more resources were
needed for air defense, it was planned to obtain them from tactical
fighter squadrons. Prior to 15 November 1969, the primary air defense
aircraft at Da Nang were six F-102s. On that date, the F-4E replaced
the F-102 and the number of alert aircraft was reduced from six to four.
There were no specific aircraft committed to air defense against
possible intrusion from Cambodia.
A majority of air defense scrambles were to identify unknown aircraft or to provide MIGCAP during such activities as search and rescue (SAR) efforts. On 5 December 1969, for example, two F-4s were scrambled from Da Nang since MIG radio calls indicated a possible threat to a SAR effort in progress. An example of another type of air defense situation occurred in June 1968, when a number of enemy helicopters were detected moving from the DMZ to Tiger Island. The normal air defense system was augmented, in that case, by laser range finders and night observation devices under Operation HAVE FEAR. Although several helicopters were attacked, the results were not known.

At the end of 1969, there was no VNAF air defense system nor were there any VNAF aircraft standing alert. VNAF assets were used by the USAF system on occasion, particularly against possible intrusions from Cambodia.

A primary responsibility of the air defense system by late 1969 was monitoring ARC LIGHT strikes for SAM, AAA, and MIG locations and threats. If support or escort aircraft were needed, they were made available by the TACC.

ARC LIGHT

The B-52 operations in Southeast Asia (ARC LIGHT) were being flown at the rate of 800 sorties per month at the beginning of 1968 from Andersen AFB, Guam, and U-Tapao RTAB, Thailand. On 1 February, the sortie rate was increased to 1,200 and to 1,800 on 15 February because...
of the Pueblo crisis and the siege of Khe Sanh. Kadena AFB, Okinawa, was added as a base of operations on the latter date. The 1,800 sortie rate continued until October 1969 when the rate was reduced to 1,400 sorties per month. The standard bomb load for sorties throughout the period was twenty-four 500-pound bombs carried externally and eighty-four internally (27 tons) for U-Tapao aircraft, and twenty-four 500-pound bombs externally and forty-two 750-pound bombs internally for Kadena and Andersen aircraft (23 tons).

Khe Sanh proved to be a watershed for B-52 operations in SEA. As a result of this siege, the sortie rate was increased to 1,800 per month and close-in bombing (within 1,000 meters of friendly forces) was inaugurated as a direct close air support tactic. Another innovation was BUGLE NOTE. Prior to the siege, the most rapid response was a seven-hour ground divert capability from U-Tapao. The BUGLE NOTE concept fragged a cell of three B-52s to a given pre-Initial Point (IP) every one and a half hours to be targeted from that point by MSQ radar. BUGLE NOTE permitted target changes as late as one and a half hours prior to the scheduled time over target (TOT). The force allocation was later changed to a six-aircraft cell every three hours over the pre-IP, with a selective target change three hours before TOT.

The results of B-52 strikes were difficult to evaluate in terms of BDA but the psychological impact was immense. The PWs and Hoi Chans indicated airstrikes forced them to move constantly, kept them off balance, caused numerous casualties, lowered morale, and prevented them...
from staging significant offensive action. As a result, on 1 April
1969, one B-52 in each three-ship cell began to carry one MI29RI leaf-
let bomb to drop with the strike, exploiting the psychological impact.
A single B-52 mission, consisting normally of six aircraft, could
deliver approximately 150 tons of ordnance on a two-kilometer square
target with better than 99 percent accuracy. For tactical fighters to
deliver the same tonnage would require many times that number of aircraft.

The B-52 target nominations were made by field commanders, COMUSMACV,
and Seventh Air Force. Target approval rested with MACV. Each Field
Force or other nominating agency was responsible for assuring the military
and political clearance of each target. The final determination of
targets for ARC LIGHT strikes was usually made by the Deputy J-3 for
Operations at MACV. While a number of the aircraft were fragged for
preplanned targets, all operated under the BUGLE NOTE system.

U.S. commanders were so concerned about getting more B-52 strikes
in their area of operations that they often went to great lengths to
request such support. At one point, for example, General Corcoran,
First Field Force Commander, made a special trip to COMUSMACV during
particularly heavy fighting in his area (October 1969) to make a per-
sonal plea for more ARC LIGHT support. The power of this weapon
was clearly recognized by every U.S. commander from General Abrams on
down. His statement on ARC LIGHT in the fall of 1968 demonstrated this
enthusiasm:
"In one instance where no ground forces were available (NW Kontum Province), the enemy was stopped by repeated B-52 strikes alone. Every time the enemy is found massing anywhere within South Vietnam, he is hit in this way. The B-52 used in this manner under centralized control becomes a tool of such effectiveness that the theater commander has no possible substitute within the conventional arsenal. Without B-52 sorties, the theater commander would need more ground troops to achieve the results obtained since initiation of this B-52 concept. This concept has been so effective that ground commanders' requests for B-52 strikes continue to exceed available sorties.

"In summary, the B-52s are the theater commander's reserve, his artillery, his interdiction tool, his means for influencing the battle, and in some instances his only means for meeting the enemy immediately upon discovery."

Use of Sensors

In South Vietnam, the primary function of tactical air continued to be response to the daily close air support requirements of ground commanders, including special air operations in support of Special Forces Camps. The interdiction role still maintained its significance, however, especially during the months of the dry Northeast Monsoon. Critical to the role of interdiction, especially in the Specified Strike Zones, were sensors. The use of sensors of various types on a reasonably large scale in South Vietnam can be dated from the battle of Khe Sanh during the first three months of 1968. During that engagement large numbers of air-delivered electronic sensors were implanted to detect enemy movements. This use attracted a great deal of interest both in the concept and in sensor reliability. Artillery was pre-aimed on sensor strings and fired when activations occurred, with very
In the months that followed Khe Sanh, the use of sensors in the DMZ and I CTZ was expanded (DUEL BLADE). In addition, plans were formulated to use sensors in other parts of Vietnam in support of ground operations in antiinfiltration technology, and to provide near real-time intelligence information on personnel and vehicular positions and movements (DUFFEL BAG).

Both seismic and acoustic sensors were used. Acoubuoy and Spike-buoy were acoustic; Adsid, Helosid, and Handsid were seismic. In addition, other more specialized sensors were used, such as, the Magid, which detected metallic objects, and the Pirid, which used infrared technology. Sensor impulses were either read directly through hand monitoring devices or were picked up by an orbiting EC-121 and then relayed to the readout facility, either at Nakhon Phanom RTAFB or the Army and Marine facilities in I CTZ.

Aside from the use of sensors in I CTZ and the DMZ, their use in South Vietnam centered around the Deployable Automatic Relay Terminal (DART) facilities at Bien Hoa (DART I) and Pleiku (DART II). The DARTs were complete sensor readout and interpretation facilities which provided near-real-time (less than one minute) sensor interpretation to Army units for artillery fire and LOC surveillance. DART I became operational on 1 March 1969. Because of the level terrain of the Mekong Delta region, data were relayed to this facility through an Automatic Data
Relay atop Mui Ba Den Mountain. The data from DART II, which began operation on 28 September 1969, were relayed through orbiting EC-121 aircraft. DART II was also used as a training facility for VNAF personnel who were to be integrated into the operation of the system.

At the end of 1969, approximately 560 IGLOO WHITE sensors were being monitored by Air Force facilities in support of COMMANDO HUNT III, with 65 strings in STEEL TIGER, 4 strings in BARREL ROLL, and 15 strings in DUEL BLADE/I CTZ. Delivery of Phase III sensors and other components was expected during 1970. Whether they would be used in-country was undecided.

In addition to these electronic sensors, a number of other sensor-surveillance techniques and instruments were being employed in Vietnam. Airborne infrared sensors were used to detect personnel and vehicles by heat indications. Side-Looking Airborne Radar and Side-Looking Infrared Radar detected moving vehicles, boats, and groups of people. Ground surveillance radar was able to observe ground movements within its field of coverage. Night observation devices (NODs) and Starlight Scopes enabled the user to see movement and targets by amplifying available night light. Data from all of these sources, plus visual reconnaissance, photo reconnaissance, and intelligence reports were combined to provide timely information on enemy locations, assets, and movements.

Herbicide Operations

At the beginning of 1968, there were 17 UC-123 RANCH HAND aircraft
available to perform the dual herbicide missions of removing natural cover to expose enemy positions and destroy enemy crops. By late 1969, this number had been increased to 25 and all had been converted to K models (jet engines added).

Operations in 1968 were curtailed by the use of the aircraft as cargo haulers during Tet and again in October and November. During the period from 1 January 1968 through 30 June 1969, RANCH HAND aircraft dispensed about 7,500,000 gallons of herbicide on approximately 2,500,000 acres. Average monthly sorties for 1968 were 443 and for 1969, 450. Of special importance were activities in I CTZ where several LOCs near Da Nang and Phu Bai were defoliated. Crop destruction was particularly effective in areas of I and II CTZ where the enemy had to exist far removed from population centers. Aircraft remained at Da Nang throughout 1969 to continue this effort.

Vulnerability to ground fire remained a problem in 1968-1969 and was inherent in the slow speed, low altitude requirement for spraying. As a result, the possibility of employing jet aircraft in the defoliation role was explored, and the first F-4 spray mission was flown on 26 January 1969 in Laos. Limited out-country application continued. In addition, all herbicide missions employed a fighter escort of at least two aircraft. The practice of using a FAC for all spray missions was also adopted in 1968. Weather conditions were a big factor in mission completion because certain temperatures, humidity, and wind conditions were necessary for maximum effectiveness. Finally,
the excessive time required to obtain clearance for a herbicide opera-
tion remained. All defoliation projects required U.S. Embassy and RVNAF
Joint General Staff approval. The time delay was sometimes as much as
two and one-half months.

RANCH HAND aircraft were also active in the out-country war,
defoliating key LOCs and suspected supply dumps. The use of the C-130
to dispense barrels of flammable material to be ignited by grenades or
rocket was explored both as a defoliation and an antipersonnel/anti-
vehicle weapon. It was quite apparent that the enemy's food supply,
his ability to travel undetected, and the number of hiding places he
had available were adversely affected by the defoliation effort. As
1969 drew to a close, however, the defoliation role was declining in
importance as the Free World Forces began to move into enemy areas and
supply lines.

Air Base Defense

The battalion-sized massed attacks on Tan Son Nhut and Bien Hoa on
31 January 1968 changed the entire perspective of air base defense in
Southeast Asia. They emphasized the insufficient numbers of security
police, the lack of heavy weapons, and the inadequate training of USAF
personnel in light infantry tactics throughout South Vietnam. The
response to Tet was evident as 1968 progressed. Base defense priorities
were raised, heavy weapons were procured, additional vehicles and night
observation devices were obtained. Increases in security police forces
were authorized, and special training in bunker and tower construction,
fencing, minefield emplacement, and infantry tactics and weapons employment were instituted.

Rocket patrols, rapid counterfire, free-fire zones, and sweep operations were all directed at decreasing the hazard of rocket and mortar attacks. While these attacks continued in 1969, the number dropped from 136 to 105. The number of rockets and mortars impacting on the air bases also decreased from 983 to 439 and from 748 to 473, respectively (430 of the 473 mortar rounds in 1969 hit Phan Rang), indicating a reasonable degree of success in these counter-rocket efforts. A program was also instituted to provide organic intelligence collection and analysis within a 10-mile radius of each USAF base in Vietnam.

Efforts to continue the post-Tet objectives in base defense remained throughout 1969. AFM 206-1, Local Base Defense Tactics and Techniques, published on 30 June 1969, recognized the need for combat infantry skills for security police. Nearly all areas identified in 1968 as requiring improvement were corrected by 1969. Special emphasis was placed on making air bases relatively safe from successful massive ground attack and repelling sapper attacks. Security police were trained in the use of new weapons and mortars, in small unit tactics, and in heavy weapons. Efforts were continued to integrate the VNAF into base defense on all levels.

The overhead aircraft shelter program (CONCRETE SKY) was instituted in 1968 and continued through 1969. The program was successful in
reducing the number of aircraft destroyed or sustaining major damage. While 34 aircraft were destroyed in 1968 and 91 had major damage, the figures for 1969 were 6 and 10, respectively.

Development of shelters proceeded for several years on an experimental basis, and they had been used in Korea. The initial shelter purchase for the Southeast Asia program was the steel arch "Wonder" shelter which had proved successful in tests at Eglin AFB, Fla. Ten of these structures were contracted for and were on their way to Vietnam by 17 February 1968. (Fig. 28.) It was decided to cover these shelters with 12 inches of concrete which would make them sufficiently strong to withstand a 122-mm rocket impact, later changed to a 15-inch cover of 3,000 psi concrete. The program was subsequently expanded to 392 shelters.

Construction began on the first shelter in July 1968. The initial concept of construction was to have RED HORSE meet the entire requirement. It soon became evident that RED HORSE did not have sufficient capability and the construction firm of Raymond, Morrison, and Knutson (RMK) signed a contract to cover about 40 percent of the shelters.

Other changes took place during the construction process. The initial shelters were to be 68 feet long, 50 feet wide, and 28 feet high. The length was changed to 70 feet in May 1969 to accommodate a jet blast deflector.
Cost reduction was a critical item as the construction learning curve progressed. Initial estimates for completed shelters ranged from $50,000 to $75,000 per unit. These were refined over the learning curve to $18,517 by RED HORSE and $37,117 by the civilian contractor. Thus the overall cost per shelter remained at approximately $27,000. Despite the cost, the value of the program was illustrated on 25 March 1969 when a 140-mm rocket scored a direct hit on an F-4 shelter at Da Nang. The fully armed F-4 inside was undamaged. This saving of a more than $2 million aircraft offset the cost of the 98 shelters at that installation. The shelter program in Vietnam was scheduled for completion at the end of 1969. At that time, 382 of the proposed 392 shelters had been completed.

Civic Action

Seventh Air Force participated in Military Civic Actions (MCAs), an integral part of the GVN Pacification Campaign, which the Commander, 7AF, considered vital to the future of Vietnam. MCAs were conducted to help the Vietnamese build a stable, responsible, and responsive system of community life as part of the MACV "One War" concept. The primary goal of MCA was a viable Vietnamese society which could defeat subversion and meet the social and economic needs of the people.

As with a number of 1968 programs, Civic Action was greatly affected by the Tet offensive and its attendant destruction. Identifying with
GVN objectives, the ensuing recovery efforts were aimed at socio-economic improvement of conditions surrounding the people. Hamlet projects were oriented toward community goals. Air Force activity, aside from tactical airlift, was oriented toward material and technical aid, education, agriculture, and socio-economic assistance. An effort was also made to shift the emphasis to the Village Chief as the primary link in coordination with the government.

At the beginning of 1969, Civic Action was directed at community development with emphasis on operations in or near population and political centers, lines of communications, and economic installations. All operations were conducted with maximum Vietnamese participation, with special attention given to VNAF and GVN participation to help create a sense of identity between government agencies and other elements of Vietnamese society. Activities stressed were education, health, public works, refugee relief, village and hamlet administration, agriculture and animal husbandry, Chieu Hoi, youth, and housing.

Seventh Air Force MCA operations were centered around the main U.S. bases in Vietnam, generally within a 10-mile radius (the rocket belt). This made MCA a vital aspect of base security. Approximately 76 percent of the labor and 24 percent of the materials used in the projects were furnished by the people in the villages and hamlets, the highest percentage in all US/FWMAF MCA. Village and hamlet officials developed a much greater awareness of their role in community development. Altogether,
MCA operations with the Vietnamese directly or indirectly affected the economic, social, and political life of approximately 4,000,000 people in nine provinces.

Psychological Warfare Operations

During 1968, the psychological warfare operation was conducted by the 5th and 9th Special Operations Squadrons. Their resources included 25 O-2Bs, 14 C-47s, and 22 U-15s, and the average number of sorties flown was 2,481 per month. The role of the Air Force in the psywar effort was simply that of providing aircraft. Seventh Air Force fragged the missions, but the targets, along with leaflet and tape acquisition, were the responsibility of the Army. Also continued during the year until the bombing halt was Operation FRANTIC GOAT, a high altitude release of leaflets by C-130s to wind drift into North Vietnam. F-4 aircraft were also used in this effort. The overall psywar effort was reduced during the year by use of C-47s as flare aircraft during the night.

The basic psywar operation remained the same during 1969, except that the aircraft force was reduced when the 5th SOS was deactivated on 15 October. Prior to that date, approximately 14,500 speaker hours had been flown and about 2 billion leaflets dropped by averaging 1,734 monthly missions in 1969. The remaining force of 6 C-47s and 18 O-2Bs were located at Thuy Hua, Bien Hoa, and Da Nang. These aircraft covered all of Vietnam and some of the Laos trail system. Two
FRANTIC GOAT missions per week were being flown at the end of 1969, with an occasional C-130 leaflet drop in South Vietnam. The VNAF continued to assume an increasing portion of the psywar effort with its U-17 and C-47 aircraft as the year progressed.

The results of the psywar effort were very difficult to determine. During 1968, there were approximately 18,000 Hoi Chanhs and during the first 9 months of 1969, about 33,000 Chieu Hoy returnees. It can be assumed that the psywar effort had some impact, since a number of defectors indicated knowledge of the leaflets which had been dropped.

Search and Rescue

The overall supervision, management, and control of Aerospace Search and Rescue forces assigned to Southeast Asia were responsibilities of the 3d Aerospace Rescue and Recovery Group (ARRG) at Tan Son Nhut AB. The group operated two rescue coordination centers, at Son Tra, Vietnam, and Udorn RTAFB, Thailand. (Fig. 29.) The organization's resources included 24 HH-3/53 long-range, air refuelable helicopters, 29 HH-43 local base rescue helicopters, and 11 HC-130P tanker/mission control aircraft. In addition, there were other resources dedicated to SAR, particularly the A-1Es from Da Nang (Spad) and NKP (Sandy). Many especially difficult SAR efforts required additional aircraft from throughout SEA.

The mission of the 3d ARRG was to aid persons in distress and recover survivors from hostile territory. The accomplishment of this