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## Chapter VI

### AIR-GROUND ACTION IN KOREA

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"During the entire time I was in command in the Far East," wrote General Mark W. Clark, "the frontline infantry units and tactical air support units worked closely together in Korea, and understood and respected each other's problems. When the foot soldier needed close air support, he got it."<sup>1</sup> Speaking at a press conference in August 1953, General Clark stated: "I have nothing but admiration for the air support that we obtained, not only from the Fifth Air Force but also from the long-range bombers . . . as well as the Navy carrier-based aviation and Marine wing that we had over there."<sup>2</sup> These Clark statements were reminiscent of those of his predecessor, General Douglas MacArthur: "I would say," MacArthur had told inquiring Senators in 1951, "the support that our tactical air has given to our ground troops in Korea has perhaps never been equalled in the history of modern war."<sup>3</sup>

Statistical records of the Korean war reveal that never before in American military annals were ground troops accorded such lavish air support as was provided to them in Korea. During the three years of Korean hostilities, Far East Air Forces planes flew a total of 461,554 combat sorties, of

which 92,603 (20 percent) were close-support sorties.\* The 1st Marine Air Wing—employed under Fifth Air Force coordination control primarily in a close support role—flew an additional total of 107,939 sorties of all types, of which 37,385 (35 percent) were close-support sorties. Although similar comprehensive figures are not available, NAVFE carrier air groups and friendly-foreign RAAF, SAAF, and ROKAF fighter squadrons also employed a substantial proportion of their effort in the close support of ground troops. In the last two years of the Korean war, years in which UNC ground forces were engaged only in a defense of fortified ground positions, FEAF, Marine, and friendly foreign aircraft flew 23,416 close support sorties between 1 July 1951 and 30 June 1952, 48,823 such sorties between 1 July 1952 and 30 June 1953, and 7,532 close support sorties in July 1953.<sup>4</sup> General Weyland estimated that during these two years of ground stalemate in Korea some 30 percent of all UNC combat air sorties were flown in close support, as opposed to roughly 10 percent used in the same endeavor in the bitterly fought European campaigns of World War II.<sup>5</sup>

#### AIR SUPPORT TO THE DEFENSIVE GROUND BATTLE

In the first year of the Korean war, when ground battles had been hard pressed, UNC close-air-support strikes had been extremely lucrative in terms of personnel casualties and material damages inflicted upon the Communist enemy. When the Korean truce talks had begun in July 1951, however, both UNC and Communist ground forces had assumed a defensive posture. Recognizing that they had to protect themselves against UNC air power, the Communist frontline troops had con-

structed heavy bunkers, underground supply centers, trenches, tunnels, and well-protected artillery and mortar positions. Against a dug-in enemy, UNC air action along the front lines became less and less remunerative. Continuous support along

\*As used in Korea, the definitions of "close support" and "general support" were those prescribed by the U. S. JCS for joint usage. A "close support" sortie was flown under the direction of a tactical controller, either ground or air, and in support of frontline troops. A "general support" sortie was an interdiction effort flown against targets designated by the ground forces in an area outside the bomb line.

such a static front demanded dispersed and sustained firepower against pinpoint targets and permitted no opportunity to the air forces to exploit their mobility and firepower against worthwhile concentrations. In such a static situation close air support was an expensive substitute for cheaper and more accurate artillery fire. The air pressure strategy which FEAF followed after July 1952 recognized the futility of expending large quantities of the scarce air capability against Communist front line entrenchments; it also appreciated the fact that UNC ground troops, who were fighting a defensive action from prepared positions, required a minimum of close air support. Yet, even though he recognized the diminished utility of air support in the stalemated ground situation, General Weyland was determined not to stint in his support of the friendly ground troops. "FEAF and Fifth Air Force," said Weyland, "leaned over backwards to provide more than adequate close air support when ground forces became actively engaged, and at other times maintained a rather high level of effort on close support in order to maintain the air-ground teamwork and know-how in a state of well-oiled proficiency."<sup>6</sup>

In the summer of 1952 both the Communists and the UNC ground forces maintained what was described as an "active defense" of their existing front-line positions. In June 1952 the Eighth Army at the western end of the battle line staged several hard-fought local attacks at which wrested several forward positions from the enemy. The Red reaction to these limited-objective UNC probes was prompt and vigorous, and the Communists invariably launched counterattacks against the newly won UNC outpost. Action on the central and eastern fronts in this month was characterized by increased UNC patrols and raids, and, on the part of the enemy, by determined resistance and scattered probing attacks against UNC outposts. Captured enemy personnel almost invariably maintained that their units were charged with defensive missions, but during June the Reds moved forward three of their armies which had been previously supporting the battle line. Desiring to determine whether these Communist troop movements represented reinforcement or rotation, General Van Fleet secured CINUNC approval for an offensive plan, known as BUCKSHOT 17, which was designed to capture enemy prisoners in

the area west of the Nam River. Made by a reinforced ROK infantry battalion, this raid was repulsed on 11 July after it had sustained substantial casualties and had been unable to take prisoners. Elsewhere during July, ground fighting was marked by small but fiercely contested local actions. In the first half of the month, action flared up on the central and eastern fronts where the Reds launched several local attacks, amply supported by artillery, against UNC outposts. In the latter half of the month, the heaviest fighting shifted to the west-central sector of the battle line. There, on 17 July, the enemy began a series of heavy attacks against the U. S. 2d Division's forward positions on "Old Baldy" (Hill 266), and after taking and losing control of this hill the Reds finally ended up in possession of it on 22 July. After 25 July heavy rains brought ground actions to a virtual standstill.<sup>7</sup>

While these intensified battle actions of June and July 1952 caused no major changes in the line of ground contact, the Communist battalion- and regimental-sized attacks marked the sharpest ground fighting so far that year. This increased tempo of the ground war demanded augmented close air support, and in June and July FEAF aircraft flew 1,910 and 2,057 close-support sorties. Marine aircraft flew 897 close-support sorties in June and 731 in July, and friendly foreign aircraft flew 114 and 98 close support sorties in the two months.<sup>8</sup> Many of these supporting missions had to be conducted under difficult flight conditions because the weather began to go bad in the middle of June and progressively worsened thereafter. Fortunately the Fifth Air Force was equal to the emergency: stationed behind each of the U. S. I, IX, and X Corps it had in operation three tactical air direction posts (TADP's) which manned MPQ-2 or MSQ-1 bombing-director radars, and these TADP's—or "Tadpoles"—enabled aircraft to render all-weather close support.\* During June the three TADP's controlled aircraft on 779 bomb runs and directed 1,606 tons of bombs on enemy frontline positions. On 24 June they controlled 24 B-29's with 215 tons of bombs in close-support attacks; and, during the period 0600 hours on 29 June to 0600 hours on 30 June when prevailing adverse weather grounded the fighter-bombers, the Tadpoles controlled 128 B-26's in a

\*See pp. 222-28.

268-ton "around the clock" close-support operation. Flying singly above the overcast and using radar-controlled bomb drops, the light bombers were able to provide close support to friendly ground troops.<sup>9</sup> In July, when low clouds continued to blank out the front lines, the Tadpole controllers worked day and night to guide 1,221 bombing runs and 2,388 tons of close-support bombs. The bulk of these missions were made by B-29's and B-26's operating at night, but during the month F-51 fighter-bombers of the 18th Fighter-Bomber Wing did effective daytime radar bombing through the overcast: they flew in formations of fours and salvoed their bombs when told to do so by the ground controller. The ebb and flow of the battle for "Old Baldy" required a great number of these radar-directed bombing missions, and during July "Hillbilly" TADP which supported the U. S. I Corps put the greatest part of the 1,104.03 tons of bombs which it controlled upon this battle ground.<sup>10</sup>

During August 1952, in support of ground action generally characterized by numerous clashes of troops of up to battalion size and by a successful UNC recapture of "Old Baldy," air force planes provided 1,836 effective close-support sorties, while attached Marine and foreign units flew an additional 1,466 sorties, to swell the monthly total to 3,302 sorties.<sup>11</sup> At the end of July, when flooded roads were complicating Eighth Army logistics and presumably were having similar effects upon the Communists, General Van Fleet had proposed that the time was opportune for an all-out Tadpole bombing effort against the enemy. Neither General Weyland nor General Barcus considered that the tactical opportunity was sufficiently favorable as to justify the diversion of a maximum number of B-29's from scheduled destruction targets to close support, as General Van Fleet desired,\* but General Weyland nevertheless made three B-29's available for TADP missions for several days and General Barcus allocated a maximum B-26 night-bombing effort to the front of the U. S. I Corps.<sup>12</sup> This Tadpole bombing effort early in August contributed to that month's total of 1,078.14 tons of bombs dropped under this control medium, but with improving weather the bulk of close-support effort was again performed by fighter-bomber air-

\*See p. 225.

craft.<sup>13</sup> Beginning in August, COMNAVFE put naval carrier-based pilots back in the close-support business, and, primarily for training, these crews flew an average of 12 ground support sorties daily at the eastern end of the battle line.<sup>14</sup>

In September 1952 the principal ground actions took place on Capitol Hill and Finger Ridge, where UNC forces remained in control. In this month air force planes flew 1,871 close-support sorties while the Marine, ROKAF, and SAAF aircraft flew 1,797 close-support sorties, to bring the monthly total of such effort to 2,888 sorties.<sup>15</sup> Early in September, COMNAVFE proposed that his carrier air groups should be used to provide close air support as requested across the entire Eighth Army front; he further stated that limited numbers of carrier aircrews should fly close air support for training purposes with Marine ground controllers. This proposition was quite agreeable to FEAF, which directed the Fifth Air Force to let naval aircraft work with Marine controllers wherever possible. Despite this increasing NAVFE interest in close support, the commander of Carrier Division 3 nevertheless cautioned that close air support had to be considered primarily as being for pilot training and had to be kept to a minimum.<sup>16</sup>

Although the close-support effort afforded by UNC aircraft during the summer of 1952 was substantial in volume, it was seldom directed against particularly lucrative air targets. The Communists habitually launched small but bitterly pressed attacks under the cover of darkness and nearly always completed their actions before dawn, by which time all enemy troops got back under the cover of their tunnels, caves, and bunkers. Along the Eighth Army front the Communists were quite careful to offer no sizable troop concentrations which might have been profitably attacked by UNC air power.

Much more spectacular and certainly more lucrative in terms of effort expended was the quantitatively small close support which the Fifth Air Force gave to friendly Korean guerrillas during the summer and autumn of 1952. At this time the 8240th Army Unit, operating under CCRAK, controlled partisan forces whose job was to operate at the left flank of the battle line and to divert enemy troops away from the main line of resistance. This force also defended and supported the

defense of such strategic off-shore islands as Paengnyong-do, Sok-to, Cho-do, Kanghwa-do, Kyodong-do, and other adjacent smaller islands. The Fifth Air Force customarily helped these guerrilla units with supply, agent, and team drops; the Eighth Army provided equipment, rice, ammunition, and clothing to these forces; and the Navy gave protection to the island bases and provided air and artillery fire support against mainland targets.<sup>17</sup> And when enemy buildups reached worthwhile proportions, the guerrillas notified CCRAK and the Fifth Air Force laid on air strikes.

Early in July 1952 friendly guerrillas began to report a marked increase of Chinese Communist Forces (CCF) 42d Army troops in the villages in the BT and YC grid areas, and within two weeks these enemy concentrations were getting so extensive as seriously to interfere with the mission and resupply of the friendly partisans. On the morning of 20 July the friendly guerrillas pinpointed five of these troop concentrations in as many villages, and that afternoon 49 F-84's of the 49th and 58th Fighter-Bomber Wings, armed with 1,000-pound bombs and napalm tanks, attacked the briefed targets. After this strike the guerrillas reported on-the-spot observations of 550 enemy casualties, mostly killed, and the destruction of the supplies and equipment of a CCF company. On 23 July the friendly guerrillas fixed the location of six more troop concentrations in the same grid areas, and late on the afternoon of the next day 48 F-84's and F-80's of the 8th and 49th Fighter-Bomber Wings hit five of the prebriefed village targets with varied loads of napalm, 1,000-pound bombs, 500-pound frag clusters, and 100-pound general purpose bombs. Guerrilla observers in the vicinity of three of the targets in the BT area reported over 700 troop casualties and substantial destruction of hostile weapons and equipment.<sup>18</sup> Strikes such as these forced the Reds to scatter their security garrisons and to emphasize passive defense, but by the middle of September 1952 the friendly partisans reported that the Chinese were again concentrating against them in the YC area. Early on the morning of 19 September, the Fifth Air Force accordingly diverted 16 F-80's to attack four village targets in this area: at one target the Reds were caught at breakfast and 150 of them were slaughtered, and at two other targets some 100

CCF men were recorded as killed. These strikes also destroyed several artillery pieces and trucks.<sup>19</sup>

When the guerrilla-reported personnel concentrations were inland, the Fifth Air Force sent prebriefed fighter-bomber strikes against them, but enemy concentrations nearer to the shorelines of western Korea were attacked in accordance with as much of the regular close support procedure as could be applied under the local situation. To work with Wolfpack guerrillas in the BS area, the Fifth Air Force on 15 July sent to Kanghwa-do Island an officer and two airmen with complete tactical air control party (TACP) equipment. This TACP selected targets in coordination with Wolfpack headquarters, and where practicable it marked targets for air strikes with white phosphorous spotting charges fired from a 75-mm. recoilless rifle. Poor operational weather greatly reduced the number of supporting missions flown in this area during the last half of July, but the party, prior to its withdrawal on 11 August, directed 81 fighter-bomber sorties against artillery and mortar positions and troop and supply concentrations in the area. Seventeen of these sorties were aimed at prebriefed targets too far inland to permit visual control by the Wolfpack TACP.<sup>20</sup> Between 8 and 25 October, the Fifth Air Force conducted operation RED COW against targets in this same BS area and got good results against Communist troops who had long felt themselves safe from air attack because of their proximity to the Kaesong restricted area. In this operation, Mosquito controllers flying in T-6 aircraft directed flights of fighter-bombers which attacked enemy positions close to the main line of resistance (MLR) or to the neutral zone. Elsewhere the fighter-bombers hit prebriefed targets designated for them by guerrillas. A total of 164 sorties were flown, and results were reported as excellent. The 41 sorties controlled by the Mosquitoes killed approximately 174 troops and destroyed or damaged 110 buildings, 29 supporting shelters, and 21 artillery positions.<sup>21</sup> Up towards the northern end of the island chain which the UNC held off western Korea, Fifth Air Force fighter-bombers used another type of close-support procedure to beat back sporadic enemy attacks. Strikes against enemy targets along the coasts, such as the Red artillery pieces which periodically fired on Cho-do, were controlled by a naval vessel, called a "Sitting Duck." In these missions, the "Sitting Duck"

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controller orally described the target for the fighter leader and the fighters usually attacked individually and corrected their aiming points on observations of the preceding pilot's bomb blast. Occasionally, the "Sitting Duck" would have the flight reconnoiter an area that was hidden from his view by hills and other terrain features and report new buildups or other special hostile activity for attack.<sup>22</sup>

Although the air strikes in support of CCRAK guerrillas well illustrated the effectiveness of air power while working against suitably exposed enemy concentrations, the vast majority of Fifth Air Force close-support effort continued to be allocated to the Eighth Army battle line. Along this main line of resistance the tempo of the land war was increased when, in coordination with the CINCFE amphibious demonstration off the eastern coast of Korea,\* the Eighth Army executed operation SHOWDOWN on the night of 13/14 October. This attack, mounted in the U. S. IX Corps area, sent one battalion each from the U. S. 7th and ROK 2d Divisions to seize critical high ground on Triangle Hill and Snipers Ridge, northeast of Kumhwa. The two battalions seized their objectives against stubborn enemy resistance, but the operation soon degenerated into a see-saw contest. Other heavy fighting took place during the month at White Horse Mountain, whose crest changed hands several times before it was occupied in force by the ROK 9th Division.<sup>23</sup> In preparation for the intensified ground fighting which had been anticipated, General Weyland made up to three B-29's available nightly for Tadpole missions in the period of 10 through 16 October.<sup>24</sup> During the month, moreover, the air force and its attached units flew a total of 4,488 close-support sorties, of which 2,217 were in support of the IX Corps.<sup>25</sup> On 21 October the commanding general of this corps messaged his "grateful thanks" for the Fifth Air Force's magnificent help. "The courage of the flyers and the effectiveness of their combat action against enemy ground targets," he said, "were manifest to those of us who observed them." The air support rendered, he stated, was timely and effective.<sup>26</sup> In preparation for the amphibious demonstration, Task Force 77 hit upon a scheme of air employment which utilized massed carrier air strikes in

\*See Chap. IV, pp. 105-06.

general support of the UNC battle line, and on 9 October it initiated what were called "Cherokee" strikes, or prebriefed air strikes against specific targets in front of friendly ground positions. Targets for these missions were designated by Eighth Army units and usually consisted of supply storage, personnel bunkers, artillery positions, or any exposed activity of the enemy. They differed from close-air-support strikes in that they were prebriefed and not directed by ground controllers, although a Fifth Air Force Mosquito was usually assigned to assist the naval aircraft in locating their targets and to perform post-strike damage assessment. These Cherokee strikes were at first conducted within the bomblines, but it was difficult properly to control a flight of more than eight planes and the policy was soon established whereby such strikes were conducted beyond the bomb line.<sup>27</sup>

Operation SHOWDOWN was the last Eighth Army offensive, for General Clark saw no need to stir up such bloody battles.† The Communists, however, had no compunction against expending the lives of their ground soldiers in indecisive combat, and early in November they pressed attacks which ultimately recaptured Triangle Hill. Toward the end of November only scattered Red probing actions were reported, but the volume of air support continued high during the month: during November the air force planes flew 2,374 close-support sorties and attacked units flew an additional 1,172 such sorties. Almost 50 percent of all combat effort flown by Task Force 77 was used for close air support and Cherokee strikes.<sup>28</sup> In the first week of December, Communist squad- and platoon-sized attacks, supported by up to 6,000 rounds of artillery and mortar fire each day, kept UNC outposts on Sniper Ridge under almost constant attack. In view of this activity, the Fifth Air Force concentrated a "considerable" close-support effort against the Sniper Ridge area, and in the period of 2 through 7 December it obtained the services of three B-29's nightly to deal with hostile artillery. Assisted by the strong air effort, UNC ground troops turned back enemy attacks against Sniper Ridge positions, but before dawn on 11 December a two-battalion enemy force, attacking in the western battle sector, wrested Little and Big Nori hills from the ROK I Division.<sup>29</sup> During

†See Chap. IV, p. 105.

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December the air force and attached units flew 3,003 close-air-support sorties, and Task Force 77 continued to emphasize Cherokee and close-air-support strikes. Three large Cherokee strikes were launched daily, using approximately 75 percent of the available propeller striking force when two carriers were on the line and 50 percent when three carriers were operating.<sup>30</sup>

In the last half of 1952 the Eighth Army and Communist ground forces had very infrequently engaged in combat with troops larger than a battalion, but the Far East Air Force's and attached units had flown a total of 20,139 close-support sorties. Ground officers testified that this air support gave a "tremendous lift" to the infantry: on 5 November, for example, the commander of the 2d Division, whose forces were generally inactive during that day, reported that his men were "pleased and happy" to see a 58th Group close-support strike in a low-level napalm attack destroy a "Chinese 50-caliber gun." He reported that his men were heard to say: "It takes real guts to go in and do that job."<sup>31</sup> In mid-December 1952 a Fifth Air Force representative informed a FEAF assemblage that from 40 to 60 percent of that air force's total effort was being devoted to close or general support of UNC ground forces. The question was whether this allocation of effort was the most profitable employment of available air power, and, if it was not, how could the effort be made more profitable. The Cherokee experiments of Task Force 77 had demonstrated that squadron-sized fighter-bomber strikes had a good expectation of doing maximum damage to support targets and of escaping excessive casualties to enemy ground fire: by December a Cherokee strike group commonly comprised eight F4U's, eight AD's, and eight to 12 F9F's. The Navy, however, had found that it was practically impossible to put such a large formation through the tedious close-support control procedures which were designed to protect friendly ground troops and still get the strike on and off of the target in an acceptably short period of time. In late November and early December, when Fifth Air Force planners desired to increase the size of the air striking forces which were being sent against frontline targets they met this same control problem. A close scrutiny of the existing Eighth Army bomblines showed that some alleviation of this control situation was feasible: the bomb line was spread out as far as 10,000 meters in front

of the friendly ground forces. This meant that air attacks far out in front of the Eighth Army had to go through the formalities of the close-air-support procedure even though there was next to no danger that friendly troops would be erroneously attacked. At the suggestion of the Fifth Air Force, the Eighth Army agreed to move this line to a position approximately 3,000 meters beyond its front line positions. In a concomitant action, the line separating "general support" for "interdiction" was moved to a position approximately 25 miles beyond the bombing.<sup>32</sup> Following these changes, the Fifth Air Force emphasized prebriefed general support strikes made by 24 to 36 aircraft against hostile personnel and supply areas lying outside the 3,000 meter line but generally within 20,000 meters of the front lines. In all, some 1,891 of these general support sorties were flown during December, and the Fifth Air Force found that these massed attacks, accomplished in a minimum time, appeared to be effective and highly demoralizing to the enemy with little cost of aircraft.<sup>33</sup>

After appraising the tactical situation, FEAF operations planners early in January 1953 requested the Fifth Air Force further to review its close-air-support effort with a view toward applying more of this effort to more lucrative and more vulnerable enemy targets in the forward areas.<sup>34</sup> This recommendation was based upon an appreciation of intelligence and reconnaissance reports which indicated that the Communists were reinforcing and regrouping their forces, perhaps to support a major ground offensive early in 1953. These same reports set off a substantial FEAF interdiction campaign which began with attacks against the key Chongchon estuary bridges on 10 January.\* The recommendation was also in context with the tempo of ground fighting for from mid-December until the last week of March 1953 there was a general lull in troop combat across the entire front. During January and February 1953, Fifth Air Force fighter-bombers shattered Communist troop concentrations and supply accumulations behind the bomblines.<sup>35</sup> Task Force 77 flyers also emphasized Cherokee strikes against hostile troop and supply concentrations in a zone from 10 to 30 miles behind enemy lines. Eighth Army unit commanders credited these general

\*See Chap. IV, pp. 114-16.

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support strikes with disrupting evidently planned enemy offensives.<sup>36</sup> Although the UNC air emphasis was on general support, far more than a mere routine effort was accorded to close air support: in the period of January through March 1953 FEAF aircraft flew 3,873 close-support sorties, and the 1st Marine Air Wing flew 2,938 close-support sorties, and the friendly foreign fighters provided an additional 854 close-support sorties.<sup>37</sup>

Early in March UNC ground reconnaissance patrols everywhere across the front met increasingly sharp enemy resistance, but ground engagements were mostly desultory. Between 23 and 29 March, however, the Communists initiated several limited objective attacks aimed at "Old Baldy" and "Outpost Vegas." FEAF immediately diverted aircraft from interdiction and general support to the support of friendly ground troops; during this week of combat Fifth Air Force fighter-bombers flew 483 close-support sorties while the light bombers provided 87 and the medium bombers made 11 Tadpole bombing sorties. Altogether, FEAF units dropped 398.4 tons of bombs into the active area of ground fighting during the week, and the Navy and 1st Marine Air Wing added another 77 tons of bombs and 66 tanks of napalm to this figure.<sup>38</sup> In April the enemy continued active on the ground, and in May UNC outposts all along the battle line were subjected to enemy pressure at one time or another. Most of these assaults were made by platoons or companies but some of them involved Red battalions. Outposts were lost and regained, but, as in the previous months, there were only nominal changes in the battle line. FEAF, Marine, and friendly foreign aircraft provided a total of 3,965 close-support sorties in April and 5,824 close-support sorties in May. Because of unfavorable weather at the front increasing use was made of B-26 light bombers in radar-directed close support: in April the 3d Wing flew 10 percent and the 17th Wing flew 11 percent of their combat effort in close support, and 14 percent and 19 percent of their total combat effort in general support of Eighth Army ground units.<sup>39</sup> In April and May Task Force 77 continued to emphasize Cherokee attacks, and in an April innovation its planes began to take a single logistical target under attacks for up to three days. Navy flyers found that such sustained attacks not only effected heavier damages on the enemy but that they also had utility in that the

enemy was seldom able to sustain his flak defense of a given area for more than two days straight running.<sup>40</sup>

As early as 27 May aerial reconnaissance indicated that the enemy was making preparations for a major offensive, and in preparation for the emergency FEAF and NAVFE aircraft mounted strong general support strikes against enemy logistical buildups, which, being often shrouded by cloudy weather, had frequently to be attacked with TADP radar assistance. Tadpole control, which Task Force 77 flyers had first tried on 23 May, ripened into a regular operational use with the naval pilots between 4 and 14 June when foul weather curtailed visibility: in this period carrier-based planes flew 470 Tadpole sorties. On 3 June the FEAF Bomber Command was required to divert its entire B-29 effort to Tadpole support of friendly ground troops, and on each of the following three nights 19 B-29's were airborne over the front lines and made radar controlled bomb drops.<sup>41</sup>

Beginning on the night of 14/15 June 1953 the Communists attacked the ROK II Corps in force near Kumhwa. This was the largest Red offensive in more than two years, and the momentum of the assault carried it eight miles down the Pukhan Valley. Recognizing that the UNC ground situation was potentially perilous, General Anderson called for a maximum air effort against the enemy and he further waived the 3,000-foot minimum attacking altitude\* which had been designed to reduce fighter-bomber casualties.<sup>42</sup> The Reds had evidently counted on getting weather cover for this offensive, but there was a temporary break in the weather on 15 June, the very day on which the Reds broke through the main line of resistance near Kumhwa. At this crucial time both the Fifth Air Force and Task Force 77 mounted a maximum effort in support of the Eighth Army. The day of the attack 859 of the 1,148 sorties flown by Fifth Air Force planes hit enemy positions at vital points along the front line; Task Force 77, with four aircraft carriers on the line, broke records to fly 532 combat sorties; and west coast carriers and land-based Marine fliers topped their records with 478 sorties.<sup>43</sup> Following these maximum air attacks, General Taylor messaged that:

\*See Chap. V, p. 152. The 3,000-foot minimum attack altitude restriction was reinstated on 26 June 1953.

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"The frontline troops of the Eighth Army join in praise of the magnificent support they received today from the planes of the Fifth Air Force."<sup>44</sup>

The entire Fifth Air Force fighter-bomber effort remained committed to battle line support until 19 June, and by this time the Eighth Army had gotten the break in its lines under control. The amount of aviation employed in support of the Eighth Army, whether directed by day by TACP's or Mosquito controllers or by night or in bad weather by Tadpole controllers, remained at high level, and it was especially large on the 15th, 16th, 26th, and 30th of June. On these days the close-air-support control system received so many aircraft that it was saturated, and some aircraft, which could not remain on station until the forward air controllers found targets for them, had to make free drops behind the enemy lines.<sup>45</sup> When weather conditions demanded it, TADP controllers put fighter-bombers on their targets, and night close support made heavy demands on the Tadpole system: such radar-directed sorties during June constituted 66 percent of the combat effort of the two light bombardment wings, and for the second time during the month all B-29's were again diverted to close support for three nights following 28 June. During June the TADP's of the 502d Tactical Control Group exceeded all their previous records and successfully controlled 2,124 bomb runs which effected the delivery of 6,947.46 tons of high explosive.<sup>46</sup> Altogether in this month of maximum close support, FEAF aircraft flew 7,023 close-support sorties, the Marine air wing flew 1,348 close-support sorties, and friendly foreign aircraft provided an additional 537 such sorties.<sup>47</sup>

As the Communist mid-June offensive abated, Fifth Air Force planes immediately began armed reconnaissance flights which were designed to profit from targets brought out into the open by the Red ground attack, but early in July heavy rainfall and low ceilings kept the biggest part of Fifth Air Force planes grounded for six consecutive days, and under the cover of the clouds the Reds prepared for an attack which was to be even larger than the one that they had made in June. Using elements of an estimated five enemy divisions, the Reds struck and overran the ROK II Corps near Kumsong on the night of 12/13 July. All air commanders again reacted vigorously to

the Red ground offensive. On 14 July the Seventh Fleet committed its maximum effort to the control of the JOC in Korea, and, as the JOC requested, it used its conventional aircraft in close support and put its jets on either Cherokee or route reconnaissance missions. The intensity of the Fifth Air Force close-support effort was shown by the fact that its fighter-bombers flew nearly 3,400 such sorties in July, while its light bombers provided 1,300 close-support sorties, 800 during hours of darkness and 500 in daylight hours. The 1st Marine Air Wing provided 1,497 close-support sorties, and the medium bombers of the FEAF Bomber Command, which were directed to give especial emphasis to the support of the ground forces on the nights of 13/14 through 19/20 July, flew 100 nocturnal sorties in support of the Eighth Army during July.<sup>48</sup>

Generally unfavorable flying weather during the first two days of this July attack and marginal weather on occasions thereafter handicapped the UNC supporting air effort, and once more great reliance had to be placed upon the TADP radar bomb control system. Altogether during July the 502d Group TADP's successfully directed 2,247 blind bombing runs with 6,899 tons of bombs, but with all commands competing for the services of the Tadpole controllers on 14 and 15 July and at intervals thereafter the TADP system was inevitably saturated with more aircraft than it could handle. At times, the TADP supporting the heavily engaged U. S. IX Corps could do nothing better than to direct some of the planes which reported to it to positions immediately behind the bomblines for "free drops."<sup>49</sup> In an effort to lighten the load which had been thrust upon the Tadpoles, the Fifth Air Force on 15 July started targeting some close-support targets for shoran attack, and 120 of these targets were attacked, 85 by medium bombers and 35 by B-26's of the 17th Bombardment Wing. At this time the 17th Wing still had only a limited number of shoran-equipped light bombers, but such of these planes as had the shoran gear led other B-26's to the assigned targets for formation drops.<sup>50</sup>

After the initial two days of reduced visibility, clearing weather and the extra maintenance which had been performed by units during the lull in operations early in July enabled FEAF to mount a maximum daily effort until the Communist

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*SORTIES BY TYPE FLOWN BY FEAF, MARINE, AND FRIENDLY FOREIGN AIRCRAFT*

July 1952—July 1953

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Close support.....	2,057	1,836	1,797	2,980	2,400	1,690	1,204	1,490	1,179	2,602	3,844	7,023	5,806
U ID/AR.....	4,598	5,576	5,490	6,816	5,658	5,937	5,843	4,889	4,229	5,271	4,682	3,449	3,561
CA/IN/ES.....	2,628	2,904	3,613	4,281	2,606	3,519	3,501	2,912	3,690	4,902	4,801	4,157	2,996
S Cargo.....	5,153	5,486	5,163	5,851	5,074	4,762	5,216	4,545	4,545	4,765	4,822	4,513	3,614
A Other.....	2,767	3,184	3,632	4,081	3,264	3,834	3,804	3,401	4,237	5,369	4,917	4,542	3,489
F Noneffective.....	282	310	341	264	237	302	265	150	161	185	197	224	204
<b>Total.....</b>	<b>17,485</b>	<b>19,296</b>	<b>20,036</b>	<b>24,273</b>	<b>19,239</b>	<b>20,044</b>	<b>19,833</b>	<b>17,387</b>	<b>18,041</b>	<b>23,094</b>	<b>23,263</b>	<b>23,908</b>	<b>19,670</b>
M Close support.....	731	1,406	1,023	1,351	904	971	1,402	736	800	1,016	1,318	1,348	1,062
A ID/AR.....	1,301	1,618	1,412	1,773	1,307	1,803	1,094	947	1,314	1,175	1,226	1,275	669
R CA/IN/ES.....	136	194	190	51	21	25	35	6	17	33	202	282	281
I Cargo.....													
N Other.....	201	261	273	381	206	359	373	272	399	501	454	526	624
E Noneffective.....	83	117	116	106	70	89	106	67	87	69	122	121	128
<b>Total.....</b>	<b>2,452</b>	<b>3,596</b>	<b>3,014</b>	<b>3,662</b>	<b>2,508</b>	<b>3,247</b>	<b>3,010</b>	<b>2,028</b>	<b>2,617</b>	<b>2,794</b>	<b>3,322</b>	<b>3,552</b>	<b>2,764</b>
F Close support.....	98	60	68	157	268	342	293	308	253	347	662	537	400
O ID/AR.....	747	1,133	982	1,334	863	691	680	353	567	805	788	525	359
R CA/IN/ES.....	52	98	223	152	200	287	272	163	16	115	64	105	77
E Cargo.....	109	208	181	206	256	257	140	184	165	147	158	155	153
I Other.....	18	39	8	46	71	79	10	54	38	58	77	39	19
G Noneffective.....	18	25	7	21	11	27	13	11	21	30	14	46	52
<b>Total.....</b>	<b>1,042</b>	<b>1,563</b>	<b>1,469</b>	<b>1,916</b>	<b>1,669</b>	<b>1,683</b>	<b>1,408</b>	<b>1,073</b>	<b>1,060</b>	<b>1,502</b>	<b>1,763</b>	<b>1,407</b>	<b>1,060</b>

LEGEND:

ID/AR=Interdiction/Armed Reconnaissance  
 CA/IN/ES=Counter Air/Interception/Escort  
 Other=Reconnaissance, Rescue, Strategic, Tactical Control, and Miscellaneous

SOURCE:

FEAF, Statistical Digests, Jan. 1953, p. 1 and July 1953, p. 1.

Figure 17

ground attack was at last contained on 20 July. What had been the enemy's purpose in making these June and July offensives was not entirely clear,\* but the tactical emergency which had faced the Eighth Army in these months had been grave and for a time the only UNC force which had been in position to oppose the enemy advance southward was the combined weight of UNC air power. Whether air power could be credited with stopping the enemy's exploitation of the punctured battle line, or whether the enemy ground actions were limited objective thrusts, could only be conjectured, but FEAF reckoned that the curtain of fire laid into these breaches by air power must have raised serious doubts in Communist minds as to the desirability of further moves to the

\*See Chap. IV, p. 125.

south.<sup>51</sup> After the July assault was contained the Communists made no significant ground moves during the last seven days of hostilities, but a part of FEAF's aircraft continued to support the Eighth Army. And at 2136 hours on 27 July 1953, a 3d Bombardment Wing crew dropped the last bombs of the Korean hostilities upon the enemy in the course of a radar-controlled-close-air support mission.<sup>52</sup>

By the way of summary, the monthly totals of close-support sorties flown by FEAF, Marine, and friendly foreign aircraft in the period of 1 July 1952 through 27 July 1953 are shown in figure 17. These monthly totals reveal that FEAF provided a substantial quantity of routine close-air-support, even in the months of the slackest ground activity, and that it gave all-out emphasis to

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ground support in periods of resurgent ground attack. Thus in July 1953, when Communist attack routed the ROK II Corps, 43 percent of FEAF's combat effort and 45 percent of the Marine Wing's total effort was employed in close support of UNC ground troops.<sup>53</sup> One may therefore state without equivocation that extremely generous quantities of close air support were provided to UNC ground forces in Korea, but it is more difficult to evaluate the effect of this expenditure of air effort. Close air support undoubtedly benefited the morale of UNC ground troops and it simultaneously degraded the battle proficiency of Communist combat troops. It closed the gaps in the UNC battle line in June and July 1953. But for the most part of the last year of the Korean hostilities the hostile targets presented for close-support attack were completely unsuited to profitable air strikes. A tabulation of the estimated results of Mosquito-controlled fighter-bomber close and general support strikes in the period 1 July 1952 through 27 July 1953 is shown in figure 18. These results confirm General Weyland's observation regarding the futility of expending large quantities of air effort in routine close support during a period in which the ground front was stalemated and the enemy was completely dug-in and under cover. From the tabulated assessments made by Mosquito controllers it would appear that the most frequently attacked close-support targets in the last year of the Korean war were bunkers, artillery and mortar positions, personnel shelters, and caves, all of which were dispersed pinpoint targets and were poorly suited to air attack. It appears doubtful that the routine close-support air strikes as they were conducted for the majority of the time in the last year in Korea inflicted any great material damages upon the Communist enemy.

**TARGETS IDENTIFIED BY MOSQUITO CONTROLLERS AND DAMAGED OR DESTROYED BY CLOSE-SUPPORT FIGHTERS.**

1 July 1952—27 July 1953

Nature of target	Destroyed	Damaged
Troops.....	1, 418(KIA)	40(WIA)
Bunkers.....	650	9, 425
Artillery positions.....	11	1, 713
Artillery pieces.....	44	40
Mortar positions.....	147	3, 545
Mortar pieces.....	14	5
Automatic weapons positions.....	4	965
Automatic weapons pieces.....	45	14
Self-propelled gun positions.....		9
Self-propelled guns.....	11	8
Antiaircraft artillery positions.....		8
Antiaircraft artillery pieces.....	1	1
Tanks.....	31	30
Vehicles.....	94	70
Buildings.....	381	178
Personnel shelters.....	3, 474	3, 779
Houses.....	235	108
Revetments.....	27	43
Caves.....	150	1, 628
Observation posts.....	13	11
Command posts.....	5	3
Tunnels.....	3	25
Road cuts.....	2	203
Bridges.....	13	47
Ammunition dumps.....	6	
Supply stacks.....	624	335
Boats.....		5
Supply shelters.....		4
Parapets.....		7
Firing bays.....		118
Rail cuts.....		4

Secondary explosions—3,410  
 Fires observed—738  
 Total flights directed—7,472

Source: Hists. 6147th Tac. Cont. Gp., July-Dec. 1952, pp. 25-26, Jan.-June 1953, pp. 23-24, and July-Dec. 1953, p. 30.

Figure 18.

**TRAINING AND TESTING IN AIR-GROUND OPERATIONS**

**Eighth Army Discontent with Tactical Air Doctrine:** "While the close air support in Korea has been highly successful," General Van Fleet had written on 20 December 1951, "it is capable of much further development and improvement."<sup>54</sup> From the beginning of Korean hostilities, FEAF had made constant efforts to develop and adapt close-air-support procedures to the local circumstances

of Korea, but it was unwilling to believe that the doctrinal and organizational lessons derived from the much more extensive experience of World War II were to be overthrown by situations obtaining in the peculiar Korean conflict. The approved USAF-Army doctrine relative to air-ground operations had had its conceptual beginnings in the land campaigns in North Africa, had been

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tried and tested in Italy, and had been elaborated and perfected in the battles of Europe, the most extensive air-ground fighting of World War II. Following this war, a board of senior air and ground officers had drawn up Field Manual 31-35, *Air Ground Operations* (August 1946) and the broad outlines included in this doctrinal manual had been expanded in a subsequently published Army Field Forces-Tactical Air Command, *Joint Training Directive for Air-Ground Operations* (1 September 1950). This approved and battle-tested doctrine recognized that air and ground forces were separate and coequal, but it required a tactical air force and a field army to work intimately for the defeat of opposing enemy air and ground forces. To this end it was desirable that the headquarters of air and ground forces should be close together, and it was necessary that air and ground operations would be integrated in a joint operations center. Three tasks would normally be performed by a tactical air force: (1) maintenance of friendly air superiority, (2) interdiction of the battle area, and (3) close support of friendly ground troops. Targets which could not be neutralized or destroyed by weapons organic to the surface forces were considered to be suitable objectives for close-support air strikes. This USAF-Army system was economical of essentially scarce air effort and was suited for large-scale air-ground campaigns in a major ground theater of operations.

In the light of its experience in the South and Central Pacific theaters of operations of World War II the U. S. Marine Corps had devised for air-ground operations another organizational concept which was especially suited for the short and intensive amphibious invasions practiced against island objectives.\* Marine amphibious landing forces had gone ashore with limited amounts of organic artillery, and Marine commanders envisioned aviation as a means for making up the deficiency. Since high-performance naval carrier-based aircraft maintained air superiority and interdicted the movement of enemy forces, Marine pilots would practice close support as a primary mission. These arrangements were formalized at the end of World War II when Marine air and ground forces were organized primarily to perform amphibious tasks. Each Ma-

\*See AHS-86, *Close Air Support in the War Against Japan*, pp. 17-29, 33-44, 182-207, 238-45.

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rine division was then given its own integral air wing, the latter being in effect a small tactical air force with its own control squadrons and combat aviation. Each Marine ground battalion was accompanied by a forward air observer, who could call down supporting aircraft from a flight normally kept on station over the battle area. This system was admittedly expensive of always-scarce air effort, but it could be justified in view of the exceptional requirements of short but intensive amphibious operations.<sup>55</sup>

One of the fundamental philosophical differences between the USAF-Army and the Marine systems of close air support was the degree of reliance placed on the supporting fires of integral artillery. Army commanders had preferred to rely on their own artillery for the neutralization or destruction of hostile targets within the first 1,000 yards of the front. They had nevertheless desired that the air should possess a capability to supply close-air-support strikes within 1,000 yards of friendly positions when critical situations or defiladed targets demanded it. On the other hand, Marine ground commanders could normally expect only the supporting fire of flat trajectory naval guns or of their own light guns, and they therefore required routine close air support in the first 1,000 yards ahead of their lines. Since they so used air support as a substitute for artillery, the Marines had to send forward air observers with each of their battalions. To assure an air strike within 5 to 10 minutes against hostile targets in such close proximity to their front lines, they had to keep aircraft on station overhead virtually all the time. The Army, on the other hand, preferred to utilize air against targets which could not be attacked by its integral artillery. Such targets, even if they were moving forward, could not normally be expected to reach friendly positions for a period of time and were often too far distant for the visual observation of a ground observer. In a normal situation there was adequate time in which the Army could call for and receive a call-type air support strike which was much more conservative of always-scarce air power than were air alert missions. There was also utility in an airborne tactical air coordinator who could locate and call air strikes upon supporting targets outside the visual range of a forward air controller on the ground.<sup>56</sup>

While the Marine system of close support was designed to meet a specialized type of intensive

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ground fighting quite dissimilar to a campaign on an army or army-group front, the peculiar war in Korea exaggerated the positive advantages of the Marine system and minimized its limitations. In the period of September through December 1950, when it provided integral air support to the U. S. X Corps at Inchon and Wonsan, the 1st Marine Air Wing had been able to base its squadrons on escort carriers or on airfields quite close to the ground fighting. Had the Communists possessed an air attack potential at this time they could have prevented the small escort carriers from operating with such freedom. Hostile jet fighter opposition or a substantial anti-aircraft artillery establishment would also have played havoc with the conventional F4U Corsairs, in which Marine airmen orbited for long periods over the battle area before they were called in for air-support strikes. Benefiting from these unreal and exceptional situations, Marine air support in this period was both immediate and generously given. An Army study dated 1 February 1951 stated that the average time required to obtain a close-support strike was 35 minutes from the Fifth Air Force and 5 to 10 minutes from the Marines. More than 95 percent of Air Force strikes were air controlled; more than 90 percent of Marine strikes were ground controlled. The average distance between an air support target and friendly troops was 0.9 mile for the Marines and 3 to 4 miles for the Air Force. Fifth Air Force close support of Eighth Army divisions averaged 12 sorties per division per day, whereas the 1st Marine Division, while operating as a part of the X Corps, had received an average of 37 sorties per day.<sup>57</sup> Although the accuracy of these figures (which were drawn from an often confused period of fighting) may be suspected of some error, it is nevertheless possible to observe that they were not inconsistent with the degree of reliance which Army and Marine units accorded to integral artillery fire. But in this respect the Korean war was again peculiar, and at no time during these hostilities did the Eighth Army possess what it considered to be an adequate amount of artillery. During the summer and autumn of 1950 ground division commanders freely admitted that they used air support as another form of artillery because they lacked field guns and ammunition.<sup>58</sup> "I do think," stated General J. Lawton Collins, Chief of Staff, U. S. Army, "that it is true that our troops, per-

haps in the early phases of the operation particularly, got to relying on air when they could have used artillery."<sup>59</sup> And in April 1953 General Van Fleet told Senators about a continued inadequacy of Eighth Army artillery: "In Korea," he said, "we have only 25 percent, approximately 25 percent or less, the number of guns we had per division in France."<sup>60</sup>

After December 1950 the U. S. X Corps was integrated into the Eighth Army battle line and the 1st Marine Air Wing began to operate under the orders of the Fifth Air Force Joint Operations Center (JOC) in much the same manner as did other Air Force tactical wings. Flying call-type air-support missions from bases in South Korea, Marine pilots could no longer perform a requested strike within 5 to 10 minutes. After July 1951, moreover, when the truce talks stalemated ground fighting and UNC air began a comprehensive rail interdiction program, General Van Fleet agreed to limit routine requirements for close support across the Eighth Army front to 96 sorties per day. Such a reduction evidently caused some resentment among division and corps commanders of the Eighth Army, many of whom felt that such an amount of close support was inadequate to their needs.<sup>61</sup>

By December 1951 General Van Fleet, explaining that the "continuing demands of the subordinate echelons in the Eighth Army" had built up against him, visited Lt. Gen. F. F. Everest, the Fifth Air Force commander, to discuss the air support problem. Van Fleet stated first that he was appreciative of the all-out support which the Fifth Air Force had given to him whenever he had requested extra effort. He next described the organization of the army, in which the corps was the basic fighting unit of the surface forces. The corps commander had a great deal of latitude in employing his forces as long as he stayed within the army plan; he controlled his artillery, engineers, communications, and everything else within his area of responsibility. The only thing which the corps commander could not control was the allocation of his air support. Van Fleet then proposed that some air—how much he was not exactly sure, but in the order of one squadron of fighter-bomber aircraft—be assigned to each corps. Such an assignment would not be made immediately, but possibly it would be effected in the spring of 1952, if the fighting broke out again. In or-

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der to give immediate support, this squadron should be located on an airfield in the vicinity of the corps headquarters. Such an assignment as this would eliminate what Van Fleet called the "continual competition between divisions and corps for close support." Each corps commander would have a given amount of air power to use according to his own plan, and all that Van Fleet and Everest would have to do was to monitor the employment of this squadron by the corps commander.

General Everest immediately pointed out the inflexibility of such a system and asked Van Fleet how he meant to meet a situation in which one corps might need a large amount of air support. Van Fleet replied that either he or Everest could shift the effort from corps to corps, but normally on a day-to-day basis, thus assuring that the corps commander could still have his own squadron available. When Everest pointed out that three squadrons along the Eighth Army front would provide far fewer sorties than the Eighth Army had been furnished during the prior six months, General Van Fleet replied that this reduction in effort would be more than made up for by the satisfaction of the corps commanders in having something they could count on and run themselves. When Van Fleet had finished talking, General Everest told him frankly that he did not believe in the soundness of putting air units under the operational control of a corps commander and that he had no personal authority so to depart from established principles of air employment. He suggested, as the friendly conversation broke up, that the battleground for such an interservice argument was in Washington, not in Korea.<sup>62</sup>

General Everest thought that the normally enthusiastic and direct Van Fleet had not had his heart in the proposition which he had orally advanced, but three days after the conversation, on 20 December 1951, General Van Fleet forwarded his proposal to CINCFE by official letter. He now proposed to utilize Korea as a testing ground to determine whether the current organization and command for the joint employment of air and ground forces was sound. Specific deficiencies in the existing air-support system, as Van Fleet saw them, were attributable to several factors: an insufficient number of air sorties were available for close support; an insufficient number of airfields were located laterally across Korea immedi-

ately behind the main line of resistance; the retention of centralized control of aircraft at the JOC was imposing administrative delays that unnecessarily reflected in the elapsed time between the request and delivery of air support; an excessive amount of time was required to put an aircraft on the target after the plane arrived in the target area; an insufficient number of TACP's were in the field and a doubtful reliance was being placed upon tactical air coordinator or Mosquito airborne control; TACP's were initially inexperienced when reporting for duty and served a relatively short tour in the field; and finally USAF had failed to develop special aircraft and armament capable of providing more effective close support to ground forces.

After such an introduction, General Van Fleet approached the heart of the matter: he thought that the advantages of decentralizing control of an army front to the component corps had been well demonstrated, and he predicted that the advent of atomic warfare would probably accelerate this decentralization. In order to decentralize tactical air to corps commanders' control, Van Fleet proposed to take three squadrons of Marine aircraft under the operational control of the Eighth Army, which he would further decentralize by placing one squadron under each of his three corps commanders. These squadrons would operate from advanced bases located, where possible, in close proximity to a corps headquarters. Their aircraft would be used for close air support along the army front, and they would also attack close interdiction targets, lying within 20 to 40 miles beyond the front lines. Air strikes would be controlled by army personnel, and maximum use would be made of field artillery forward observers in the this function. Requests for close air support from divisions would be processed at corps headquarters and would be normally filled from aircraft under the operational control of each corps. The Eighth Army, however, would divert aircraft from one corps to another when necessary, and when army plans did not require the maximum use of all immediately available corps airplanes, they would be made available to the use of the Fifth Air Force, just as it was anticipated that the army would receive additional support from the Fifth Air Force during periods of major ground activities. The Air Force would continue to accomplish photography, reconnais-

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sance, and radar-controlled close-support strikes for the ground forces.<sup>63</sup>

Few of the specific complaints which General Van Fleet launched against the existing air-support system were new, and many of them, as will be seen below, were resultant in some part from the fact that the Eighth Army had never provided all of the communications nets needed for the expeditious requesting of close-support strikes. As it appeared to the Fifth Air Force, however, the Van Fleet letter was not aimed at the correction of existing faults in the system used in Korea but it rather attempted "to justify Army operational control of tactical aviation units."<sup>64</sup> What action was taken by CINCFE on the Van Fleet proposal that three squadrons of the 1st Marine Air Wing should be placed under the operational control of the Eighth Army is not apparent, but no change was made in the existing system whereby the Fifth Air Force provided close air support to the Eighth Army and exercised coordination control over the 1st Marine Air Wing. Dissatisfaction nevertheless continued within the Eighth Army, particularly within the U. S. X Corps where in mid-February 1952 an observer team recorded that "there was a desire for the Army to have tactical air allocated directly to the Corps commander to be employed as desired."<sup>65</sup> General Van Fleet's proposals in reference to the 1st Marine Air Wing were clearly not forgotten, and they were brought before General Clark in a briefing on 1 July 1952, shortly after Clark had assumed the duties of CINUNC/CINCFE. At this time Clark directed that Van Fleet should be informed that his proposed plan for the use of the Marine Air Wing in exclusive support of the Eighth Army could not be favorably considered. Clark directed, however, that action should be initiated in FEC headquarters "to tackle objectively the existing problems of close air support with a view towards developing and improving procedures in the implementation of current air-ground operations doctrine."<sup>66</sup>

**The CINCFE Paper on Air-Ground Operations:** While he had served as chief of the Army Field Forces, General Clark had, to some extent, been involved in the "burning issue" relative to "the control and adequacy of close air support for the infantryman." In a published article in 1950 he had described the kind of air support that the Army wanted and had visualized an "ideal" air

support aircraft. As the theater commander in the Far East, however, General Clark had the over-all responsibility for successfully prosecuting the Korean war, and he recognized that each force component assigned to the theater "contributes its own specialized capabilities to the attainment of the . . . over-all mission and in so doing assists the other components; however, no single service exists solely or primarily for the support of another." Clark later explained that he had not come out to the Far East to aggravate any differences of opinion between the Army and the Air Force. "With a specific job to do," he said, "I had to maintain an air-ground team working as efficiently as possible."<sup>67</sup>

Having studied the particulars of Eighth Army dissatisfaction with its air support, CINCFE on 11 August 1952 issued a "considered opinion" that no far-reaching or drastic changes or experiments which were contrary to existing close-air-support procedures and doctrine should be attempted, based solely on the often unusual conditions which had prevailed in Korea. He recognized that extant doctrinal procedures were far more fitted for general hostilities than had been the case in Korea. "The doctrine and procedure in the Joint Training Directive for Air-Ground Operations, dated 1 September 1950," CINCFE stated, "was established only after the most comprehensive and exhaustive joint deliberation. It was based on a vast reservoir of experience data amassed on all fronts in World War II. It also represents in the Armed Forces the composite view of senior members who had the longest and most responsible experience in close support during World War II."

"After careful study," CINCFE stated, "I consider that much of the criticism of the present system is not fully justified—principally because the criticism is based on factors that are entirely unrelated to the system itself." The first of these factors was a general lack of understanding that air-ground operations in the combat zone were a direct result of policies arrived at in consultation and enunciated by the Air Force and Army commanders. Second, there was a tendency on the part of ground officers, at all levels, to give the Air Force credit for greater capabilities than it possessed. Failing fully to recognize the limitations and capabilities of the air arm, these ground commanders were disappointed in air results and

sance, and radar-controlled close-support strikes for the ground forces.<sup>63</sup>

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**The CINCFE Paper on Air-Ground Operations:** While he had served as chief of the Army Field Forces, General Clark had, to some extent, been involved in the "burning issue" relative to "the control and adequacy of close air support for the infantryman." In a published article in 1950 he had described the kind of air support that the Army wanted and had visualized an "ideal" air

support aircraft. As the theater commander in the Far East, however, General Clark had the over-all responsibility for successfully prosecuting the Korean war, and he recognized that each force component assigned to the theater "contributes its own specialized capabilities to the attainment of the . . . over-all mission and in so doing assists the other components; however, no single service exists solely or primarily for the support of another." Clark later explained that he had not come out to the Far East to aggravate any differences of opinion between the Army and the Air Force. "With a specific job to do," he said, "I had to maintain an air-ground team working as efficiently as possible."<sup>67</sup>

Having studied the particulars of Eighth Army dissatisfaction with its air support, CINCFE on 11 August 1952 issued a "considered opinion" that no far-reaching or drastic changes or experiments which were contrary to existing close-air-support procedures and doctrine should be attempted, based solely on the often unusual conditions which had prevailed in Korea. He recognized that extant doctrinal procedures were far more fitted for general hostilities than had been the case in Korea. "The doctrine and procedure in the Joint Training Directive for Air-Ground Operations, dated 1 September 1950," CINCFE stated, "was established only after the most comprehensive and exhaustive joint deliberation. It was based on a vast reservoir of experience data amassed on all fronts in World War II. It also represents in the Armed Forces the composite view of senior members who had the longest and most responsible experience in close support during World War II."

"After careful study," CINCFE stated, "I consider that much of the criticism of the present system is not fully justified—principally because the criticism is based on factors that are entirely unrelated to the system itself." The first of these factors was a general lack of understanding that air-ground operations in the combat zone were a direct result of policies arrived at in consultation and enunciated by the Air Force and Army commanders. Second, there was a tendency on the part of ground officers, at all levels, to give the Air Force credit for greater capabilities than it possessed. Failing fully to recognize the limitations and capabilities of the air arm, these ground commanders were disappointed in air results and



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leveled their blame at the system which controlled air operations. In this regard CINCFE pointed out that: "The normal supporting weapons in divisions and corps should be fully utilized as a matter of first priority. Calls for close air support should be made only when available ground weapons are fully employed and cannot furnish the required support." Third, the majority of officers at corps level and below did not appreciate the fact that the Fifth Air Force was assigned air missions of greater scope than normally assigned to a tactical air force. Few of these officers appreciated the "very limited means" at the disposal of the Fifth Air Force, FEAF Bomber Command, and Navy air elements for furthering the theater commander's over-all mission by exploiting throughout North Korea the intrinsic capabilities of air forces. The UNC air forces had to continue to throw the full weight of air attacks against all major resources important to enemy operations, while simultaneously maintaining an ability to meet unforeseen emergencies. Enemy offensive air capabilities had to be neutralized and kept neutralized. The CINCFE recalled that there had never been any difficulty in determining a proper allocation of air effort at the Eighth Army-Fifth Air Force command level: during the CCF offensives in the spring of 1951 "every plane that the Fifth Air Force could get airborne and that possessed a close support capability was on that mission. The full weight of FEAF Bomber Command was also thrown against the enemy." When the ground front had stabilized in July 1951, a transportation interdiction program had been instituted with the complete concurrence of the Eighth Army commander, and with his full knowledge that aircraft to be made available for close support would be in limited numbers. "If we disregard for a moment the front line commander who can never get enough support, either artillery or air," said CINCFE, "and get back to the Tactical Air Force-Army level where the decision on allocation of available effort to type missions is made, there appears to be no problem existing in jointly selecting the mission desired by both commanders." Fourth, any comparison of the Army and Marine system of close air support was faulty in its very premise because the two systems were designed for completely different types of ground operations and necessarily had entirely different allocations of artillery and sup-

porting air. The Marine system was too expensive in personnel and equipment and its requirement for aircraft was too great to permit its adoption in tactical air force-army use where 60 to 100 divisions might be employed. Fifth, CINCFE suggested that the tactical air force had probably been its own worst enemy in expressing its mission as tasks, which were: to gain and maintain air superiority, to isolate the battlefield, and to provide close support of ground forces. Army officers often incorrectly assumed this statement of missions to mean that air support was a third priority effort. CINCFE further suggested that this mission might be better expressed "by indicating that the Tactical Air Forces has but one mission, which is: **IN CONJUNCTION WITH SURFACE FORCES TO INFLICT MAXIMUM DAMAGE THROUGH AIR ACTION ON ENEMY AIRCRAFT, MATERIEL AND INSTALLATIONS, AND PERSONNEL.**" Such a mission could be accomplished by three types of action: anti-air, anti-materiel and installations, and anti-personnel. In cooperation with army commander, the tactical air force commander would engage the enemy with a combination of these actions depending on the over-all tactical situation. Sixth, the deficiencies noted in the close-support system employed in Korea—an excessive length of time required to get air ordnance to the target and the accuracy of delivery of such ordnance—could and had to be countered by constant cooperative training between air and ground forces.

After this introduction to the problem, CINCFE instructed his force commanders to re-examine their positions and to direct their efforts "toward perfecting the present system." To this end he proposed 13 steps to be immediately undertaken to increase the efficiency of the existing close-air-support system in Korea:

1. Insuring that appropriate commanders and key staff officers are indoctrinated in the capabilities and limitations of the respective services in effecting their missions, and in the principles and approved procedures of air-ground operations.
2. Increasing the attendance of Eighth Army and Fifth Air Force personnel in the air-ground operations school, currently being conducted at Johnson Air Base, Japan.
3. Preparing individual tactical air force pilots with an opportunity of becoming better acquainted with the tactical situation and with Army personnel on the ground and on the front line, by spending a minimum of four days with a front line unit.

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4. Recommending improvements in and maintenance of the signal equipment utilized in the air-ground operations system.

5. Increasing the utilization of Army personnel in the air-ground operations system, either by utilizing Army personnel for tactical air control parties at battalion level, which would operate under general supervision of the forward air controller of the Air Force TACP at regiment, or by making more efficient use of forward observers and the First Support Coordination Center (FSCC) in close air support missions.

6. Resolving the question of what constitutes an appropriate target for an air attack, especially those targets for MPQ-2 strikes.

7. Developing quicker and more efficient means of designation and identification of targets, especially in the utilization of smoke by the ground units and the picking up of these targets by the pilots.

8. Developing faster means of processing close air support requests by utilizing the complete system as prescribed in the Joint Training Directive for Air-Ground Operations.

9. Developing further the ability to locate grouped enemy personnel and/or other remunerative area targets in close proximity to the front lines for utilization of medium bombers in MPQ-2 strikes; and developing means of better evaluating the results of these strikes.

10. Developing a procedure to insure that in critical ground situations the ground commander who has the best over-all knowledge of the immediate situation has full responsibility for the selection of the target to be attacked by the allocated air effort.

11. Developing better means of delivering air strikes with greater accuracy and surprise.

12. Developing procedures that will not require the lifting of artillery and mortar fire prior to an attack.

13. Developing ground techniques to insure the immediate ground attack following a close air support strike.

In addition to these 13 steps which were to be given immediate study and action, CINCFE outlined a proposed experiment in air-ground operations which would keep the air-support system continuously under study and would provide functional data which might lead to its improvement. "The proposed experiment," stated the CINCFE paper, "is submitted on the premise that the current system of close air support is sound, but that any system should be continuously under study for improvement." To this end, the paper outlined three phases of effort, which might well be carried out simultaneously or overlapped as required for best results. Phase I contemplated the establishment, in conjunction with the already operating Air-Ground School at the headquarters of the Fifth Air Force, of a small joint Eighth Army-Fifth Air Force travelling team, constituted from personnel experienced in the existing

air-ground operations system. This travelling team would be expected to present an analysis of the air-ground operations system at each army corps, division, and regimental headquarters in Korea. Its instruction was to be planned for the sole purpose of informing commanders, key staff officers and personnel in the air-ground operations system of the current factors affecting the situation and to answer questions which pertained to the operational procedures utilized in air-ground operations. Phase II of the proposed experiment contemplated a tactical exercise in which each front line battalion commander would call for an air-support strike against a target which could be viewed by personnel of his battalion. Such exercises would be conducted by corps, with the Fifth Air Force allocating 50 to 100 sorties for JOC alert and the participating corps being designated to receive all of these JOC on-call missions during the time its units were conducting the experiment. These support strikes would be processed in a normal method, and it was supposed that this process should result in a battalion getting response to its request by proper ordnance delivered on target within 30 minutes from the time of the request. A second demonstration would be run utilizing aircraft on an air alert status. A third demonstration would test whether or not faster action could be obtained when close support requests went over a division tactical air request net directly from battalion to division to JOC, with regiment and corps monitoring. During phase II the Fifth Air Force would be expected to insure that every pilot had an opportunity to spend a minimum of four days on the front line as a guest of a battalion commander, preferably of the battalion which the pilot's unit would later support. In phase III of the proposed experiment, the JOC would be expected to allocate to a corps FSCC the "mission control" over one or more fighter-bomber squadrons for a definite period of time. The period of time would desirably coincide with the anticipated duration of either an assumed or an actual attack. During such a period, the corps commander, operating through his FSCC, would have final authority as to the targets selected for air attack as well as for the actual allocations of the available air effort to any subordinate unit within his command. This phase of the experiment would serve to test the feasibility of delegating mission control of an air

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unit during a planned operation to a headquarters below the army-tactical air force level.<sup>68</sup>

In order to perfect the air-support system in Korea, CINCFE thus expected his subordinate force commanders to accomplish three different sets of actions. Many of the 13 steps and the first phase of the proposed operational experiment dealt with training in air-ground operations. The remainder of the 13 steps concerned specific improvements which were to be made in the extant operations system. The second and third phases of the operational experiment proposed certain deviations from established doctrine which were to be tested in an effort to "improve" the existing system.

**Air-Ground Operational Training:** Both FEAF and the Fifth Air Force had long recognized that the one-year tour of combat duty in Korea was productive of an extremely rapid turn-over of experienced air and ground personnel in that theater. As early as 26 March 1951 a joint Eighth Army-Fifth Air Force board had recommended that a joint school should be established in Korea to indoctrinate personnel who were participating in the air-ground system, as many current ground commanders as was possible, and future unit commanders as they reported for duty in Korea. The board further recommended that the school should support a travelling team which would conduct an instructional program in each division when the tactical situation permitted. At this time the Fifth Air Force had expressed a willingness to establish this joint air-ground school, but the Eighth Army had stated that such a school would be impracticable in Korea because of the number of instructors which would be required and the difficulty which would be encountered in obtaining combat unit commanders as students. The Eighth Army recommended that training objectives could be adequately met by periodic army-air team visits to frontline units.<sup>69</sup>

While Fifth Air Force air liaison personnel made efforts to disseminate a sound understanding of the principles of air-ground operations, these officers in the autumn of 1951 reported that the Eighth Army replacement turnover had brought in more and more new people who were unfamiliar with close air support and who had never experienced combat conditions which actually required all-out air support.<sup>70</sup> On 17 September 1951 the Fifth Air Force had accordingly instituted what

it first called a "routine familiarization course" and, after June 1952, an "air-ground operations course." As initially laid out this three-day program was made available to air and ground officers, with quotas for each class established at one air officer from each tactical wing and three ground officers from each corps. The curriculum included the training film "Control of Tactical Air Operations"; briefings on the Fifth Air Force's mission and capabilities, G-2 Air and G-3 Air organization and functions, naval air operations in Korea, and the tactical air control system; and field trips or visits to the JOC and TACC, the 67th Tactical Reconnaissance Wing, and the 51st Fighter-Interceptor Wing. The Air Liaison Division of the Fifth Air Force Directorate of Operations was responsible for this familiarization course, and from time to time when Eighth Army divisions were inactive this division also gave special presentations in the field.<sup>71</sup> Because of the limit on the number of available Air Force billets in Seoul, this course had a maximum capacity of 70 students per month, but prior to the autumn of 1952 the course was never this well attended. The two courses conducted in February 1952, for example, had a total enrollment of only six air officers and 24 ground officers. The instructional teams which made special presentations in the field seldom succeeded in securing the attendance of key people at their briefings.<sup>72</sup>

Although this Fifth Air Force indoctrination training benefited those officers who attended it, the enrollment was much too small to provide a leaven of knowledgeable men in the combat theater. After visiting Korea in January and February 1952, representatives of the U. S. Joint Tactical Air Support Board noted that: "The most outstanding discovery of the tour was the quite apparent lack of indoctrination within both Army and Air Force units in the fundamental principles and concepts of Tactical Air Operations."<sup>73</sup>

In Japan at Johnson Air Base, the Japan Air Defense Force had been conducting an abbreviated air-ground operations course in conjunction with the XVI Corps, and in February 1952 (possibly motivated by the U. S. Joint Air Support Board criticism) CINCFE directed that this training would be expanded into a Far East Air-Ground Operations School (FEAGOS).<sup>74</sup> This FEAGOS was established under staff supervision of the

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JADF at Johnson Air Base, where on 19 May 1952 it opened to an initial class of 15 army and 15 air officers. The course of instruction, which comprised lectures and demonstrations, was five and one-half days in length. In accordance with the CINCFE directive that the attendance of Eighth Army and Fifth Air Force personnel at this school would be increased, the FEAGOS conducted weekly courses after 27 October 1952. Enrolled in larger quotas after August 1952, 174 Eighth Army and 105 Fifth Air Force officers attended the school during 1952. The Fifth Air Force, which made a conscientious effort to insure that its quotas were filled by key officers from units directly engaged in air-ground operations, reported that the FEAGOS training was "of great value . . . particularly in the fighter-bomber wings where it has the greatest applicability."<sup>75</sup>

While there was some difference of opinion regarding the details of the augmented air-ground training which was to take place in Korea, all parties agreed that a further and concerted effort would have to be directed toward educating key personnel. The immediate result of the CINCFE paper was to increase the enrollment of officers in the Fifth Air Force air-ground operations course: two of these courses were conducted in September 1952 with an enrollment of 93 officers, including 6 general officers. Pilot indoctrination visits to frontline units began on 15 September, and thereafter 15 pilots were sent to the front each Monday and Thursday. In order to avoid an undue burden to the frontline units, these pilot visits were limited to three days, an amount of time which General Van Fleet thought adequate for the purpose.<sup>76</sup> Commenting on the first phase of the CINCFE operational experiment as they were required to do, General Van Fleet generally concurred in it and suggested that the travelling team should be set up as a section in a permanent air-ground school at Fifth Air Force headquarters; General Barcus had no objection to the proposed travelling team although past experience indicated to him "that its activities will probably meet with little success since it is difficult to insure attendance by the proper people" at travelling presentations; General Weyland stated that the first phase was an "excellent idea," but he had some doubts about the practicability of travelling about Korea with bulky training aids and suggested that an increased enrollment of carefully

selected personnel in the existing schools offered more probability of achieving fruitful results.<sup>77</sup> In view of the general acceptance of the first phase by all who were concerned, CINCFE directed on 16 October 1952 that it would be implemented as indicated in his air-ground operations paper.<sup>78</sup>

Assisted by Eighth Army instructions designed to assure an appropriate attendance at their presentations, the joint Eighth Army-Fifth Air Force Indoctrination Team got better results than had been initially anticipated. This team made its first presentation in the field on 29 October, and when it completed its tour on 19 November it had made 15 presentations to 530 key command and staff officers of the Eighth Army's subordinate units. The subject matter covered in the team's presentations included a briefing on the doctrine applicable to control of tactical air operations; the mission, capabilities, limitations, and functions of the Fifth Air Force and its assigned, attached, and affiliated units; the functions and operations of Eighth Army G-3 Air and the operational procedures utilized in air-ground operations in Korea; and the techniques of reconnaissance and targeting. The team reported that its course of instruction was received with much interest by attending army personnel, and when the results of the CINCFE air-ground operations experiment were written up on 16 March 1953 it was evident that such periodic presentations were highly desirable. General Barcus and Lt. Gen. Maxwell D. Taylor, now the commander of the Eighth Army, therefore agreed that the travelling indoctrination team would continue to visit and to make its presentations at each U. S. infantry division and corps at least once every four months.<sup>79</sup>

**Air-Ground Operations "Experiments":** While all of the key commanders in the Far East agreed upon the need for augmented training provided for in the CINCFE paper on air-ground operations, they had many objections to the second and third phases of the proposed CINCFE operational experiment. This proposed experiment had been submitted on the premise that the doctrinal system of close air support was sound, and yet certain provisions of the third phase of the experiment were in deviation from this established doctrine. Oddly enough the CINCFE paper proposed to "develop" the extant doctrine and procedures by testing procedures which were in themselves deviations from the extant doctrine.

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As outlined in the CINCFE paper the second phase of the operational experiment proposed to allocate 50 to 100 air sorties to the three corps in turn for their use in a series of demonstrations. General Van Fleet generally concurred with this proposition, but he pointed out that the Fifth Air Force had been allocating 80 to 94 close-air-support sorties each day for use across the Eighth Army front and he desired that such timely support would be continued during the experimental period in which one corps would be getting the 50 to 100 special sorties. To General Barcus it appeared that the training which a ground battalion would receive in witnessing air strikes "would be at considerable cost, measured in terms of ordnance expended, aircraft flying time consumed, battle damages, and losses sustained." Since in the period of April through July 1952 the Fifth Air Force had been losing one aircraft to hostile ground fire in every 382 close-support sorties and had had one aircraft damaged by hostile ground fire in every 26 close support sorties, it seemed to General Barcus that the ground battalions would very likely witness nothing more substantial than a demonstration against a target of little importance at the same time that the Fifth Air Force would suffer not only unnecessary damages and losses but also a substantial diversion from its offensive role. General Weyland also stated that the "value received in return for the effort expended" in these demonstrations would be "questionable." There were 109 battalions in the Eighth Army each of which would require a demonstration, and the 100 sorties which were spoken of as an especial allotment to a single corps represented 30 percent of the Fifth Air Force's normal daily fighter-bomber sortie capability. As for a special air alert demonstration, Weyland pointed out that airborne fighter-bombers were frequently diverted by the JOC to close-support targets; to include in the experiment one demonstration including air-alert fighter-bombers to prove that there was an appreciable reduction in elapsed time between this type of strike and an on-call strike appeared to be wasteful. Based upon actual experience, the time differential could be very well computed for any given tactical situation without conducting a costly experiment.

The third phase of the CINCFE experiment, wherein the "mission control" of one or more fighter-bomber squadrons was to be allocated to a corps

for a definite period of time, met strong objections. General Van Fleet concurred in this phase, but, strangely enough for a man who had earlier urged some such arrangement, he posed three hazards which had to be considered when allocating mission control of an air unit to the FSCC of a corps. Nonoperational weather at the designated squadron's home base might keep it grounded when it was needed: in order to minimize the effects of base weather, the current policy was to allocate JOC-alert flights to the various fighter-bomber groups in Korea. Van Fleet also pointed out that if a corps had mission control over an air squadron it would have to have direct communications between the corps FSCC and the squadron airfield. Finally, Van Fleet cautioned that aircraft damage and loss expectations were major factors to be considered before placing a squadron under the mission control of a corps. Aircraft losses on close-support missions were being incurred at a higher rate than in other tactical air missions; and if one squadron was required to take these losses, even over a short period of time, the squadron would probably lose its operational effectiveness. General Barcus pointed out that the term "mission control" was unfortunate since it included weather information, radar and communications facilities, and current knowledge of enemy and friendly air activities which were beyond the capabilities of a corps FSCC. Such an arrangement whereby air units were placed under ground control, moreover, would negate the principle of centralizing the control of all air elements in a tactical air force, a principle which ensured a capability to bring a maximum air striking force to bear when and where required. General Weyland additionally demonstrated that such allocations of air units to ground units had already been tested and found disastrous in American operations in North Africa during World War II. "Phase III of the proposed experiment," Weyland informed CINCFE, "is considered a regression which is contrary to established doctrine."<sup>80</sup>

In view of the Air Force objections to some of the phases of the proposed operational experiment, CINCFE on 16 October directed that General Weyland, in conjunction and in agreement with General Van Fleet, would recommend by 1 November a series of practical experiments which would provide ground and air personnel with the experience they required to conduct air support in

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a manner prescribed in current doctrine. As has been noted, CINCFE at this time ordered that the training phase of his proposed experiment would be implemented at once. FEAF promptly instructed the Fifth Air Force to hold discussions with the Eighth Army and to recommend experiments which would meet the CINCFE objectives.<sup>81</sup>

By 27 October, Fifth Air Force and Eighth Army representatives worked out a modified air-ground operations experiment, and they presented their proposed program on that day for review by higher authority. As a preliminary phase of the new experiment a joint travelling indoctrination team would make three presentations in each corps, first at corps headquarters, then at a division headquarters, and finally at a regimental headquarters. Following this indoctrination, three experiments would be conducted, all on a much more modest order than those originally planned in the CINCFE paper. In the first experiment, approximately 24 fighter-bomber aircraft would be committed to each corps in turn. Targets for a massed close-support strike would be selected by the corps, and when this was done the air commander of the committed unit would visit the corps and be briefed on the proposed targets. After such personnel as the corps commander desired to witness the strike were in place, the corps would call for the strike and it would be conducted. In the second experiment, approximately eight fighter-bombers would be committed to each corps in turn. These aircraft would be held on a strip alert, without benefit of prebriefing, and they would be scrambled by the JOC on request from the corps, again after personnel who would witness the strike were in place. The pilots would be given their targets while airborne and after reaching the corps or division control. In the third experiment, four fighter-bombers would be placed on an air alert and allocated to each corps. Targets would again be selected by the corps or some subordinate unit, and the targets would be called out to the fighter-bomber commander while the planes were airborne.<sup>82</sup> CINCFE approved this proposed joint Fifth Air Force-Eighth Army air-ground operations experiment on 24 November, and at that time he directed that reports containing evaluations, comments, and recommendations would be submitted to him upon the completion of the experiment.<sup>83</sup>

Beginning on 26 December 1952 and concluding

on 14 February 1953, the Fifth Air Force conducted the planned operational experiments with each U. S. infantry division in Korea, following this schedule:

Date	Corps	Division	Wing
26 December	X	40th	8th FBW
8 January	IX	25th	8th FBW
25 January	I	7th	58th FBW
7 February	IX	3d	58th FBW
7 February	X	45th	8th FBW
14 February	I	2d	474th FBW

In the course of each of these exercises there were three phases of effort: a planning phase, a briefing phase, and a mission phase. The planning phase included the planning for target selection, ground action, artillery participation, selection of observation posts, display of ground panels, communications and control facilities (to include both TACP's and Mosquitoes), scheduling of participating fighter-bomber units, selection of proper ordnance, and designation of the persons who were to observe the missions. The briefing phase was conducted primarily for key air personnel at the division two days prior to the mission phase. Attending the briefings were the fighter-bomber group commander, the group operations officer, mission leaders, Mosquito pilots, forward air controllers, air liaison officers, and a representative of the combat operations section of the JOC. Commanders and key staff officers from the division, corps, and from Eighth Army also attended these briefings, whose subject matter included the friendly and enemy situation, the plan of ground action, description and location of air targets, plans for artillery flak suppression and target marking, proposed timing of air strike, recognition signals, and ground marking panels. Preparatory to the prebriefed air mission, the mission leaders were given annotated photographs and maps for study, and the leaders of these missions were shown their targets either from ground observation posts or from aloft in liaison-type aircraft. The mission phase consisted of the deployment of the controller equipment, deployment of observers, the controlling of the strike aircraft, and the execution of the individual strikes.

The various type missions were conducted much as had been planned. The preplanned 24-aircraft

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missions attacked their targets at scheduled times with a planned ordnance loading selected for the particular target. Prior to these missions, all aircrews had been thoroughly briefed and had made a detailed study of annotated maps and photographs. In view of the detailed prebriefing, most of these strikes had less difficulty in identifying their targets and in prosecuting an attack against them, but it was nonetheless difficult to orbit a large formation of aircraft on a close-support target and still retain the close formation which was needed for attacking the target, this within an acceptably short period of time. Most of the fighter-bomber wing critiques also pointed out that pilots could hardly expect to get such elaborate prebriefings at a time of fluid ground operations. The 8-aircraft strip alert missions were conducted by crews who were put on an alert during a specific period of time. These crews received a general briefing but they were not informed of the description or exact location of their targets. At the time desired, the division initiated a request for an immediate air strike through army request channels. The JOC processed this request and scrambled the aircraft, and in this interval the target information was passed from the division to the Mosquito controller or TACP who was to control the strike. When the fighter-bombers arrived they were controlled to their targets by the Mosquito or TACP, and a final post-strike visual reconnaissance was made of the target by a Mosquito. In the 4-aircraft air alert mission, the fighter-bomber strike force was placed on an air alert over a corps area at a specific time, again without foreknowledge of the target to be attacked. At its arrival over the corps, this flight was advised to stand by for a call from a division controller. The Mosquito controller was then given the target, and he made a prestrike reconnaissance. When the division desired the strike, the Forward Air Controller (FAC) contacted the fighter-bomber flight and directed it to the target area. The fighter-bombers then rendezvoused with the Mosquito and the attack was coordinated, controlled, and assessed in the same manner as the strip alert mission.<sup>54</sup>

These air-ground operations experiments produced next to nothing of any value looking toward an improvement of the existing air-ground operations system. The planning phase had been normal everyday routine work for air personnel,

and while the briefing phase had been handled in an exemplary manner in all divisions the air officers believed that such elaborate, frontline briefings were not actually required in order to conduct a satisfactory mission. Nothing new was developed in the strip alert and air alert missions. The Fifth Air Force had hoped to get some positive results with the novel 24-aircraft massed close-support attacks, which could be reasonably expected to be effective and highly demoralizing to the enemy. The maximum effectiveness of such attacks, however, depended in getting all aircraft on and off the target in the shortest period of time: if an air attack took longer than three minutes it obtained little shock effect, and, if a ground attack was planned to follow such an air strike, no time could be wasted. The conclusion was that fighter-bomber units would have further to refine their tactics and formations in order to reduce their time on target. In all types of missions it was brought to the attention of observing ground personnel that near misses in mountainous terrain did little or no damage to pinpoint targets. It was again made evident that fighter-bomber attacks could be controlled much more effectively in such terrain by Mosquito controllers than by a forward air controller on the ground.<sup>55</sup>

During the course of the experiments several air officers had occasion to comment on the inadvisability of such an endeavor which exposed personnel to an unnecessary risk of life.<sup>56</sup> One of these experiments—the so-called operations SMACK—drew adverse comment in American newspapers and was the subject of a congressional investigation. Operation SMACK was the air-ground operations experiment conducted by the 7th Infantry Division, with the support of the 58th Fighter-Bomber Wing, on 25 January 1953. To add reality to the exercise, the division commander decided to conduct a daylight raid on "T-bone" hill with the objective of capturing prisoners, and, as customary in maneuvers, the 7th Division issued a stiff-backed, mimeographed operations order and time schedule, which it labeled a "scenario." In the attack, two infantry platoons were supposed to jump off in coordination with tank artillery fire and air strikes, but because of such factors as the slowness of the infantry in launching the attack, failure of the platoons to close vigorously with the enemy, loss of the shock effect of the air strike, and inability to secure prisoners the operation was

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not considered successful. Friendly losses were 3 men killed and 61 wounded. The Department of Army explained the circumstances of operation SMACK to a congressional committee, but the operation nevertheless precipitated a violent reaction in the American press, which unfairly emphasized stories that American lives had been lost in a needless demonstration viewed by high-ranking officers.<sup>87</sup>

Despite the adverse publicity of operation SMACK and the fact that the air-ground operations experiment had produced nothing of value looking toward an improvement of the existing air-ground operations system, Generals Barcus and Taylor determined that the interest engendered by the demonstrations had been worthwhile. An added interest had been created in the subject of air-ground operations, and the personal contacts developed between air and army personnel were valuable. They therefore decided that at least once in each four months each U. S. infantry division would conduct a joint air-ground operation to include formal planning conferences and briefings of interested air and ground officers. The air effort required for such training, however, was to come from the normal JOC-alert commitments.<sup>88</sup> The Barcus-Taylor report of the joint

operations experiment was apparently never formally approved by General Clark, but his successor as CINCFE, General John E. Hull, on 20 October 1953 approved this report, which had been tendered by Generals Barcus and Taylor on 16 March 1953. At this time General Hull observed: "It is worthy of note that the Air-Ground Operations Experiment in Korea proved of considerable value in reaffirming the basic principles set forth in established doctrine." He further noted that a "demonstrated improvement in operation efficiency [had been] accomplished by the thorough orientation of air and ground commanders and staffs."<sup>89</sup> \*

Although much discussed over a long period of time, the CINCFE air-ground operations experiment was productive of little more than training values, but the attention which these tests focused upon the air-ground operations system gave rise to a smoother functioning of the close-support system. General Barcus went on record with the statement that: "Advancements of marked significance for future warfare were made in the theory and practical use of aircraft for close support of ground troops."<sup>90</sup> How the air-ground operations system was developed in the last year of the Korean hostilities will be seen below.

#### DEVELOPMENTS IN THE JOINT AIR-GROUND OPERATIONS SYSTEM

**Expansion of the Joint Operations Center:** Parallel levels of command for air and ground forces within a theater of operations require a coordination of effort which is achieved at the army-tactical air force level through the agency of the joint operations center (JOC). Such a JOC is composed of army personnel who form the air-ground operations section and air personnel who form the combat operations section. The primary function of the JOC is to unify the efforts of air and ground forces, while major sub-functions include the exchange of battle information and the direction of day-to-day operations. The JOC is thus the hub or center of air effort, into which flows information, intelligence, and air requests, and most tactical air activity is a result of decisions reached and directives issued in that agency.

In its organization and functioning the JOC established in Korea generally followed the doctrinal dictates of the *Joint Training Directive for Air-Ground Operations*, but in the Korean theater

special modifications had to be made in recognition of the presence of Marine and Navy air units whose employment had not been contemplated in the doctrinal lessons of World War II.

The 1st Marine Air Wing operating in Korea, after a few months of semi-autonomous activity in the autumn of 1950, was very effectively and smoothly integrated into Korean air activities, but certain procedures were nevertheless adopted in recognition of the fact that the Marine wing was a balanced task organization, capable of independent operations, and would desirably maintain its integrity and capabilities for independent air task force actions. Although this wing was under the coordination control of the Fifth Air Force, wherever possible the Fifth exercised its

\*General Hull desired that air-ground tests should be continued "for the purpose of further exploring the broader utilization of artillery forward observers and air observers and air observation posts, as well as the improvement of artillery methods of shifting fires for target identification and flak suppression." See p. 215.



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control over subordinate Marine wing units through the commander of the wing. Only in one circumstance did Fifth Air Force officers deal directly with Marine air units: because these Marine wing units were split between two widely separated bases in South Korea, the JOC scrambled Marine strip alert flights to execute immediate close-support missions without going through the wing commander. Preplanned Marine air missions, however, were handled as follows: each morning the 1st Marine Air Wing forwarded a daily wing intention schedule to its liaison officer at Fifth Air Force headquarters, and later in the day the Marine liaison officer presented these intentions at the daily Fifth Air Force planning conference. At this time the Marine wing intentions were approved or altered as necessary to conform to the over-all tactical air plan, and the resultant decisions were published as a Marine annex to the tactical air force daily operations order.<sup>91</sup>

Navy air operations were not satisfactorily integrated with those of the Fifth Air Force in the Korea JOC until the last few weeks of the Korean hostilities. In August 1950, after some initial confusion, a Navy liaison group had been established at the Fifth Air Force, its duties being to coordinate the effort of naval forces with that of the Fifth Air Force in support of the Eighth Army. The primary mission of this naval liaison group was to provide methods for the rapid interchange of information and the processing of various requests for desired naval air actions. The liaison group, for example, kept the Fifth Air Force and naval forces afloat conversant with each other's planned operations and passed these activities' requests upon each other for air-sea rescue, target and rescue cover, reconnaissance, and other forms of support. With the Army G-2 Air and G-3 Air, the naval liaison group coordinated close and general support strikes which were to be made by naval aircraft and exchanged target information, photo interpretation reports, and general intelligence. While this liaison with Task Force 77 was said to have permitted the JOC to "cope with situations as they arose,"<sup>92</sup> the senior naval liaison officer did little more than to pass information and requests from the Fifth Air Force or Eighth Army, and he had no authority to commit the fleet to a desired action. The Fifth Air Force was frequently hard pressed to make up supporting air

strikes which were accepted and then suddenly cancelled by Task Force 77, and the JOC seldom received on the results of naval air strikes the kind of detailed reports which it needed to be conversant with the tactical air situation. The continuous wave (CW) radio communications between Task Force 77 and the JOC were frequently uncertain and, at best, unable to handle more than one-tenth of the volume of traffic that was needed.<sup>93</sup>

During the first two years of Korean hostilities, Seventh Fleet reluctance to participate wholeheartedly in the work of the JOC most likely stemmed from an expressed feeling that it had to hold itself constantly ready to execute its primary missions and that "diversions such as supporting the air forces or Army effort must be subordinated to a category of 'as feasible.'"<sup>94</sup> When supporting ground forces in the early months of Korean hostilities, Task Force 77 had displayed an inclination to work directly with the Eighth Army rather than to participate in the JOC.<sup>95</sup> To some extent this tendency to bypass the combat operations section of the JOC continued until a reformation in late June 1953. The Eighth Army G-2 Air Target Branch, in coordination with G-3 Air in the JOC, for example, submitted general support of Cherokee targets directly to the Navy, without any consultation with the Fifth Air Force. "Coordination of target selection between the Army, Navy, and the Air Force," stated the final joint air-ground operations report for the Korean hostilities, "was not satisfactorily achieved prior to the integration of Navy air operations in the JOC and the daily planning conferences toward the end of hostilities in Korea."<sup>96</sup>

Late in June 1953 the commanders of the Fifth Air Force and the Seventh Fleet determined that the air combat operations of both services had to be integrated in order to inflict maximum damage upon the enemy with greater efficiency and economy of force. At this time the Seventh Fleet accordingly granted the JOC a positive control of close-air-support assignments and of Cherokee target selection. To effect this change of policy, the fleet established a naval member of the JOC (NMJ) whose stipulated duties were analogous to those of the director of operations of the Fifth Air Force. The NMJ was specifically charged with the selection of targets for naval aircraft in support of the Eighth Army, and he was further

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charged to institute such naval air operations as were necessary to insure an effective combat coordination of naval air with the operations of the Fifth Air Force. The NMJ mainly discharged his responsibilities for target selection and assignment in concert with the representatives of the other services at the JOC daily operations planning conference, held each day at 1300 hours. Here targets were allocated, missions laid out, and numbers of aircraft committed. The commander of Task Force 77 provided the NMJ with his operations intentions each day, 24 hours in advance, and the NMJ notified the task force commander daily, 12 hours in advance, of the assignment of aircraft to immediate and preplanned missions in the enemy forward areas. He further provided the task force commander with information concerning fleeting targets as they were located. The NMJ was assigned the additional duty as senior naval liaison officer with the Fifth Air Force, and, as such, he operated a naval air operations center which maintained current information concerning the movements of fleet naval aircraft, the location of naval surface units, and functioned as a local fleet message center.<sup>97</sup>

The action whereby the Navy liaison section became an integral part of the JOC was hailed by FEAF as "the final step in creating the centralized control so necessary to successful tactical air operations," but FEAF also observed that "it came too late to have any real effect on the course of the war."<sup>98</sup> The final joint report on air-ground operations in Korea, prepared by representative Army, Air Force, Marine, and Navy officers, recommended that on appropriate occasions in future conflicts there would be a definite requirement for "the integration of all services in a manner similar to that accomplished in the last month of the Korean War." This board also recommended the establishment of an approved and official joint doctrine for air-ground operations which would facilitate the training, organizing, and equipping of all three of the military services.<sup>99</sup>

In the last month of Korean hostilities, when the Navy had agreed to participate integrally in the work of the JOC, belated efforts were made to establish adequate communications between the JOC and Task Force 77. During most of 1950 the JOC had possessed no direct communications with the naval task force, but late in that year,

when Task Force 77 had agreed to get into communication with the JOC, efforts had been made to arrange a radio teletype circuit between the Fifth Air Force and the fleet. Navy representatives, however, had discounted the practicability of a radio teletype circuit, and, as a result, a manual continuous wave (CW) radio circuit had been established between Task Force 77 and the Fifth Air Force in January 1951. The JOC also had voice communications channels with the Seventh Fleet and Task Force 77 through the JOC liaison net. In July 1952, however, the senior naval liaison officer at Fifth Air Force had stated that communications between himself and the forces afloat were "severely handicapped." The air administrative net was incapable of meeting traffic demands, and communicating delays and signal lapses occurred frequently in both the CW and the voice nets.<sup>100</sup> If these communications channels were insufficient for the functioning of a naval liaison officer, they were clearly inadequate for the work of the NMJ, and thus, effective 12 July 1953, an AN/GRC-26 radioteletype circuit with on-line cryptographic facilities was opened between the Fifth Air Force and Task Force 77. Early tests on this circuit were not satisfactory, but by the end of the month, after antenna installations and frequencies had been changed, the circuit was judged to be reliable for approximately 70 percent of a 24-hour period. In August, depending on propagation conditions, the circuit was reliable for approximately 18 to 20 hours each day.<sup>101</sup> At a special meeting on 15 September 1953, Fifth Air Force and Navy communications officers outlined the communications requirements between naval and tactical air force units in combat air support of land campaigns. They established the need for one duplex radio teletype circuit between the JOC and the naval task force, which would be expected to be reliable from 12 to 18 hours each day. In addition to this radio teletype circuit, which would handle the bulk of traffic when it was operational, one manual CW circuit was needed as a back-up facility. For the broadcast of general information and operational traffic to naval units, one high frequency CW broadcast circuit, operating simultaneously on three frequencies, was needed. Finally, one high frequency voice radar reporting circuit was required in order to relay radar information between units of the tactical air force and the naval

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task force. The radio teletype, CW broadcast, and manual CW circuits would need to have a capability for reaching any naval unit operating within a 1,000 mile radius from the JOC. Such communications facilities, which far exceeded anything available during the fighting in Korea, were judged to be "essential to insure satisfactory communications" between air force and naval units.<sup>102</sup>

**The Tactical Air Operations System:** The tactical air operations system employed by the Fifth Air Force provided the tactical air commander with the organization and equipment required by him to plan, direct, and control air operations. The highest echelon in this system was the combat operations section of the JOC which was an integral part of Fifth Air Force headquarters and operated under the direct supervision of its director of operations. The 5th Communications Group provided the "hot lines" and other communications channels through which the JOC possessed immediate communications with all tactical air wings assigned or attached to the Fifth Air Force.

The 502d Tactical Control Group provided the necessary in-flight control of aircraft utilized in the tactical air effort and furnished radar surveillance of the Fifth Air Force area of responsibility. The group's 605th Tactical Control Squadron operated the Tactical Air Control Center (TACC),\* which was physically adjacent to the JOC in Seoul, while the group's 606th, 607th, and 608th Aircraft Control and Warning Squadrons operated Tactical Air Direction Centers (TADC's) at Kimpo, Cho-do, Kuska-bong, and Kangnung. The primary function of these TADC's was aircraft control and warning within their areas of operational control. Assigned to each of these AC&W squadrons was one detachment which operated either MSQ-1 or MPQ-2 bombing director radars, and one of these Tactical Air Direction Posts (TADP's) supported each of the American corps in Korea. A Marine TADP

\*Although certain changes in joint air-ground operations terminology were made in the U. S. armed services during the course of the Korean hostilities, these changes were not effected in Korea until 30 August 1954. The following changes in terminology took place at that time: the tactical air control center (TACC) became the air control center (ACC); the tactical air direction center (TADC) became the control and reporting center (CRC); the tactical air direction post (TADP) became the target director post (TDP); and the tactical air control party (TACP) became the air control team (ACT).

was customarily employed in support of the 1st Marine Division.†

The most forward elements of the tactical air operations system were the Tactical Air Control Parties (TACP's) and the Tactical Air Coordinator, or Mosquito functions. When the fighting had begun in Korea the Fifth Air Force had expected to provide the visual control of supporting air strikes through the agency of the Forward Air Controller (FAC) in the TACP, and it had expected that the FAC would operate from some visual vantage point on the ground, as had been the case in World War II. Korea, however, was so mountainous that a controller on the ground was frequently unable to find a suitable observation post for directing air strikes, and in July 1950 the Fifth Air Force had begun to send out airborne tactical air coordinators in T-6 trainer aircraft, which were popularly designated as "Mosquito" control planes. To handle both the TACP and the Tactical Air Coordinator functions, the Fifth Air Force on 25 April 1951 had established the 6147th Tactical Control Group (Provisional) which included the 6148th and 6149th Tactical Control Squadrons (Air) and the 6150th Tactical Control Squadron (Ground). The first two squadrons handled the Mosquito controller function; the last squadron provided the TACP's. On 20 June 1953 the 6150th Squadron was discontinued and replaced by the regularly constituted 942d Forward Air Control Squadron.<sup>103</sup>

The Fifth Air Force also provided an Air Liaison Officer (ALO) for each corps and division headquarters. These ALO's were experienced pilots, and their principal duties required them to serve as the direct representative of the Fifth Air Force commander at their places of assignments and to advise the local ground commanders and their staffs as to air operational procedures and the capabilities and limitations of air power. In Korea these ALO's were also required to exercise operational control over the TACP's which assisted the ground units wherein the ALO's served. This anomalous and time-consuming additional duty was changed effective 20 September 1952, at which time the 6147th Tactical Control Group designated a Flight Commander Forward Air Controller for each of the three American and

†See p. 222.

two Korean corps in the battle line. These flight commanders relieved the ALO's of logistic and administrative responsibilities for the TACP's, thereby permitting the ALO's to serve in their doctrinal capacity as air advisors to corps and division ground commanders.<sup>104</sup>

Most of the general air support communications facilities in Korea were provided by the 502d Tactical Control Group. Radio, principally very high frequency/frequency modulation (VHF/FM), proved to be the most satisfactory means of transmitting the tremendous volume of messages involved in the air support function, and approximately 95 percent of the traffic load was handled by means of various types of radio equipment. The number of circuits and the terminating points employed within the 502d Tactical Control Group approximated those for any typical tactical control group. The somewhat unusual employment of TACP's and tactical air coordinators in Korea, plus the mountainous terrain which interfered with VHF radio transmissions and receptions, nevertheless demanded communications which were adapted to the local situation. Between Fifth Air Force and the JOC and the 6147th Group base at Chunchon were one teletype circuit and one telephone circuit, both provided by the Eighth Army through its local switching central in Chunchon. The telephone and teletype circuits were backed up by a high frequency voice radio net in which the TACP's attached to corps and divisions were included.<sup>105</sup> Because of frequent outages and overloadings of normal communications channels, however, an additional radio network was provided for handling immediate operational messages between a FAC or tactical air coordinator and the JOC: during all daylight hours, the 6147th Group kept a radio relay C-47 on station approximately 20 miles behind the front lines, which immediately forwarded transmissions from an airborne coordinator, or FAC, or a fighter-bomber flight directly into the TACC in Seoul. Forward air and ground units were required to report vital flight and strike information through this radio relay team, and the JOC also depended on it for relaying its orders or information to units at the scene of action.<sup>106</sup> This VHF channel served well to expedite communications between the front lines and the JOC, but it was realized that the C-47 relay aircraft would have been very vulnerable to enemy air

attack.<sup>107</sup> Air liaison officers normally used common user communications facilities at regimental, division, and corps levels. In emergencies and instances of inoperative circuits, they possessed high frequency radios for communicating with the TACC and with adjacent ALO's.<sup>108</sup>

**The Air-Ground Operations System:** By doctrine the air-ground operations system comprises army personnel with necessary equipment for participating in air-ground operations at all echelons of army command and at the airfields of tactical air units. The highest echelon in this system was the Air-Ground Operations Section of the JOC, which was staffed by a G-2 Air and a G-3 Air, who, together with their Air Force counterparts, comprised the Operations and Intelligence Branches of the JOC.\* The principal task of the air-ground operations section in the Korea JOC was to present Eighth Army requirements for offensive and reconnaissance air support. This section also supervised the activities of the Ground Liaison Officers (GLO's), one of whom was attached to each tactical air group in Korea.<sup>109</sup> These GLO's assisted in briefing pilots prior to their departure on missions and interrogated them on points of interest to the ground forces on their return from missions; they kept army personnel in the JOC informed of information obtained from returning pilots.

The personnel and functions of the field agencies of the air-ground operations system generally conformed to doctrine. In infantry battalions and regiments an Assistant S-3 (Operations) officer served additionally as S-3 Air. The corps and divisions, however, had primary duty G-2 Air and G-3 Air officers, and the place of duty of these officers was normally in division and corps Fire Support Coordination Centers (FSCC's). To request an immediate air strike, the battalion S-3 normally dispatched a message over organic communications to the division G-3 Air, who consolidated these battalion requests and forwarded them over the air request net directly to the JOC. At the corps FSCC, the corps G-3 Air monitored all immediate air strike requests, indicating his approval by maintaining silence. Preplanned air strike requests went up from battalion, through regiment, through division, and through corps,

\*See Chap. VII, pp. 253-54 for a discussion of the establishment of a reconnaissance branch in the JOC.

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being evaluated and consolidated at each echelon before arriving at the JOC.

The status of Eighth Army communications and the static nature of the Korean fighting had their peculiar effects upon air support request procedures. The *Joint Training Directive for Air-Ground Operations* contemplated that the division G-3 Air, the regimental S-3 Air, and the battalion S-3 Air officers would be provided "special radio equipment" for the transmission of air support requests within the division. As early as March 1951 a joint Eighth Army-Fifth Air Force air-ground operations board had recommended "that a separate air request net be established to handle air requests between the front lines and the division FSCC and that the use of the VHF Tactical Air Direction Net between the Regimental TACP, Mosquito, the Division TACP, Mosquito Mellow [the radio-relay C-47], and the JOC be used only as an emergency measure." The Eighth Army had cautioned its subordinates that the tactical air direction (TAD) net could be used only for emergency requests of air strikes. Apparently a few division tactical air request (TAR) nets of the type contemplated by doctrine had been set up, but it was said that their operation was made frequently uncertain by local Chinese voice jamming and by terrain obstacles.<sup>110</sup> Shortly after the air-ground operations board recommended that the division tactical air request nets should be established, the Eighth Army wired itself in for a period of static ground operations coincident with the truce talks, and it was apparently decided that these regular wire communications could be used for requesting close-support missions. These wire communications were frequently overloaded with administrative traffic, with the result that battalion S-3 officers not infrequently met delays when they attempted to call for an immediate air strike. In compliance with step 8 of the CINCFE program for the improvement of air-ground operations, several divisional tactical air request radio nets were established with locally available SCR-193 and AN/GRC-9 radio sets. It was decided, however, that quantities of organic equipment and personnel were insufficient to permit the operations of these division air request nets. Most units, moreover, believed that separate TAR nets within the division were unnecessary, since existing wire and radio communications could be used for the purpose.<sup>111</sup>

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The Eighth Army air-ground request net, which passed requests for air strikes from divisions, through corps, to the Eighth Army communications center in Seoul, utilized radioteletype sets AN/GRC-26, which, in the case of the lower echelons, were physically located in the division and corps FSCC's. The necessity for encoding and decoding the messages transmitted over this AN/GRC-26 net necessarily slowed the passing of immediate air requests, but in a remedial action demanded by the CINCFE program this difficulty was somewhat mitigated in the winter of 1952-1953 by a supplemental installation of Signin equipment.<sup>112</sup> Another defect in this air-ground request net was not so easily overcome: the Eighth Army communications center was located approximately five miles from the JOC, and into this center came requests from the various division and corps FSCC's, each on a separate teletype machine, and these requests had to be transmitted from the communications center to the JOC on one machine. This bottleneck greatly slowed traffic and raised a further problem of transmission priorities among the various corps requests.<sup>113</sup> The Eighth Army air-ground request net should have been backed up by direct voice communications, including a direct telephone circuit between the JOC and the several corps FSCC's.<sup>114</sup>

The inadequacy of Eighth Army air-ground request communications, stated the final Korean air-ground operations board, "produced a completely false and misleading system" for handling immediate air support requests. In order to equalize the traffic load on the G-3 air nets, ground units were required to submit requests for immediate strikes on a prescribed schedule starting at 0100 hours each morning. The result was that few of the targets submitted were legitimately "immediate" and most of them could have been better handled as preplanned targets. Such targets as caves, personnel and supply shelters, mortar and artillery positions, which might or might not have been occupied at the time, were considered acceptable as immediate targets. And while approximately one hour elapsed between the time a request for an air strike was submitted to the A-3 duty officer in the JOC and the time on target of the fighter-bombers, as much as 17 hours might have elapsed between the time that a battalion originated the request and the time that the target was actually attacked. Since the ground front was

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generally static these delays did not trouble ground units too greatly, and during times of genuine ground emergency, or when fleeting targets at the front needed attack, the FAC or the TAC in the forward area used his VHF control radio to call the target directly to the TACC, through the airborne Mosquito relay aircraft. In such event, the JOC diverted airborne planes to the attack. This procedure held two serious faults: it overloaded air control channels with air requests which should have been handled by army communications, and the channel of communications was potentially subject to interruption due to the vulnerability of the unarmed C-47 Mosquito relay aircraft.<sup>115</sup>

Beginning in June 1952, in recognition of the static ground front, the Eighth Army undertook to emphasize the more efficient preplanned close-air-support missions. The Eighth Army and its corps and divisions developed targets for this program, and a G-2 Air Target Branch was established in Eighth Army headquarters to provide a processing agency for the preplanned air targets. Each day G-2 Air Targets prepared an army priority list, which, together with annotated photos, was passed to the Air Force target division, where it was incorporated into the target recommendation sheet presented at the daily planning conference. Some of the initially adopted procedures and techniques proved detrimental and had to be corrected. At the beginning of the program, emphasis was put on quantity and not quality of targets, and the corps were allowed to submit an unrestricted number of targets for preplanned support missions. In December 1952, the procedure was changed, and the corps were allowed to submit only as many targets as the G-3 Air at the JOC authorized. As a result of this artificiality, targets submitted became more lucrative. At first, the corps were instructed to say whether they wanted a target to be attacked by day by fighter-bombers, or to be destroyed by a TADP-controlled attack, or to be harassed by a TADP-controlled attack, but it was recognized that the corps did not have personnel qualified to make these decisions, and in the last months of the war a new procedure was instituted whereby the corps submitted targets and the Fifth Air Force determined the method of attack and the ordnance to be employed against them. The rigidity of administrative procedure involved in this process, although acceptable in

view of the static ground front, made it less responsive to changes in the ground situation than was desirable: after target priorities had been assigned and an operations order had been drawn up it was difficult to reschedule these preplanned air missions to take cognizance of a rapidly changing tactical situation. There was some possibility, however, that these problems could have been met by a wider dissemination of target files and folders to attack and control units, thus providing them with alternate targets which would have permitted speedy changes in air plans.<sup>116</sup>

**Tactical Air Control Parties:** By doctrine, tactical air control parties (TACP's) are teams especially organized and equipped to control close-air-support strikes to their targets in the vicinity of forward ground elements. As constituted in Korea, these parties comprised a pilot who served as forward air controller (FAC), one radio operator, and one radio mechanic. Until October 1951, Fifth Air Force tactical wings had furnished pilots to serve as FAC's on 60-day detached service tours, but after this time the two Mosquito squadrons of the 6147th Tactical Control Group provided these controllers from their own resources. Under the new system, the FAC's usually flew a number of Mosquito missions before being assigned to an 80-day tour with a TACP, after which tour they returned to the Mosquito squadrons to complete a flight tour. Rotation of the airmen serving with TACP's depended upon the availability of personnel, but the 6147th generally sought to relieve them after 60 days in the field.<sup>117</sup>

Prior to the autumn of 1952 the Fifth Air Force, charged by doctrine to allocate TACP's on the basis of legitimate need, allotted one TACP to each U. S. corps, division, and regiment, one to each British division and brigade, one to the Turkish brigade, and one to each ROK corps and division.<sup>118</sup> Such an allocation to the units of the ROK army was admittedly inadequate, but in the earlier days of the Korean fighting the TACP's with ROK troops had not infrequently been deserted when these units retreated in disorder before enemy attacks. In October 1952, when ROK discipline had improved, a second TACP was assigned to each ROK division. In the autumn of 1952 the 6147th Group also trained three Korean TACP's and sent them out for on-the-job training in the field with the ROK I Corps. An effort was made to secure personnel for two additional

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ROKAF TACP's, but delay was met due to the requirement for a speaking knowledge of English and a general disinclination of ROKAF pilots to serve as FAC's. The total number of TACP's in the field at one time varied with the commitment of ground units in the Eighth Army line, and in the last year of the war the number of these parties actively engaged averaged between 48 and 60.<sup>119</sup>

The generally mountainous terrain of the Korean battleground and the characteristics of the communications equipment available to the TACP's in good part determined their tactical employment. Despite some little experimentation with other type vehicles, the jeep had remained best fitted to transport the TACP radio equipment. During the several years of the Korean fighting, however, the modifications of these radio jeeps progressed from the Mark I with 4 channels of VHF communications, to the Mark II with 10 VHF channels, to the Mark III and the Mark IV with 16 VHF channels, and the later models of these jeeps had a remote control system which theoretically allowed a FAC to control air strikes from observation posts on the front slopes of hills while his jeep was parked in the shelter of a rear slope.<sup>120</sup> In actual practice, however, the TACP jeep was at no time a satisfactory vehicle for front-line radio control work in Korea: it was rough on fragile electrical equipment, frequently out of order for mechanical reasons, and at once too small for the paraphernalia of a control party and too large to approach forward observation posts in rugged terrain. What the FAC's actually required for controlling air strikes from forward observation posts was a portable VHF set which had a minimum of 10 channels of communications. Completely cognizant of the need for such a portable radio, the 6147th Group obtained AN/TRC-7 radio sets in July 1951, but these portable sets were found to be totally inadequate: they had only two VHF channels, which had to be preset and pretuned at some rear echelon of maintenance. One of these channels had of necessity to be set on the reporting-in-and-out (RIO) frequency which was common to all fighter-bomber wings, and this left only one channel on which a fighter-bomber strike could be worked. In April 1951 the Fifth Air Force requisitioned enough MAW-8 VHF portable radios to equip all TACP's, but these Marine sets were found to require crystals which were not available for the frequencies used by

Fifth Air Force aircraft. Although operational requirements were stated for the needed portable VHF radio, the Fifth Air Force did not obtain suitably modified MAW-1, 10-channel sets, until April 1953, and these sets were not put into field use until July 1953 because of an additional delay met in securing crystals for them. Reports from the TACP's in July 1953, moreover, indicated that the MAW-1 sets were not as desirable as expected because of troubles arising from power sources and inferior crystals.<sup>121</sup>

Since their radio equipment did not permit them to work at frontline observation posts, the TACP's were commonly located at the fire support coordination center (FSCC) of the ground unit to which they were attached. The corps TACP was stationed at the corps artillery FSCC, where it could work with the G-3 Air and the G-2 Air. The division TACP was stationed at the division artillery FSCC, and the regimental TACP was normally stationed at the regimental command post, which was usually near the regimental fire control center. At these fire direction centers, the FAC could use the ground communications lines to forward army units and to the forward artillery observation posts, and from such a point of vantage the FAC could arrange for artillery cooperation, including flak suppression and the marking of close-support targets with smoke shells. When supporting air strikes came in, these several TACP's handled them in the following manner: the TACP at the corps FSCC funneled the fighter-bombers to the appropriate division for further instructions; the TACP at the division FSCC determined whether the air strike could be controlled by a regimental TACP or by a Mosquito. If the strike was to be controlled by a Mosquito, the division TACP gave this airborne controller all the pertinent information he needed; if the regimental TACP was to control the strike from a ground observation post (in this case the regimental TACP would have left the regimental command post and have gone forward to work with a battalion) the division TACP directed the fighter-bombers to the proper regimental area. When a critical ground situation necessitated it, either the corps or division TACP, acting as instructed by the local ground commander, could divert supporting flights to the highest priority targets in its sectors. If the strike was to be controlled by a Mosquito, the regimental TACP arranged

an artillery marking round and flak suppression and then monitored the mission. In this case, the TACP would have previously furnished the airborne Mosquito controller with information as to the exact target location and its description, the exact location of the nearest friendly forces to the target, and other necessary flight information. If the strike was to be controlled by the regimental TACP, this party usually went forward to a battalion, arranged for artillery marking rounds and flak suppression, and then visually guided the planes to their targets. The TACP also directed all visual reconnaissance of specified areas within the bomb line, such reconnaissance being made at the discretion of the Mosquito after having evaluated enemy defenses and flak hazards.<sup>122</sup>

Because of terrain and communicating problems, Mosquito tactical air coordinators actually directed the vast majority of strike aircraft to their close-support targets in Korea: during these hostilities some 93 percent of close-support missions were directed by Mosquito controllers whereas only 7 percent were directed by the FAC of a TACP. Many individual forward air controllers were said to have spent their entire three months tour with frontline units without visually controlling an air strike. On 12 March 1953 the Fifth Air Force stipulated that each FAC must control at least one close-support strike per month in order to maintain proficiency, and in the period of 1 April through 30 June 1953 the forward air controllers controlled a total of 149 close-support strikes, many of them against training-type targets.<sup>123</sup>

During the extensive European ground campaigns of World War II, the U. S. Army Air Force had allocated air-support parties only to corps and divisions, except for armored divisions in the Third Army which were given an air-support party for each more or less independently operating combat command, organizations which were approximately comparable in size to regiments. In World War II, the control party attached to a division had customarily remained at the division command post, a central location at which the position of frontline troops was generally known and from which communications were available to frontline infantry and artillery units. In such circumstance, the air controller could not visually direct close-support strikes, but he was able to notify the supporting artillery of

an approaching air mission and to get the artillery to mark the target with smoke. Statements from generals commanding ground units during World War II had indicated that no deficiency existed in such an allotment and employment of air control parties.<sup>124</sup> Having observed the 1st Marine Division, which in Korea had an allocation of one integral TACP for each battalion, the Eighth Army in the autumn of 1950 developed and thereafter tenaciously clung to the position that a TACP should be provided for each infantry and tank battalion in infantry, armored, and airborne divisions, and for each regiment and division of these types of forces. This meant that the Eighth Army wanted from 13 to 15 TACP's attached to each infantry division, instead of the 4 which the Fifth Air Force provided in Korea.<sup>125</sup> The Eighth Army also desired close-support strikes to be visually controlled by a battalion TACP located at a forward air observation post, and one of its evaluation reports said that the "weakest spot in the control system in Korea" was the frequent inability of forward air controllers to undertake visual control of air strikes.<sup>126</sup>

Although the Fifth Air Force rebutted each argument offered by the Eighth Army as to why it needed 13 to 15 TACP's per division,\* it was quite willing to enter any cross-servicing agreements which promised to improve the operational capability of control party equipment. The problem of maintaining TACP vehicles and signal equipment at a distance from other air force units was quite difficult: travelling 6147th Group maintenance teams visited the parties at the front as often as they were able, and, where possible, each TACP was accompanied in the field by a back-up radio jeep. Early in 1952 a team representing the U. S. Joint Tactical Air Support Board visited Korea and concluded that simplified maintenance of TACP signal and vehicular equipment would result if the Army furnished all such equipment and enlisted technicians to operate it. This board contemplated that the Air Force would continue to provide the forward air controller in each of the TACP's. Such a delineation of responsibility was acceptable to the Chiefs of Staff, U. S. Army and USAF, who on 2 July 1953 notified their subordinates of a realignment as follows: the U. S. Army would be responsible for furnishing, maintaining,

\*See AHS-72, pp. 202-205.



an artillery marking round and flak suppression and then monitored the mission. In this case, the TACP would have previously furnished the airborne Mosquito controller with information as to the exact target location and its description, the exact location of the nearest friendly forces to the target, and other necessary flight information. If the strike was to be controlled by the regimental TACP, this party usually went forward to a battalion, arranged for artillery marking rounds and flak suppression, and then visually guided the planes to their targets. The TACP also directed all visual reconnaissance of specified areas within the bomb line, such reconnaissance being made at the discretion of the Mosquito after having evaluated enemy defenses and flak hazards.<sup>122</sup>

Because of terrain and communicating problems, Mosquito tactical air coordinators actually directed the vast majority of strike aircraft to their close-support targets in Korea: during these hostilities some 93 percent of close-support missions were directed by Mosquito controllers whereas only 7 percent were directed by the FAC of a TACP. Many individual forward air controllers were said to have spent their entire three months tour with frontline units without visually controlling an air strike. On 12 March 1953 the Fifth Air Force stipulated that each FAC must control at least one close-support strike per month in order to maintain proficiency, and in the period of 1 April through 30 June 1953 the forward air controllers controlled a total of 149 close-support strikes, many of them against training-type targets.<sup>123</sup>

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\*See AHS-72, pp. 202-205.

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and commanding the equipment and personnel (less the forward air controller) of tactical air control parties. The communications equipment involved was to be compatible with and possess the same channel spacing as that used in aircraft. The USAF would be responsible for providing the forward air controllers, for directing aircraft through the forward air controllers, and for allocating the frequencies which would be employed in close-air-support communications. The effective date of this transfer of functions was established as 1 January 1954.<sup>127</sup>

This USAF concession which agreed that the Army would own and control all of the personnel and equipment of the TACP with the exception of the forward air controller was of extreme significance because of the TACP was one of the air facilities which was useful to an air commander in placing bombs on a target. This agreement, moreover, did not settle the problem as to how many TACP's would be assigned to an army division. This matter continued in dispute in Korea and when a joint board considered the record of close air support at the close of these hostilities it filed a split opinion on the matter.<sup>128</sup>

When the final Korean air-ground board report was written, Army, Navy, and Marine Corps representatives recommended that TACP's (with FAC's) should be provided for each infantry and tank battalion in infantry, armored, and airborne divisions, and for each regiment and division of those types of forces. Their reasoning was that the U. S. Army had to be organized, trained, and equipped for prompt and sustained combat operations on land. The Army's combat effectiveness, they said, depended on the state of training of its battalions, and the effectiveness of the battalion-team demanded that all elements of this team be integrated and trained together. These men urged that a forward air controller could be integrated into the functioning of a battalion only when he was continuously present in the battalion. "It is not believed that this training can be achieved to a satisfactory degree," they said, "with the forward air controller being assigned on other than a full time basis." The forward air controller, they stated, "must be a part of the battalion, and he must understand his importance to that battalion, in order to achieve for it the highest degree of effective close air support."

The Fifth Air Force representatives on this

joint board conceded that the Army might be warranted in maintaining TACP's, less forward air controllers, in such battalions as were in reserve: such a decision might be justified by a need for organizational integrity and in recognition of the problems which arose when delicate radio equipment had to be shifted from one location to another over rough roads. The assignment of forward air controllers to inactive units, or even to all battalions, however, presented an entirely different problem. The board had agreed that a forward air controller was most desirably a fighter-bomber pilot of flight leader capabilities. Given this qualification as a prerequisite, the Fifth Air Force representatives demonstrated the waste of highly skilled personnel that would result if Army demands were met. In Korea, for example, the Eighth Army was posing a requirement for the assignment of 364 forward air controllers, an unrealistic requirement when compared to the Fifth Air Force's total combat authorization for only 525 fighter-bomber pilots, of whom approximately 140 might be supposed to be qualified to lead flights and thus to serve as forward air controllers. These figures were even more revealing when it was considered that, in a normal situation, approximately one-third of the forward air controllers would be assigned to units in the reserve. The Fifth Air Force representatives therefore concluded that the Army requirement for TACP's was "unrealistic and has not been established on a realistic basis."

During the Korean hostilities a frequent ground criticism had been that forward air controllers were insufficiently versed in ground force tactics and served too short a tour to become properly indoctrinated in such tactics and techniques. Demurring to the truth of this charge, the Fifth Air Force had pointed out that the FAC was supposed to provide the experience and understanding of a combat pilot while his ground force counterpart—the S-3 Air officer—was supposed to provide the experience and understanding of a ground officer. The Fifth Air Force had nevertheless extended the tours of forward air controllers from 21 days, to 60 days, and then to 80 days, the latter length of temporary duty having been put into effect when the two Mosquito squadrons of the 6147th Group began to furnish the forward air controllers.<sup>129</sup> By requiring the 6147th Group to supply all forward air controllers, the Fifth Air Force

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had simplified the administration of this program, but, in good part, the pilots who had been assigned to the Mosquito squadrons and who had also served tours as forward air controllers had had very little experience in fighter-bomber work.\* Thus in August 1953 all representatives on the air-ground operations board admitted that the experience level of forward air controllers had not been of the desired fighter-bomber flight leader category. The board therefore recommended that in the future forward air controllers should be provided from fighter-bomber wings on a temporary duty basis. It further suggested that the Navy could legitimately furnish a proportionate share of forward air controllers, thus increasing the availability of such controllers and integrating personnel from all air services into the operational system.<sup>130</sup>

During the course of the CINCFE air-ground operations experiments and thereafter, the Fifth Air Force made continuing efforts to "make more efficient use of [artillery] forward observers and the fire support control center in close air support missions." An air SOP, implemented by Eighth Army instructions, required artillery observers to render assistance to fighter-bomber pilots over the joint scene of action frequency.<sup>131</sup> During the course of these experiments, no one had questioned the proposition that a forward air controller had to be an experienced pilot. On 20 October 1953, when he gave his approval to the report of the air-ground operations experiment, General Hull nevertheless desired that "additional tests be conducted in Korea . . . for the purpose of further exploring the broader utilization of artillery forward observers and air observers and air observation posts."<sup>132</sup> FEAF questioned whether this somewhat vague language meant that air strikes were to be controlled by artillery forward observers, and the FEC J-3 Staff indicated that such was indeed the intent of General Hull.<sup>133</sup> Since this proposal was not only in violation of doctrine but also contravened a long established policy that a forward air controller had to be an experienced pilot, FEAF informed the Fifth Air Force that any proposed test which required artillery observers to control air strikes needed FEAF's prior and explicit approval. "In any air-ground operation, either routine or special test," FEAF stated,

\*See p. 217.

"it is imperative that the controller, either ground or airborne, be a qualified fighter-bomber pilot."<sup>134</sup>

**Mosquito Tactical Air Coordinators:** Under the exceptional circumstance of friendly air superiority in Korea, the Mosquito tactical air coordinators gave yeoman service, and they were in fact the principal means of directing supporting fighter-bombers to their targets at the front lines. The origin and early functioning of the Mosquito squadrons has been told elsewhere,<sup>†</sup> and in the last year of the war the 6148th and 6149th Tactical Control Squadrons (Air) were authorized a total of 52 LT-6G aircraft, 78 pilots, and 26 Army observers for this airborne control function. In this last war year, pilots assigned to these two squadrons were fresh from the zone of interior and without prior experience in Fifth Air Force tactical air units. After an intensive five-day classroom course in the 6147th Tactical Control Group, the new pilots were checked out in an LT-6 and then returned to their Mosquito squadron where they flew a minimum of six tactical Mosquito missions with a combat tactical instructor pilot and eight more such missions with a senior Army observer. On his fifteenth mission, the trainee pilot was given a combat proficiency check ride by an instructor pilot, and if he completed this test the trainee pilot was assumed to be combat capable. After his 20th mission, the pilot was dispatched for an 80-day tour as a forward air controller, and after the completion of this temporary duty he returned to a Mosquito squadron, where he was rechecked, and then flew the remainder of his 100 combat missions. The aerial observers were supplied on temporary duty by Eighth Army combat units. These observers attended ground school with trainee pilots, flew six missions with a combat instructor pilot, eight missions with an experienced combat pilot, and received their combat capability checks during their fifteenth mission. Each observer was given combat capability rechecks every 20 missions during the remainder of his Mosquito tour.<sup>135</sup>

Early in the Korean war hostile air and antiaircraft artillery opposition had been slight and enemy troops had revealed a reluctance to fire at a Mosquito lest they give away their positions. In these months unarmed T-6 aircraft had roamed the front lines at treetop height and had pene-

†See AHS-71, pp. 25-26; AHS-72, pp. 191-195.

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trated far within enemy lines with relative impunity. During the truce talks, however, the enemy built up flak along its front lines and posed hazards to air operations in this sector. In context with the enemy's defenses in the last year of the war, the T-6 Mosquitoes were required to maintain a 6,000 foot altitude, except for such time as was needed to mark targets and assess the results of a fighter-bomber strike. They were not allowed to fly beyond a line drawn approximately two miles north of and parallel to the bomblines. In spite of these operational restrictions, the Mosquitoes continued to furnish valuable services. During daylight hours five Mosquitoes were regularly kept on station, one in front of each army corps. In fluid situations many more Mosquitoes went on station: on four or five occasions on 17 July 1953 up to 28 Mosquitoes were airborne at the same time. The first Mosquito took off 30 minutes prior to sunrise, and the last sortie for the day left a corps area when ground objects were no longer distinguishable because of darkness. Missions were normally two and one-half hours long, and the number of missions flown in any one day depended on the number of daylight hours. Upon arriving on station at a corps area, each Mosquito crew reported in to the TACP at the corps headquarters for a subsequent working assignment to a division TACP. Each Mosquito also made a visual reconnaissance of possible enemy targets along the front lines, either on its own volition or as requested by a division TACP. When directed to do so by the TACP with which it worked at the front, and such was usually the case, the Mosquito undertook the "seeing eye" direction and control of fighter-bomber close-air-support strikes.<sup>136</sup>

The methods which the Mosquito used in controlling the fighter-bombers and identifying their targets necessarily varied with weather, types of targets, terrain features, target location, and the type of the fighter-bomber. The first concern of the Mosquito was to locate the target and to make observations as to its nature, its position in relation to friendly elements, its position in relation to prominent landmarks, obstructions to its approaches, and other factors incidental to its destruction. After the Mosquito had located and confirmed the target and had so informed the TACP, he was ready to control a strike. His next problem was to make a rendezvous with the

fighter-bombers. Ordinarily a TACP coordinated this rendezvous: if the target was beyond the vision of the forward air controller, he normally instructed the fighter-bombers to proceed to a prominent landmark near the target. Before leaving the vicinity of the TACP the fighter pilot made radio contact with the Mosquito controller and informed him of the azimuth of approach. Ordinarily the fighter-bombers orbited at 15,000 to 18,000 feet higher altitude than the Mosquito, both while making rendezvous and when receiving special attack instructions. After the rendezvous was made, the Mosquito described the target in brief and concise terms. Communicating with an appropriate FSCC through the local TACP, the Mosquito gave the signal on which friendly artillery fired a smoke shell to the vicinity of the target. These artillery shells did not usually fall on the target itself (in such case there would be a prima facie case that an air strike was unnecessary) but they provided a visual reference through which further adjustment to the target could be made. If positive identification of the target could not be made by verbal description or smoke shell reference, the Mosquito carried 2.25-inch or 3.5-inch marking rockets (the latter was found to be superior<sup>137</sup>), and he was required to place several of these smoke rockets on the target in one single pass. Once again, the smoke rockets did not have to be put precisely on the target but only near enough to provide visual reference points. If the target was still not successfully marked, the Mosquito was permitted to make a pass on the target, accompanied in close proximity by the flight leader of the fighter-bombers, who fired his machineguns through the pass for flak suppression. When the target was positively identified by the striking force, the Mosquito observed the attack by the fighter-bombers, calling out aiming corrections in clock positions and distances for the benefit of the successively attacking planes. When the strike was completed, the Mosquito reconnoitered the target and made a post-strike damage assessment.<sup>138</sup>

In directing offensive fighter strikes under the conditions met in Korea, the Mosquito tactical air coordinator had a considerable advantage over a TACP. In a condition where most targets were on distant slopes of mountains or hills, a TACP could neither accurately direct close-support strikes nor assess their results. Although mobile,

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the TACP frequently could not keep abreast of ground movements, particularly in a fluid battle situation. During the enemy push in July 1953, for example, land communications were disrupted, and the Mosquitoes were the only forward control elements which could furnish fighter-bombers and the JOC with immediate and on the spot information about enemy and friendly positions. The orientation capabilities of TACP's were quite slow in comparison with fast moving and short range jet fighter-bombers: because of terrain obstacles, low clouds, and haze restrictions to visibility, a forward air controller on the ground was sometimes so slow in locating and identifying approaching fighters that these jet aircraft were forced to depart the scene of action without striking. Finally, the Mosquito had much less trouble with radio malfunctions than did the TACP, whose jeep movements over rough terrain damaged electrical equipment.<sup>139</sup>

The Mosquito control function, however, was not without its difficulties and deficiencies. The training aircraft used for the purpose, the conventional LT-6G trainer, afforded a very poor observer vantage point and it lacked the power and rate of climb needed fully to exploit the potentialities of air controlling work. Lacking such operational advantages as self-sealing fuel tanks, the T-6 was highly vulnerable to enemy ground fire. Realizing the deficiencies of the LT-6G aircraft, FEAF in May 1953 asked USAF for enough modern T-28 trainer aircraft to fill the Mosquito function, but this request could not be approved because of continued engine support difficulties met in the T-28 program.<sup>140</sup> The weaknesses of the T-6 as an airborne control plane were so evident in the limited war in Korea that it was quite apparent that this obsolete aircraft would be completely ineffective in such a function in future hostilities.

In all fairness to the Mosquito squadrons it must be emphasized that these organizations maintained a high standard of personnel morale which derived from a sound indoctrination regarding the importance of the airborne control function, but it must nevertheless be admitted that the quality of pilots assigned to the squadrons was not as high as the desired standard for a tactical air coordinator. Most pilots assigned to the 6147th Group had never flown a fighter aircraft, and more than three-fourths of them had never served in a tac-

tical air force unit. In the spring of 1953, moreover, some 35 pilots, who represented an overage in the Sabre wings, were assigned to the 6147th. Such circumstances as these led many new Mosquito assignee pilots to believe that they were being placed in a "catch all" organization. While, with few exceptions, the Mosquito pilots soon grasped the importance of their work, the fact remained that most of them did not have the requisite initial proficiency equal to that of a fighter-bomber flight leader; this a tactical air coordinator required for a satisfactory performance of his duty.<sup>141</sup> In other words, the average Fifth Air Force Mosquito controller did not have an experience background of at least 30 fighter-bomber combat missions (or 50 fighter-bomber tactical training missions) which he required in order to be able to direct other fighter-bomber pilots on a close support mission.<sup>142</sup> As for the observers who served as the second member of the Mosquito crew, the Eighth Army not infrequently sent men to the 6147th Group to serve as observers primarily because of some previous flying experience. Such officers did not necessarily possess that degree of knowledge about Army movements and weapons that was so vital to the Mosquito team.<sup>143</sup>

A serious tactical defect in the Mosquito control procedure was the fact that the enemy, observing a T-6 orbiting in their vicinity, immediately effected passive and active ground defense measures. Cognizant of this factor, as well as of the fact that a hovering aircraft could not expect to live against hostile enemy air opposition, but still faced with the proposition that a forward air controller on the ground could not direct strikes against a target which he could not see, the Fifth Air Force asked FEAF in May 1952 to look into the prospect of obtaining some kind of close-support radar equipment for use in Korea. It was known that USAF was developing a radar set AN/MPX-6 (or AN/GPX-16) which might be suitable for that purpose.<sup>144</sup> What the Fifth Air Force had in mind was a radar which would give the forward air controller a simultaneous visual reference both to the fighter-bombers and to the ground target. Col. James R. McNitt, Director of Communications of the Fifth Air Force, believed that this close control function might be accomplished by use of:<sup>145</sup>

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a small radar, preferably one which can be truck mounted and which has range of approximately 40 miles, altitude coverage to 12,000 feet, a very narrow beam for high azimuth definition and a high PRF [pulse recurrence frequency] for good range definition. By video insertion the ground picture could be put into the scope face. If this proved to be impractical a sufficient picture could be drawn on the face of the scope to provide the ground reference. The position of the attacking aircraft could be automatically shown thus providing the TACP controller with visual simultaneous reference to both fighter bomber and ground. Ground targets could be marked on the scope and the attacking aircraft guided with a certain degree of accuracy to the target. This guidance whenever possible would be range tracking for greater accuracy.

Pursuant to the FEAF request, USAF allocated five of the first AN/GPX-16 sets which were to come off production lines for field testing in Korea. Although the Fifth Air Force made all the necessary preparations to receive and test these new radars, the sets did not arrive in time to see service during the Korean hostilities.<sup>146</sup> Had this radar been obtained and successfully utilized, it would have eliminated the requirement for the vulnerable Mosquitoes and it would have undoubtedly speeded the accomplishment of a close-support strike.

In mid-1952, when the vulnerable Mosquitoes were forbidden to operate more than two miles beyond the bomblines, the Fifth Air Force had to devise some system for guiding fighter-bombers to targets beyond the safe operating limits of the Mosquito yet near enough to friendly troops as to demand positive target identification. Such a system was also required in order to attain the advantage of surprise and to negate the advantages of the enemy's growing flak defenses. As a result of these requirements, the "Pathfinder" method of target attack was introduced on 20 July 1952. For this type of mission—which was said to be somewhat on the order of a combination of a close-support mission and an interdiction mission—the general tactics of an interdiction mission applied, with the exception that a pathfinder element was dispatched 10 minutes ahead of the main effort. This pathfinder flight, made up of two aircraft flown by the most experienced pilots in a tactical wing, reconnoitered and pinpointed the target. Upon reaching the target area, the pathfinders located the target from as high an altitude as possible and from as great a distance

as possible, in order not to alert the enemy of the impending attack. At this time the pathfinders obtained a radar fix from a TADC, thus positively determining that there was no danger of an erroneous attack against friendly ground troops. Having established the objective, the pathfinder flight returned to a predetermined rendezvous point and intercepted the main fighter-bomber force. Assuming the lead in the fighter-bomber force, the pathfinder took the formation to the target, where the lead pathfinder peeled off and marked the target with his bombs. Ordinarily the number two man in the pathfinder flight stood by, and if the pathfinder leader missed the target with his bombs the number two man either verbally directed the remainder of the formation to the target with reference to the miss distance and direction of the first marking bombs, or else he went in himself and properly marked the target. After making his initial attack, the pathfinder leader returned to altitude, whence he corrected the bombing of successively attacking aircraft.<sup>147</sup> During the air-ground operations experiments in January 1953, the 8th Fighter-Bomber Wing got good results when it used a pathfinder to lead its 24-plane close-support strikes. After a mission on 17 January, this wing reported that the use of a pathfinder to identify the objective and to lead the main effort onto the target had been "highly effective," had speeded the mission, and had minimized the possibility of bombing friendly positions. This wing recommended that pathfinder aircraft should be used in all large close-air-support strikes, and that, in such an event, the Mosquito should stand by to monitor the attacks, to relay information to ground controllers, and to mark targets if requested to do so by the pathfinder.<sup>148</sup>

In Korea a general consensus of opinion acknowledged that Mosquito contribution to close air support was a major factor in the successful air-ground operations, but everyone who commented recognized the essential hazard of depending so heavily upon the Mosquito control system. General Van Fleet, in his criticism of close air support on 20 December 1951 suggested that an insufficient numerical assignment of TACP's to ground units had necessitated "undue reliance upon control by Mosquito aircraft, a practice that may prove unworkable against an enemy who can challenge our complete mastery of the air over the battlefield." In commenting on Van Fleet's sug-

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gestion, the Fifth Air Force agreed that the T-6 trainer, without armor or armament, had to be eliminated from the battle front, but it believed that an airborne tactical air coordinator would continue to be a requirement for close air support. It suggested that tactical reconnaissance pilots, flying high-performance aircraft, might perform a tactical air coordinator function.<sup>149</sup> The final Korean joint air-ground operations board recognized that there would be a requirement for tactical air coordinators in future air-ground operations. Noting that the Korean experience had proved that high-performance aircraft were "highly satisfactory" for airborne control, this board recommended that airborne controllers, flying high-performance aircraft, should operate from the fighter-bomber wing bases. In such an employment, the board believed that day-to-day problems could be more effectively coordinated and that more highly experienced personnel could be utilized for the airborne control work. Seasoned men, such as flight leaders and possibly flight commanders, could be fed periodically into control duties, thereby bringing into the control system the advantage of combat experience. Such a plan would admittedly place a greater load upon the ground liaison officers at the fighter-bomber airfields, who would have to collect and disseminate the full body of ground intelligence which these fighter-bomber airborne controllers would require for a satisfactory performance of their duty.<sup>150</sup>

**Artillery Flak Suppression for Air Support Strikes:** Prior to 23 July 1952 in Korea, "Plan Negat" curtailed friendly artillery fire during air support strikes in the forward battle area, and once fighter-bombers had reported into the front line area, division air liaison officers habitually restricted practically all artillery fire within a 25,000-yard radius of the target for the air strike. Only two exceptions were allowed: a friendly gun could mark the target with a smoke or white phosphorous round, and, in the short interval between the time that the Mosquito cleared the target area and the fighter-bomber strike, some flak suppression fire was laid on known hostile antiaircraft artillery positions. "Plan Negat" was satisfactory to neither air nor ground forces. After the completion of the short interval of flak suppression, hostile antiaircraft artillery and infantry troops could man their weapons and deliver unimpeded fire against the striking aircraft in the

target area. During 1952 and 1953, moreover, the Communists habitually concentrated flak at any area in which they planned a significant ground attack. Machinegun fire from organic infantry weapons got heavier, and the enemy customarily put up a barrage of fire over targets which were marked by the Mosquitoes, forcing the attacking fighter-bombers to fly through a curtain of flak. As a result of these developments, close-air-support missions were increasingly hazardous to aircraft and aircrews: in mid-1952 the Fifth Air Force anticipated the loss of one aircraft for every 380 close-air-support sorties and damage to one aircraft for every 28 such sorties. Plan Negat also deprived friendly ground units of their artillery support in a circular area almost three miles in diameter for the 8 to 45 minutes in which a close-support strike was being executed. Such a restriction was a serious detriment to the friendly infantry on those occasions when they needed both air and artillery support. Plan Negat sometimes deterred the ground forces from requesting close-air-support strikes at critical junctures when this support would have been of great value.<sup>151</sup>

Plan Negat was intended to insure that friendly supporting aircraft were not endangered by friendly artillery fire, but apparently it represented a practice which had been instituted without any particularly definite information as to the nature of the extent of this hazard. During World War II the artillery had employed varying systems of limiting fire concurrently with air strikes, without making any definite analyses of the problem. There were, for example, varying opinions as to the horizontal and vertical dimensions of the areas from which friendly artillery projectiles had to be excluded and on the duration of these exclusion periods. There were no definite studies or analyses from which reasonable conclusions could be drawn as to the likelihood of friendly aircraft activating on-the-way proximity-fused artillery missiles. No one had evaluated the proposition that enemy ground fire, if unneutralized by continuing friendly artillery fire, might present a greater danger to friendly aircraft than would the continuation of friendly artillery fire.<sup>152</sup> That friendly artillery could destroy friendly aircraft, however, had been demonstrated in Korea on 3 June 1951 when a confused Mosquito controller had led a formation of supply-dropping C-119's into an artillery barrage

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and two of the cargo planes had been destroyed.\*

As long as Fifth Air Force fighter-bombers made treetop height close-support attacks, Plan Negat had a definite utility, but, disturbed by an unnecessarily high ground-fire inflicted loss and damage rate to his fighter-bombers, General Barcus in July 1952 set 3,000 feet as the minimum recovery altitude for all dive-bombing attacks,† and this policy presumably cleared the way for the relaxation of some of the restrictions upon artillery fire during a close-support strike. After a meeting between air and ground officers on 23 July, the Eighth Army issued a new directive which superseded Plan Negat: VT-fused projectiles and high-angle fire were still prohibited, but restrictions on artillery fire during close-support strikes were eased and these restrictions were to be limited to the minimum time period needed by an air mission. A need for further improvements led to the issuance of the Eighth Army's "Plan Suppress" on 6 August, which was designed to provide increased uniformity and effectiveness in counter-flak artillery fire. Division and corps artillery were instructed to maintain plans for the neutralization of all known and suspected anti-aircraft artillery positions within effective range of air strike targets. The limitations of the 23 July directive were maintained under Plan Suppress, but the plan definitely detailed how it would work: after making rendezvous with the fighter-bombers, the Mosquito would inform the appropriate FSCC of its need for flak suppression in a specified number of minutes; the FSCC prepared to deliver fire on call and informed the TACP which was in contact with the Mosquito of the general line of fire, the maximum ordinate, and the proposed duration of the fire; the flight-leader transmitted to the Mosquito controller, who relayed it to the TACP, his plan of attack during or immediately after the flak suppression; the fire was delivered when the fighter-bomber flight leader was ready for it; and the FSCC informed the TACP when the last flak-suppression round was fired. Fighter-bomber flight leaders were permitted a choice as to whether to use or to decline flak suppression.<sup>153</sup>

There was need for further experimentation in the use of artillery during close-support strikes, and accordingly, beginning on 25 September, a

30-day test was run in the IX Corps area. This test included prestrike flak suppression, and, in addition, all friendly artillery was allowed to fire while the close-support strikes were in progress. VT-fused fire was emphasized in the prestrike suppression of hostile flak, but it was prohibited while the fighter-bombers were attacking their target. After firing its last round of flak suppression, the artillery fired an additional marking round of white phosphorous or colored smoke to indicate that the area was clear of VT-fused rounds. As the fighter-bombers pounded their target, the artillery continued firing high-explosive rounds on known anti-aircraft artillery positions, varying the volume of this fire from a maximum to a rate of one round every three minutes during the length of the air strike. The experiment was "decidedly successful." During the 30-day period in which 1,816 fighter-bomber close-support sorties were flown for the IX Corps, only one fighter-bomber was lost to enemy ground fire and only two major and 11 minor damages were sustained from the same cause. This significant drop in flak losses and damages occurred in spite of a three-fold increase in hostile anti-aircraft artillery positions in the IX Corps area during the month. Not a single friendly fighter-bomber was lost or damaged by the friendly artillery fire, which included missiles from 105-mm. howitzers, 155-mm. howitzers, 155-mm. guns, and 8-inch howitzers. As a consequence of these favorable results, the Fifth Air Force requested and strongly recommended that a similar flak suppression plan should be implemented across the entire Eighth Army front.<sup>154</sup>

The flak suppression technique was extended across the entire Eighth Army front by regulations published by the Eighth Army on 29 November and by the Fifth Air Force on 2 December. The new system, effective on 6 December, encompassed a few changes from that used in the IX Corps test. Under the new procedure a Mosquito led the fighter-bombers to their assigned target, which it either marked for them with smoke rockets or with an artillery-fired smoke shell. When all fighter-bombers pilots had positively identified the target, the Mosquito orbited them out of the flak suppression area, and then, when the fighter-bomber leader was ready, he requested flak suppression. The Mosquito immediately relayed this request through a TACP to the FSCC, and received back a reply that flak suppression

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\*See AHS-72, p. 238.  
†See Chap. V, p. 152.

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would commence in a given number of minutes. At this time the friendly artillery fired one VT-fused projectile per piece on all known enemy flak weapons within a radius of 2,500 yards of the target, and at the conclusion of the VT-fused fire the artillery fired one round of white phosphorous or colored smoke, which again marked the target and signalled that proximity-fused fire was completed. Without delay, the artillery then changed to fuse quick and continued flak suppression against known hostile positions for three minutes. When the phosphorous or smoke round was fired, the fighter-bombers immediately began their strike, and they desirably completed it within the three minute period of continuing flak suppression. If some delay in the execution of the air strike necessitated it, the FSCC would be requested to prolong the three minutes of flak suppression.<sup>155</sup>

In December 1952 the Communists continued to reinforce their frontline flak, but the new flak suppression techniques reduced the effectiveness of the hostile ground fire. On close-support strikes during this month only one aircraft was lost for every 917 such sorties flown, and battle damage was sustained by only one aircraft in 153 sorties. Varying by corps area, the average of flak suppression fired per fighter-bomber sortie was from 5 to 30 rounds. This loss and damage rate for fighter-bombers was not as good as it had been during the September-October tests, but the expanded system still had some flaws which would have to be worked out. The fighter-bombers, for example, were not always in a position to begin their attacks as soon as prestrike flak suppression was completed, and unless additional flak suppression was requested the last aircraft in the mission quite frequently were on the target too late to benefit from the 3-minute flak suppression. Air strikes had to be so rapidly executed that a Mosquito had very little time in which to correct errors in the aiming of the fighter-bombers. The Fifth Air Force was nonetheless confident that as more interest and experience were gained more effective flak suppression would be fired and combat crews would better utilize this suppression fire.<sup>156</sup>

During the spring of 1953 the Communists continued to augment their frontline flak, and, taking advantage of the shelter furnished by cloud cover, they concentrated weapons along those sectors of the front where they intended to make ground

attacks. Thus, prior to making their attack against the Kumsong salient, the Reds established 20 antiaircraft guns and 43 automatic weapons in the IX Corps sector and 20 guns and 57 automatic weapons in front of the ROK II Corps. A record high of 250 automatic weapons in frontline areas was observed on 22 July.<sup>157</sup> Continued emphasis of artillery flak suppression kept fighter-bomber losses in close-support strikes at a minimum, and on 9 June 1953 the Fifth Air Force thought so well of the procedure that it directed all fighter-bomber leaders to call for flak suppression as a matter of routine on all close-support missions.<sup>158</sup> Benefiting from the friendly flak suppression, the Fifth Air Force lost only 17 aircraft and had only 147 damaged in close-support missions in January through June 1953.<sup>159</sup> During late March and early April, when ground action along the front was stepped up, the Fifth Air Force out of a total of 2,981 close-support sorties, lost only one aircraft and had four damaged. This extremely favorable ratio was bettered in May,<sup>160</sup> and in June out of 5,126 close-support sorties only four aircraft were lost, only 9 suffered major damage, and 43 suffered minor damage. Some part of these increased damages was believed due to a temporary relaxation of the 3,000-foot minimum altitude rule during this month.<sup>161</sup> During the combat operations of July 1953, the Fifth Air Force flew 12,122 combat sorties, of which almost half were in close support of ground troops. Although an exact breakdown of losses on type missions was not available, only 8 aircraft were lost to hostile ground fire and only 45 were damaged from the same cause during this month.<sup>162</sup>

At the end of the Korean war the joint air-ground operations board which met at Seoul stated that flak suppression for fighter-bomber close-support attacks had been "highly successful." The program had demonstrated that ground artillery fire did not need to be lifted during close-support strikes, unless the fire was very heavily concentrated or unless proximity fuses were employed.<sup>163</sup> In its analysis of the value of friendly artillery flak suppression, the final FEAF report on the Korean war found it difficult to assign a realistic value to the fact that the two opposing land forces had been long operating on a stabilized, well-established front. Both of these forces had more weapons available, better offensive and defensive positions, and more intelligence on each

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other's activities than could normally be anticipated in a fluid tactical situation. "Nevertheless," stated this report, "the conclusions are undeniable that friendly artillery, fired for flak suppression purposes during the conduct of close air support strikes in Korea, did reduce aircraft losses by a considerable amount and constituted only a minimum hazard to the attacking aircraft."<sup>164</sup>

**Radar-Directed Close-Support Bombing:** During the Communist offensives in the spring of 1951, the three MPQ-2 radars which were posted, one behind each of the three U. S. corps in Korea, had contributed mightily to the success of the UNC ground battle. On night after night, these tactical air direction post radars (or "Tadpoles") brought in B-29 Superfortresses, loaded with proximity-fused 500-pound general purpose bombs, to decimate Red ground troops at those intervals when they left shelter and gathered together for attacks against UNC ground positions.\* In June 1952 the 502d Tactical Control Group was operating three of these TADP's: the two supporting the U. S. I and IX Corps had newer model MSQ-1 radars, and that which lay to the rear of the U. S. X Corps still had the older MPQ-2 radar. For safety's sake, the two MSQ-1 radars were backed up by the old MPQ-2 sets which they had replaced. Marine Air Support Radar Team One operated an AN/MPQ-14 radar in support of the 1st Marine Division. This same deployment was to continue in effect during the remainder of the Korean hostilities. Each of these radars was a modification of the old SCR-584 gun director radar. The AN/MPQ-2 had automatic tracking in azimuth and elevation only, while the newer AN/MSQ-1 also had provision for automatic tracking in slant range. The MSQ-1 also had a longer theoretical range than the older set, but the mountainous terrain of Korea fairly well cancelled this advantage. Accuracy of the MSQ-1, however, was somewhat better and its computer was more refined and faster than that of the MPQ-2. Each of these radars enabled a TADP controller to direct a bomb run and a bomb release against suitable targets under conditions of zero visibility or at night.<sup>165</sup> Both the MPQ-2 and the MSQ-1 sets were commonly referred to as "MPQ radars," and the blind-bombing system which employed these radars was called "MPQ bombing."

\*See AHS-72, pp. 65-66.

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Whether the equipment used was the MPQ-2 or the MSQ-1, the tactical employment of the Tadpoles was the same. The truck-mounted radars possessed a theoretical mobility but they remained in fixed positions during the last two years of the Korean war. They were each surveyed in at points as close as was safe behind the front lines, and their exact positions were determined from bench markers located to second order survey accuracy (1:10,000). Designation of targets for the Tadpoles was normally handled by the particular corps to which they were attached. Utilizing all sources of enemy information available to him, each Corps G-3 Air officer screened out potential targets and plotted them on a target work map. To request a mission against one of these targets, the G-3 Air established two pairs of eight-digit Universal Transverse Mercator (UTM) grid coordinates on an appropriate FEC emergency first edition 1:25,000 scale map: these pairs of coordinates marked the beginning and the end of the best straight line bombing run across the given target. The maps used in such calculations had been produced by multiplex stereoplotting and were considered to have an accuracy on the order of 50 feet; such maps were available to cover a distance to approximately 60 miles behind the front lines. The Corps G-3 Air sent the coordinates to the JOC for an approval of the mission, and if favorable action was there authorized they were passed back down through the TACC to the TADP. After this transmission, the TADP's usually checked the target coordinates directly with the Corps G-3 Air in order to insure that they had not been garbled. As soon as he had received these target coordinates, the TADP controller made the necessary parallax computations for both pairs and was then ready to control an air mission.<sup>166</sup>

The TADP controller could handle any type of aircraft that he could pick up on his narrow-beam radar equipment, but B-29 medium bombers and B-26 light bombers were the principal users of the system. The B-26's usually bombed from 12,000 to 14,000 feet and the B-29's came in higher at 16,000 to 18,000 feet. A B-26 normally exhausted its combat load of 10 x 500-pound bombs in a single run, but a B-29 usually made four such runs, dropping 10 x 500-pound bombs on each run. Except for these differences, the Tadpole radar bomb control technique was much the same for

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both type bombers. The bomber assigned to work with a Tadpole first reported to a TADC, which vectored it into a proper course on which it could be picked up by the narrow-beam TADP radar. The Tadpole controller made VHF contact with the pilot and located the aircraft on his radar-scope. From the pilot, the controller obtained data covering the altitude of the plane and the type of bombs carried, and, using this information, coupled with a radar check on the ground speed of the aircraft, the controller computed intervalometer settings required to cover the assigned target and worked out the bombing problem. All the while this information was being passed, the aircraft was positioned and kept on course by the TADP and brought to a predetermined initial point, where the controller advised the pilot to open his bomb-bay doors. As the aircraft neared the proper release point, the controller began a count-down, and at "zero" the bombs were released. The pilot was subsequently informed when he was over the ground target in order that the crew might check its results visually by fire or smoke. As a safety factor to friendly ground troops, bomb runs were made as nearly parallel to friendly lines as possible, and no targets could be bombed within 1,000 yards of friendly troops unless in an emergency and after explicit approval by the JOC.<sup>167</sup>

Working at top speed and under conditions of maximum continuous operations, the controller-pilot combination in June 1952 was said to have been able to complete a Tadpole mission from initial VHF contact to bombs-away in an average of 11.5 minutes. During this month, the Fifth Air Force fed B-26's into the TADP at 20 minute intervals and B-29's (which made four runs per aircraft) at intervals of one hour and five minutes.<sup>168</sup> But in a period of a subsequent time study between 30 June and 15 October 1952 (when there was no need to expedite runs) some 200 B-26's completed their Tadpole runs in an average of 21 minutes, and 47 B-29's averaged 20.6 minutes in single runs over a Tadpole target. Each additional run over the same target by a B-29 required an average of 13.1 minutes.<sup>169</sup>

Tadpole bombing was first used exclusively for night operations, but in June and July 1952, when weather shrouded Communist troop and supply concentrations near the front lines, Mustang fighter-bombers of the 18th Wing began to make

radar-directed bomb drops. In September 1952 these same Mustangs flew 63 combat MPQ sorties.<sup>170</sup> In November 1952, when hostile automatic weapons buildup around many front line close-support targets became too hot for fighter-bombers to handle, a system employing Tadpole-directed, daytime B-26 attacks had utility: in these missions, a B-26 formation, flying at an altitude above the effective range of hostile automatic weapons, was vectored onto a target run by a TADP, and when the lead bombardier sighted and positively identified his target the bomb run was continued visually.<sup>171</sup> In the spring of 1953, when the Communists timed their ground offensives to coincide with periods of bad weather, fighter-bomber Tadpole attacks were frequently employed. In such missions the Fifth Air Force employed flights of four to eight aircraft, and the flights flew a close fingertip formation, the second flight following very close and stacked either down or up. Following a steer given to him by a TADC, the fighter-bomber leader made contact with the Tadpole controller, who assigned him an altitude (10,000 to 15,000 feet) and airspeed and put the formation on its bomb run. The Tadpole controller notified the fighter-bomber leader when he was on the final approach, alerted the flight when it was time to arm its bombs, and then, about 15 seconds away from drop time, began a count-down cadence. At "zero" all members of the flight released their bombs, checked each other for hung ordnance, and then returned to their home base.<sup>172</sup> Utilizing these same tactics which had been pioneered by the Fifth Air Force fighter-bomber wings, the 1st Marine Air Wing began day and night Tadpole bombing on 8 March 1953. Seventh Fleet carrier-based aircraft first tried the MPQ technique on 23 May 1953, and they made extensive use of the radar bombing technique during June and July when foul weather prevented visual operations along the bomblines.<sup>173</sup>

Under the conditions of Korea the Tadpole missions were generally "no sweat" operations. Since the Communists had very few radar controlled guns on their front lines, the B-29's and B-26's were often ordered to make fairly long and leisurely target approaches, parallel to the front lines and over enemy territory, to hold their air speeds constant, and to make no more than small corrections in course.<sup>174</sup> In a short period in early December 1952, however, the 3d Wing lost three

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aircraft to hostile flak while working with the same TADP, and thereafter the TADP's were directed to vector B-26's onto their bomb runs at the minimum distance possible from the bomb release point. At this time, the B-26's were additionally limited to a single run against a given Tadpole target.<sup>175</sup> All VHF radio transmissions incident to Tadpole control were in the clear, and occasionally an enemy voice, pretending to be a controller, would come on the channel to give an erroneous steer or to ask about the accuracy of the flak. Some unwary pilots are reported to have replied to these questions and then suddenly to have found flak bursts all around them.<sup>176</sup> Although naval aircraft utilized the technique without aircraft loss, carrier pilots thought that the Tadpole bombing was apt to become dangerous. The commander of the *Philippine Sea* stated that conventional carrier-based aircraft should not be employed for MPQ bombing missions unless the entire run could be accomplished above or in a solid overcast. The relatively low altitude, slow speed, and steady course employed on these missions, he said, rendered propeller-driven aircraft extremely vulnerable to visually directed enemy antiaircraft fire when the planes went through breaks in the cloud cover. Navy pilots, who were also apprehensive about radar controlled flak, strongly recommended that the initial course and speed should be given to them by code or shackle.<sup>177</sup>

From the beginning of the employment of the technique, Tadpole night bombing met the especial favor of UNC ground commanders in Korea.\* As employed in April and May of 1951 against enemy troop concentrations night-bombing B-29's had undoubtedly quenched several enemy offensives before they had gotten started. Such a continuing employment of B-29's against close-support targets, however, became standing operating procedure, and late in 1951, when the Communists had dug-in and dispersed along the battle front, the Fifth Air Force vice commander reported that "all ground units now expect at least a part of one aircraft load in their sector every night regardless of the degree of contact with the enemy."<sup>178</sup> More or less as a matter of routine, the FEAF Bomber Command therefore employed a B-29 on TADP-directed close-support missions (B-29 crews called them "Primer" missions) along the Eighth Army

\*See AHS-72, p. 66.

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front, and when there was evidence of enemy activity to warrant it additional numbers of B-29's and B-26's were so employed.

At the same time that the radar-controlled close-support effort was generously provided to UNC ground troops in Korea, both FEAF and the Fifth Air Force became increasingly more skeptical as to the value of such effort against such targets as the Eighth Army was designating in the existing stalemated ground situation. Because most Tadpole missions were conducted under conditions of limited visibility against obscure targets in mountainous terrain, there was very little opportunity to observe the actual damage of such missions to the enemy. FEAF operational planners could nevertheless obtain some idea as to their potential effects on the enemy by analyzing the potential bombing accuracy of the Tadpole bombing system. In May and June 1952 the Fifth Air Force therefore conducted a controlled experiment which paired two 67th Wing RB-26's (which bombed and made strike photographs by daylight) with both MSQ-1 and MPQ-2 stations. Under the most favorable circumstances possible, the two RB-26's in 113 drops with MSQ-1 scored a CEP of 1,123 feet and in 58 drops with MPQ-2 scored a CEP of 1,223 feet. The CEP for the Tadpole system thus averaged out at 1,177 feet. Such an average circular error was reasonable considering the experience level of the radar operators, the condition of the equipment, and the practice of controlling the plane by voice. This study—called "Project Pinpoint"—concluded that the TADP radars constituted a valuable aid in the direction, location, and coordination of aircraft in all tactical support operations and noted that these radars were capable of directing an effective area bombing effort. Under the demonstrated accuracies, however, a single stick of 10 x 500-pound bombs had very little chance of destroying pinpoint targets, such as artillery pieces, which Eighth Army units frequently nominated for Tadpole attack. The study recommended that area type targets, of a size consistent with the demonstrated accuracies, should be chosen for future operations.<sup>179</sup>

The conclusions of Project Pinpoint were valid and pertinent, but the major difficulty in implementing them lay in the fact that Eighth Army units selected and designated the targets for Tadpole missions. Lacking a capability for develop-

ing targets along the front lines, the Fifth Air Force assumed no responsibility for evaluating such targets or for recommending the proper weapons to be used in harassing attacks against them. It merely received and passed on the target coordinates of areas which the Eighth Army desired to be attacked. Fifth Air Force target experts did not see any targeting photography for such missions, and Eighth Army requests seldom characterized such targets in definite descriptive terms. Fifth Air Force operations officers nevertheless observed that the army not infrequently fed back into the Tadpole target system some targets which had been turned down in the JOC as unsuited or not valuable enough for fighter-bomber close-support attacks.<sup>180</sup> On 5 July 1952, moreover, an Eighth Army operations research organization, which had been studying the historical experience in MPQ-2 night bombing during the maximum effort of May and June 1951, concluded that only 50 percent of the Tadpole targets which had been recommended by the Eighth Army in this period could be classified as valid, while 28 percent were probably valid, and the remaining targets had been nonexistent. This study estimated that the MPQ bombing effort had attained only one-third of its possible effectiveness, and it noted that an improper selection of aiming points had contributed materially to this wastage of bombing effort. It recommended that a more accurate means of determining MPQ targets and selecting aiming points should be developed. In reviewing this study, the USAFFE commander found its conclusions to be open to question, since 31 percent of the bombs on which the study was based were classified as "missing," but he stated a belief that proper selection of aiming points and accurate bomb releases would at least double the effectiveness of MPQ close-support bombing.<sup>181</sup> Asked to comment on the report, FEAF stated that the small sampling of bombs used in the evaluation precluded acceptance of the study's conclusions and recommendations without a further detailed investigation of the whole problem.<sup>182</sup>

Although FEAF recognized that Tadpole bombing was not very effective against the scattered and pinpoint targets which were being designated for such attack, it made no objections until early August 1952, and then it acted in response to a request from General Van Fleet that a maximum B-29 effort be flown in front of the U. S. IX and

the ROK II Corps on the nights of 31 July and 1 August. No especial ground fighting was underway, but Van Fleet alleged that such an allocation of effort was needed for four reasons: many "known remunerative targets" were available; unfavorable weather was hampering fighter-bomber close-support strikes; the enemy was undoubtedly aware that floods were complicating Eighth Army logistics and he had the capability to make numerous probes and limited objective attacks; presumably the enemy had also been hampered by heavy rains and his troops would be out in the open repairing flood damages and would be more vulnerable than usual, and, at any rate, such attacks would increase any difficulties which the enemy might be experiencing.<sup>183</sup> General Clark replied that any diversion of B-29 effort, except on genuine emergency missions, was not favorably considered, and he further informed General Van Fleet that neither FEAF nor the Fifth Air Force believed that available targets justified such a diversion of B-29's from their scheduled missions to Tadpole close-support strikes. In response to this CINCFE message, however, General Van Fleet insisted that lucrative Tadpole targets existed in great numbers: the Eighth Army, he said, had 173 targets suitable for B-26's and 110 suitable for B-29's. Van Fleet further explained that the Communists had been hurt by recent heavy rains and were more vulnerable than at any time for the past several months.<sup>184</sup>

In the round-robin of messages and discussions which followed the Van Fleet request for a maximum B-29 Tadpole effort, General Barcus, while disagreeing as to the suitability of some of the Eighth Army's targets, allocated a maximum B-26 effort to the IX Corps front, and General Weyland agreed to make three B-29's available for daily Tadpole employment during a test period. After a conference with General Weyland, General Clark informed Van Fleet that he was of the definite opinion that both Generals Weyland and Barcus were objective in their thinking and desirous of supporting the Eighth Army in every possible manner. He especially enjoined Van Fleet to work closely with General Barcus in the selection of "suitable" B-29 close-support targets.<sup>185</sup> This episode was thus settled, but it had revealed a serious divergency between Eighth Army and Fifth Air Force views as to what constituted an appropriate Tadpole target.

Although General Van Fleet had spoken of great numbers of "known remunerative targets," a Fifth Air Force representative on 5 August declared that "except for training and heckling purposes the MPQ-2 effort at this time is completely wasted."<sup>186</sup> As has been seen, CINCFE, in his paper on air-ground operations issued on 11 August, directed his subordinates to resolve "the question of what constitutes an appropriate target for an air attack, especially those targets for MPQ-2 strikes."

In August 1952 the FEAF Bomber Command flew 37 Tadpole sorties and dropped 1,271 bombs. Although the medium bomber crews made diligent efforts to secure scorable strike photography which would permit bomb damage assessment, no evaluation of the results of these missions could be made because of a lack of proper prestrike photography. The Bomber Command commander believed that these MPQ attacks had had psychological effects, both on enemy and friendly forces, but his opinion was that they resulted in "insignificant destruction of enemy resources."<sup>187</sup> A Fifth Air Force assessment of the bomb damage photography of 54 B-26 radar-controlled bombing runs, made at about this same time, came to the conclusion that: "MPQ-2 operations are not very efficient." This assessment revealed that within an assumed target strip 100 feet wide only 16 hits were scored in an excess of 500 bombs dropped. This analysis further disclosed that many of the targets coordinates furnished by army units were not accurately located and that some of the radar controllers had not been using an optimum axis of attack against many of the strip targets.<sup>188</sup> These reports, coupled with the findings of Project Pinpoint, enabled Generals Barcus and Taylor to inform CINCFE in March 1953 that: "With the inherent effort of the MSQ-1 and MPQ-2 equipment only relative large area targets such as supply and personnel areas are suitable." In order to assist ground units in selecting and preparing MPQ targets, the Fifth Air Force drew up a single, nontechnical document which treated such matters as target vulnerabilities and concentrations, limitations of aircraft bombing accuracy and control, optimum locations of aiming points, optimum length of bomb runs, and other such kindred information needed for a proper understanding of an air target selection process.<sup>189</sup>

The Tadpole strikes undoubtedly benefited the

morale of Eighth Army ground units and in some measure harassed the Communists. For this reason the Fifth Air Force used its light bombers liberally in such attack, and on special occasions in the static ground war the FEAF Bomber Command upped its routine allocation of one MPQ bomber to three MPQ bombers per night: such occasions were 10 through 16 October, coinciding with the ground activity accompanying the amphibious demonstration off the east coast of Korea, and 2 through 7 December, when the IX Corps was prosecuting an artillery duel along Sniper Ridge.<sup>190</sup> The 500-pound general purpose bomb remained the standard ordnance for Tadpole attacks, but FEAF was tolerant in substituting such other weapons as the ground forces desired for harassing the enemy. In January 1953, after ground officers had suggested that heavier bombs might be profitably used, FEAF had the B-29's drop 2,000-pound general purpose bombs, fused .1 nose and tail, against entrenched troops and bunkers. Even though this was not the most effective weapon for Tadpole bombing, FEAF saw some good in its use since there was an oversupply of these bombs in the theater and it was better to use them than to let them deteriorate in storage.<sup>191</sup> At the request of Eighth Army, the light bombers for the first time on 25 May 1953 dropped M-29 antidisturbance, or "Butterfly," bombs in certain areas across the front lines. Such bombs had been previously banned for Tadpole employment near the front lines for obvious safety reasons, but the Eighth Army, which kept careful account of where they were dropped, thought that they would be valuable for denying enemy use of active supply points and similar areas. Employed extensively during the Communist offensive in July 1953, the Tadpole-directed Butterfly bombs were later reported by Eighth Army intelligence to have been highly effective: POW's said that they were greatly demoralized when they encountered these antidisturbance bombs at night.<sup>192</sup> In front of the ROK II Corps in July 1953, the medium bombers dropped some 4,000-pound air-bursting general purpose bombs. There was no conclusive evidence regarding the results of the use of this ordnance, but FEAF felt that nothing was lost since there must have been some definite psychological effect on the enemy, who probably had become more or less accustomed to a lower order of explosives.<sup>193</sup>



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If FEAF thus tolerantly attempted to give the Eighth Army what it wanted in the way of harassing radar-directed bombing attacks, it nevertheless attempted to increase the destructivity of Tadpole attacks, and the measures which it employed toward this end proved effective when the Communist ground offensives during June and July 1953 bared the types of area targets which were best suited to Tadpole attacks. Although the BDA effort was hampered by a continuing lack of prestrike photography, both the FEAF Bomber Command and the Fifth Air Force made determined efforts to evaluate their Tadpole bombing accuracy.<sup>194</sup> The results of this sustained scrutiny were well illustrated by improved B-26 accuracy with this radar bomb direction system: during the period of January through March 1953, when 48 B-26 blind-bombing strikes were assessed, it was found that the light bombers had scored 1,420-foot CEP's, but in the period of April through July 1953, when 73 B-26 strikes were assessed, the light bombers were shown to have put 50 percent of their bombs within 804 feet of their aiming points. In the latter period, all personnel involved had made especial efforts to improve the accuracy of this type of bombing.<sup>195</sup> During the final three months of the war it was at last possible to make a calculation of the accuracy of B-29 ground radar controlled bombing: on the basis of complete data on 101 single B-29 strikes, the medium bombers scored an average Tadpole CEP of 1,300 feet. The operations analysts who computed this "unexpectedly large" CEP value suspected that poor target coordinates arising from inaccurate and unreliable map data might have been a major contributing factor to its magnitude,<sup>196</sup> but some part of the unfavorable comparison of B-26 and B-29 Tadpole circular errors must have been due to the fact that the medium bombers bombed from higher altitudes, which magnified endemic equipment and personnel errors.

During most of the Korean war the Fifth Air Force assumed very little responsibility for target evaluation and weapons selection of those Tadpole targets which the Eighth Army recommended for harassing attacks, but early in May 1953 the Eighth Army stated that such attacks were intended to destroy rather than to harass their targets. The Fifth Air Force promptly followed up this statement, and pointed out that the target-

ing of destructive Tadpole strikes became an Air Force responsibility since, to achieve destruction, consideration had to be given to ordnance, fusing, force requirements, and other related operational factors. The Fifth Air Force accordingly undertook the necessary Tadpole targeting for all missions, except for four to six B-26's which were set up each night for training, harassment, and to give corps commanders additional support for night patrols.<sup>197</sup> This procedural change, whereby the Fifth Air Force assumed responsibility for evaluating MPQ "force requirement" targets, proved salutary. During the Communist offensive against the ROK II Corps, for example, the Fifth Air Force accomplished first priority photography of the battle area, located targets on the photography, and dispatched these targets to appropriate air units for attack, before the Eighth Army could come in with requests for attacks. This excellent close-support targeting capability benefited both MPQ attack and preplanned fighter-bomber support strikes.<sup>198</sup>

As employed in Korea, the TADP's with their MSQ-1 and MPQ-2 radars insured that Communist front line troops received 24-hour air attacks, in all kinds of weather. The night and all-weather bombing capability which the TADP's permitted to FEAF aircraft meant much to the UNC war effort because the Communists habitually maneuvered and launched their ground troops in attacks during hours of darkness or in other conditions of limited visibility.

At times of critical ground operations, when the Communists offered area targets of sufficient density, TADP-controlled radar bombing was exceptionally lucrative. Thus on the nights of 20 and 21 May 1951, when a Red ground offensive was in progress, MPQ-controlled medium bombers launched proximity fused 500-pound bombs to destroy a regiment and a battalion of hostile troops on the front of the U. S. X Corps.<sup>199</sup> In June and July 1953 when Red ground offensives, timed to coincide with adverse flying weather, twice punctured UNC ground battle lines, the MPQ technique enabled UNC aircraft to pour enough air-delivered ordnance into the breaches to stop the enemy offensives. But in the static conditions of ground warfare which prevailed during most of the period of the truce talks, the bombing accuracy permitted with MSQ-1 and MPQ-2 was insufficient for effective attacks

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against the low density and pinpoint targets which were frequently scheduled. Because of the relatively large circular error bombing values achieved with these ground radar bombing director systems, the Fifth Air Force operations analysis office recommended that a pattern bombing procedure, using multiple aircraft, should be employed whenever practicable when this blind-bombing system was used.<sup>200</sup>

The joint air-ground board which summed up Korean operational experiences noted that increased enemy ground activities at night and during inclement weather had emphasized the value of tactical air direction posts. This board stated that it would be highly desirable if more TADP's could be provided across an army front, spaced in such a manner as to furnish a half-range overlap on each adjoining unit. Through such a procedure, all areas along the front line would be effectively covered by two TADP units, and two aircraft would be able simultaneously to work targets in the same general area. The procedure would also provide an emergency back-up for any given area in the event of equipment failure at a TADP. Thinking in terms of the combat operations during June and July 1953, this board also stated that there was a definite need for the assignment of a tactical medium bombardment wing to each tactical air force commander. Since a TADP had a limited working capability, it was obvious to the board that much greater ground coverage, especially of area targets, could have been effected under Tadpole control by a given number of B-29's than was accomplished by the same number of B-26's or formations of fighter-bombers.<sup>201</sup>

**Flare Support for Ground Operations:** While seeking a practical means of illuminating targets for night intruder attack late in December 1950, the 3d Bombardment Wing had demonstrated that a C-47 could transport large numbers of naval-type paraflares which could be launched through a "stove pipe" chute in the cargo door. The C-47 aircraft which were so modified for flare-dropping soon proved to be too vulnerable to illuminate the targets deep within North Korea which the B-26's desired to attack, but the unarmed transports nevertheless displayed great utility along the ground battle line. During the enemy offensives of January 1951, the illumination provided by airdropped flares permitted friendly UNC artillery to zero-in

on enemy targets, and the light from the flares proved exceptionally demoralizing to the Communist infantrymen who habitually fought under the cover of darkness. Many UNC ground commanders initially mistrusted the illumination of their positions, but the "Firefly" aircraft were immediately popular with the ground soldiers. When unit commanders gained familiarity with an illuminated front, they began to request flare missions in increasing numbers. The C-47 Firefly aircraft also afforded illumination for low-level night air attacks against moving targets just behind the enemy's front lines. And in the spring of 1953 the Fifth Air Force also paired flare aircraft with interceptors in a generally unsuccessful attempt to break up the heckling Red air attacks against the Seoul-Inchon-Kimpo area. Although the flare aircraft thus had several potential tactical employments, the Fifth Air Force accorded a first priority claim to the task of illuminating the Eighth Army front lines.<sup>202</sup>

Originally organized as the Tactical Flight Section, 3d Air Base Group, the Firefly function long sought a proper administrative lodging in the Fifth Air Force. In early May 1951 this section was transferred to the 67th Tactical Reconnaissance Wing, where it remained attached to various wing units until 14 May 1952 when it was finally transferred to the special air missions section of the 6167th Air Base Group at Seoul Air Base (K-16).<sup>203</sup> At this base the Firefly function was integrated in Flight "B" of the 6167th Operations Squadron. For a mission which required it to perform psywar, clandestine, and flare flights, the 6167th Squadron was authorized 10 C-47's and 4 C-46's, and in recognition of the probability that such a number of aircraft would be insufficient to fill flare requirements in a renewed ground offensive the 315th Air Division (Combat Cargo) was required to modify 10 C-46's for emergency flare dropping. Each month in the spring of 1953 the 315th Troop Carrier Wing sent four C-46's to Seoul to assist Flight "B" with the added illumination requirements laid on it during each full-moon phase.<sup>204</sup>

The combat employment of the Firefly aircraft was carefully controlled in a manner befitting their capabilities and scarcity in number. Each Firefly transport was equipped to carry 150 Mark V or Mark VI naval type parachute flares, and they usually remained on station for three or four

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hours. Unless otherwise instructed, missions were normally flown at 10,000-foot altitudes, and the flares were primed in the aircraft and set to go off at approximately 1,000 to 1,500 feet below the plane. Each million-candlepower flare, drifting down to 2,000 feet, would light an area of approximately one square mile.<sup>205</sup> Since the demands for flare aircraft steadily increased, the Fifth Air Force effected procedures necessary for their most efficient employment. All requests for flare aircraft had to be submitted to the JOC, and, when high priority targets appeared, the JOC was authorized to divert flare aircraft already airborne to handle them. Ordinarily, Firefly planes were held on a strip alert for a JOC scramble, but when friendly preplanned actions or anticipated enemy actions required it they were scheduled in the operations orders for airborne alerts. When flare aircraft were scheduled in support of Eighth Army units, they reported as directed by the JOC scramble order or the daily Fifth Air Force operations order to a predetermined orbit point and there contacted a designated TADC for instructions. After receiving these instructions, the Firefly pilot normally contacted a TADP for a steer to the position for its first flare drop, and having arrived there he dropped his flares as directed by the local TACP. The number of flares dropped on each run was at the discretion of the using agency, but the Firefly normally liked to set up an orbit which would permit successive drops just prior to the time that a flare burned out. After the first flare ignited, the ground controller instructed the Firefly where to drop additional flares, using the position of each flare as a reference point for the next drop. Since the usual Firefly orbit put it in a position to release flares every three to four minutes, it was quite important for the TACP to give the flare crew a release direction at such intervals. If the ground controller delayed in assigning flare release points too long, previous flares would burn out and reference points would be lost. Individual flare drops continued as long as needed, and the flare aircraft commander advised the using agency when he had 45 minutes fuel or flare supply

remaining.<sup>206</sup> Because the C-46's and C-47's used for the work were slow and vulnerable, flare operations had to avoid areas of heavy flak concentrations, both enroute or returning from their targets and while over the target areas.<sup>207</sup> In deference to the operational characteristics of the two aircraft, C-46's were used as much as possible for flare operations.<sup>208</sup>

"The practice of employing flare aircraft in support of infantry night operations," concluded the Korean air-ground operations board in August 1953, "has proved basically sound . . . Army requests for flare aircraft utilization have been generally met in a satisfactory manner."<sup>209</sup> Flare operations were naturally heaviest in periods of special ground activity. Thus on the night of 29 March 1953 some 1,004 flares were dropped to assist ground troops defending "Old Baldy," and during July 1953 a total of 101 flare missions illuminated the battle front.<sup>210</sup> In normal operating procedure, the joint air-ground operations board admitted that flare aircraft were best employed when they were kept on a strip alert and ordered out to fly missions where and when they were most needed. This procedure, however, made for a lag of some 45 minutes before a plane could comply with a request for flare support. This delay was principally caused by the slow speeds of the C-46's and C-47's used for flare dropping, but some part of the elapsed time was attributable to delays in positioning of the aircraft for the release of its first flare. As an emergency measure, when flare requirements were immediate, most UNC divisions employed their liaison aircraft to drop flares, and this measure was satisfactory as a stopgap until the regular Firefly could get to the scene of the action. The air-ground operations board nevertheless recommended that some means should be used in future flare employments to assist a TADP in positioning the flare aircraft for its initial drop: it specifically suggested that ground-fired illuminants or searchlight reference points would help prevent an overloading of the TADP's and would generally expedite the initial positioning of a flare aircraft.<sup>211</sup>

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