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ATTENTION

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Gill Robb Wilson
Journalist of Air Power

Friend of Billy Mitchell, intimate of Hap Arnold, Ira Eaker, Tooey Spaatz, Jimmy Doolittle, George Kenny, Curt LeMay, Hoyt Vandenberg, and the entire roll of Air Force greats; for a generation and more a wise chronicler and public interpreter of the Air Force story, Mr. Gill Robb Wilson was asked by the Editors of the Air University Quarterly Review ***to read the omens of public apathy to the role of air power in today's world.***

The Public View of the Air Force

GILL ROBB WILSON

THE author is assigned a rough mission . . . the public view of the Air Force. In the first place no one can tell exactly what the public thinks . . . as so many times has been demonstrated by experts. In the second place the shifting status and many facets of the Air Force have given the public such a moving target that it has had little chance for authoritative analysis . . . only spotty impressions.

But let us have at it. There are perhaps enough chips to start a fire . . . and we carry our own flint.

Beyond peradventure of doubt the public is aware of air power. This awareness is the more acute because of the warheads of air power—the atomic and hydrogen bombs . . . of which air power is the chief carrier and against which air power is the chief defender. On the indubitable thesis that the public loves nothing more than its own neck, we may be sure of its interest in air power. But equally we may be sure the public could not care less who saves its neck. It is merely that air power is pertinent to existence. That is the sum and substance of that.

The Air Force could make no sadder mistake than to believe that public concern about air power is *ipso facto* zeal for the Department of the Air Force. The fact is that Army and Navy could quietly absorb every major role of the Air Force without enough public outcry to disturb a nursery.

Just because a few of us with soap boxes here and there sound the clarion with unflagging determination, the Air Force should not have any illusions about its position. Its real position remains one of bidding for exercise of air power . . . bidding against experts whose eye teeth were cut before even Darius Green himself had a flying machine.

The course of World War II highlighted air power. At that time it appeared to many that the postwar reorganization of military strength could not fail to set forth air power as the central theme of modern military science. It followed of course that an independent unified Air Force would implement the central theme of air power.

But what happened? Did the postwar years produce an evaluation of air power adequate to its potential? Not so. The thesis that air power could control the air ocean and be decisive in war or peace . . . freedom or aggression . . . victory or defeat . . . was rejected. Air power was allotted a supporting role only. True, long-range air power was given the flattering title of Strategic Air Command, as amid much naive satisfaction, a Department of the Air Force was created. Strategy my eye. One need not be a confirmed cynic to know that in our National Defense Act, surface occupation remains the medium of basic strategy.

Once the intellectual fight to modernize military science by an adequate concept of air power was lost, subsequent compromises seemed logical. There remained no urgency for the compacting of national air strength into a mighty arm able to exercise global discipline, as the Romans had exercised it by highways and the British by seaways. The National Defense Act which purported to create a Department of Air, custodial of air power, conversely dispersed air power and invited continuous dispersement. That element of air power which was used to form the Air Force (Army aviation) was mousetrapped into junior partnership in a League of Rations whose escutcheon bore the politer name of compromise . . . "balanced power."

Now it cannot be denied that extenuating circumstances contributed to make a truly adequate evaluation of air power less pressing than otherwise might have been. Inept statecraft at top political levels added up to a tolerant viewpoint toward Soviet aggression and an official forecast of at least several decades of peace.

This pitch inevitably had its influence on all military thinking. It further made public expression on the urgency of sound military thinking seem alarmist and futile. Further, everybody was tired of war. Brilliant leaders in all walks of life were weary to death in body, heart, and mind. The indicated job of the military branches was to set their houses in order in anticipation of diminished budgets and decreased public interest.

Leaders of the Air Force were operators with scant experience in political introspection. Within the confines of their mousetrap they moved as they might. The National Air Guard was gotten under way. It could be politically powerful at the grass roots. The Reserve . . . but the reservists of World War II would be too old to fight many years hence . . . if indeed we ever had another war . . . so why count on them except as a nice gesture?

Thus in an aura of international political misconception, vouched for at highest levels, the Air Force, a junior third in an uninspiring trinity, missed plenty of boats.

In the meantime there were many practical problems pressing for answers. Airmen were crawling from million-dollar cockpits to live with their wives and children in shacks and trailers. The need of housing was desperate. Training facilities were miserable. In fact everything was needed. The Air Force had no roof over its head, and budget to do all this was not foreseeable.

If technical intelligence was in short supply . . . well, it would just have to remain that way. Peace lay ahead, and there would be time. If development of progressive fighter models was falling behind . . . well, don't blow your top! The world is at peace. If jet engine design was emphasized to a greater extent in Britain . . . well, who are we going to fight in such an all-fired hurry? We have the atom bomb, haven't we, and the Soviet can't possibly catch up in less than five years, can they?

The sum and substance of it was that the Air Force, harassed by technological requirements, plagued by morale problems due to lack of facilities, and competing with experts in the area of political favor and public opinion, was forced on the defensive . . . its do-or-die spirit dissipated by circumstances beyond its control. In fact the situation got so bad that the very thesis of its existence was challenged and its integrity publicly impugned. The Air Force fought back with righteous indignation in the so-called "B-36 trials" and came off with flying colors. But the very fact that it could be attacked and investigated by Congress shows how unhappy was its status and how tenuous its reliance on the public viewpoint.

Where did the Air Force stand in public view? A question mark . . . no less. And why? Simply because it was basically a creature of original compromise. Demonstrably it did not represent the sum total of air power . . . was not the custodian of the great concept. It spent a lot of money. It loused up its public relations. It had accidents too often. That new blue suit looked nice but maybe it was a mere vanity. How come so many people running around in it without wings on their chest? And throughout all this time why were so many of the matured, trusted stalwarts retiring from the Air Force? And what was all this talk of empire building within the Air Force?

Thus the public cogitated . . . here a thought and there an impression, like the sounds on old McDougal's farm. Some of it made sense and some didn't, but the fact remained that the Air Force was a question mark to the rank and file of the American citizenry. Some of it was due to Air Force ineptness and some of it was due to circumstances beyond Air Force control, but there it was. Because of its own compromised status it was inevitable that hiatus should develop in the viewpoints of important Air Force leaders. There was lack of unified concept to which all must rally. Small wonder that the public, with deep-set convictions on the subject of air power, had no convictions about the Air Force itself.

Outbreak of war in Korea found the Defense establishment face to face with reality. The face of the free world was the stake, and it never came nearer getting wiped. Of course the outbreak of aggression could have been halted in its original tracks by air forces with atomic war-heads, but that would have reversed the military thesis that had been adopted.* So the war was pursued in the ancient formula, with air forces used in support. The result was a greater sacrifice of human life and a more complete rape of a land and its resources than an atomic barrage originally-used could ever have accomplished. That 125,000 American citizens were casualties, that enormous national resources were drained away, that "K' Day brought no decision, is a result which traces back to the original compromise against the central theme of air power. History will make those responsible for that military compromise eat the Korean war.

And how did the Air Force handle itself in Korea? Unimpeachably from an operational standpoint. Of course it had to dig out the reserves for about 85 per cent of its combat strength . . . the lads who were going to be too old to be of any account by the time another war came! But it did a job in Korea within the limits of its permission to perform . . . sort of a policeman who had no right to follow a criminal into the next township.

But what did the Air Force do with the Korean war from the standpoint of defining itself while public attention was again concentrated on military affairs? Apparently not much since budget cut proposals after K" Day found the Air Force again getting the axe. And has the public risen in holy wrath and demanded

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*[In a public statement General Vandenberg, USAF Chief of Staff at the time, declared that by purely tactical considerations Korea offered no adequate targets for atomic bombs. Strategic and diplomatic considerations are also diverse and complex, and together with public opinion, add tremendously more than the military aspects to employment of nuclear weapons.—*Ed.*]

that the savings which are so essential be made in cuts of other than the Air Force?

Well, that's about as illustrative an example of the public view of the Air Force as should be needed. Argue it up or down, sideways or crossways, facts are facts.

Can this situation be changed? Certainly it can. But it can't be cured without diagnosis, and the Air Force has never faced up to the fact of its tenuous position. It has presumed that it was the legal custodian of air power and that was all there was to it.

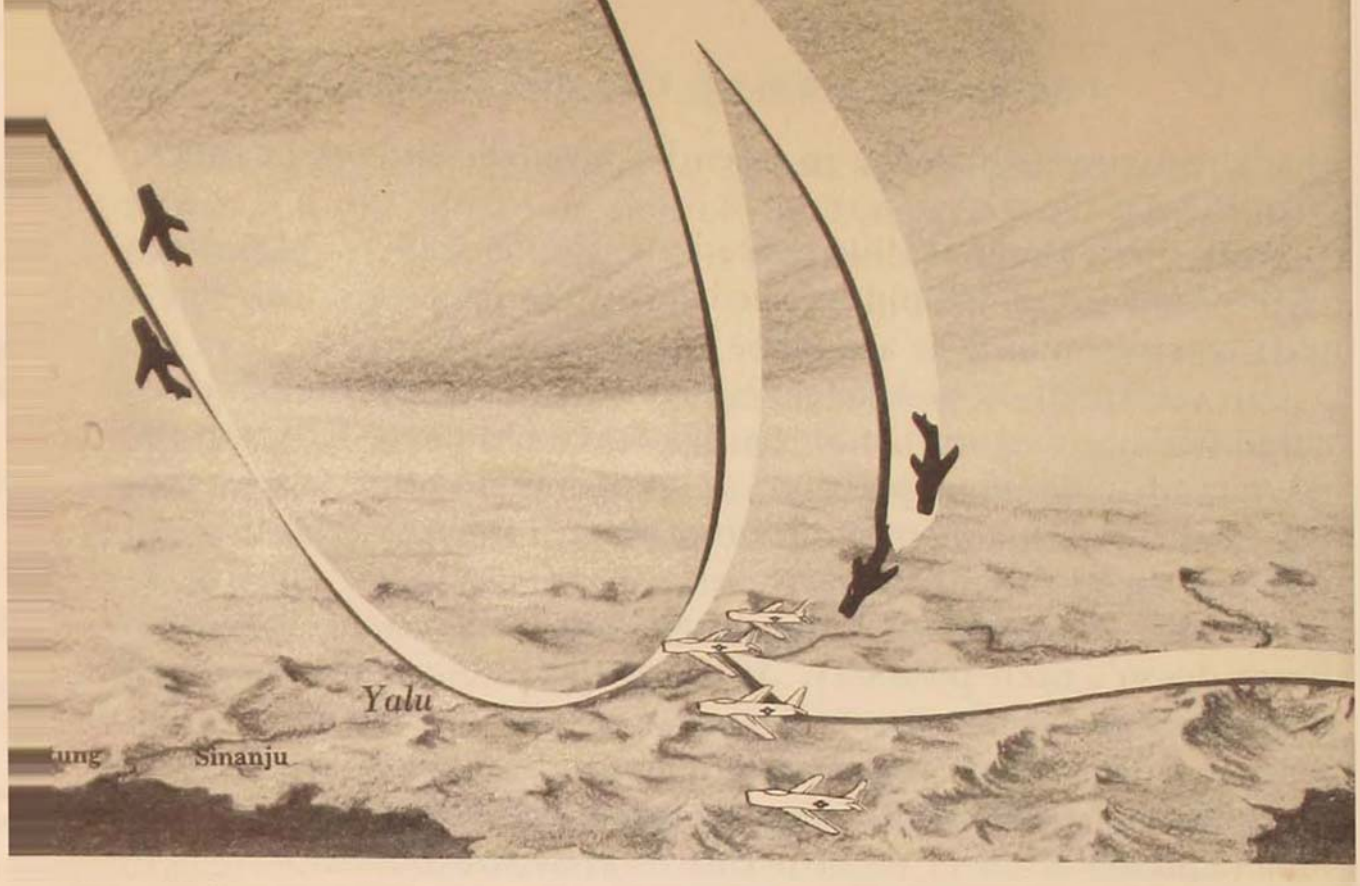
The cure of this situation is not a matter for a few frustrated PIO's. It is a matter for highest staff duty and action. The Air Force doesn't need publicity. It needs the public. The two are very different matters.

In an editorial in *Flying* magazine not long ago the writer made the statement that "the Air Force needs no defense other than an honest presentation of its own case." That still holds. It is not essential to castigate any other branch of the service to tell the Air Force story. Every businessman knows that the way to meet competition is to make and advertise a better product. The best way to win public approval is to be so good that the public can't ignore you. Kids will flock to the Air Force when they can't afford to miss the opportunity. Industry will stop grousing about the problem of doing business with the Air Force when it becomes a pleasant experience. The Marines have long had the formula. Even the President of the United States got his ears pinned back when he wise-cracked to the detriment of the Corps.

There is no secret to morale. It's just the art of being so good that life is full of fun and pride. You can't make good Air Force by restrictions on flying. You can't make good Air Force by permitting empires within Air Force. You can't make good Air Force without character so sharp that it cuts across public consciousness like a diamond on glass.

Maybe that's what public approval is after all . . . just appreciation of character.

New York



Hit-and-Run. *During the early months of history's first jet warfare Communist MIGs confined their air operations largely to the immediate vicinity of the Yalu River, rarely venturing more than a few miles into North Korea. As USAF pilots approached the Yalu at 38,000 to 40,000 feet, enemy jets swooped across the border in flights of four at altitudes of 40,000 to 50,000 feet, breaking into elements of two for the attack. The first element intentionally overshot the Sabres to decoy them, while the second element closed in rapidly from five to seven o'clock One diving pass began and ended the battle. Then followed a race for Manchuria and safety.*

MIG Maneuvers

Zoom and Sun, Yo-Yo, or Decoy -- MIGs Went Down

FOR 32 months, from November 1950 to July 1953, USAF F-86's and Russian-built MIG-15's tangled above North Korea in swirling air battles. This was the first all-jet air warfare in history. Because of the peculiar ground rules of the Korean War and the nature of the aircraft, the air battles were notable for their vertical depth and their blinding speeds. Vast dogfights swooped from horizonless altitudes, where the MIG enjoyed advantages, down to lower levels, where the Sabre was the master. Head-on passes closed at rates of more than 1200 miles per hour—so fast that the human eye and human reflexes were taxed almost to the limit. When the armistice brought this colorful and dramatic phase of the war to an end, the total box score stood at 802 MIGs shot down to 56 Sabrejets lost—a ratio of 14 to 1 in favor of the Sabrejet. The 802 "MIG Kills" were confirmed beyond question by gun-camera photographs. In terms of air order of battle, the enemy lost the equivalent of approximately 11 jet fighter-interceptor wings to the USAF air-to-air loss of approximately two thirds of one wing.

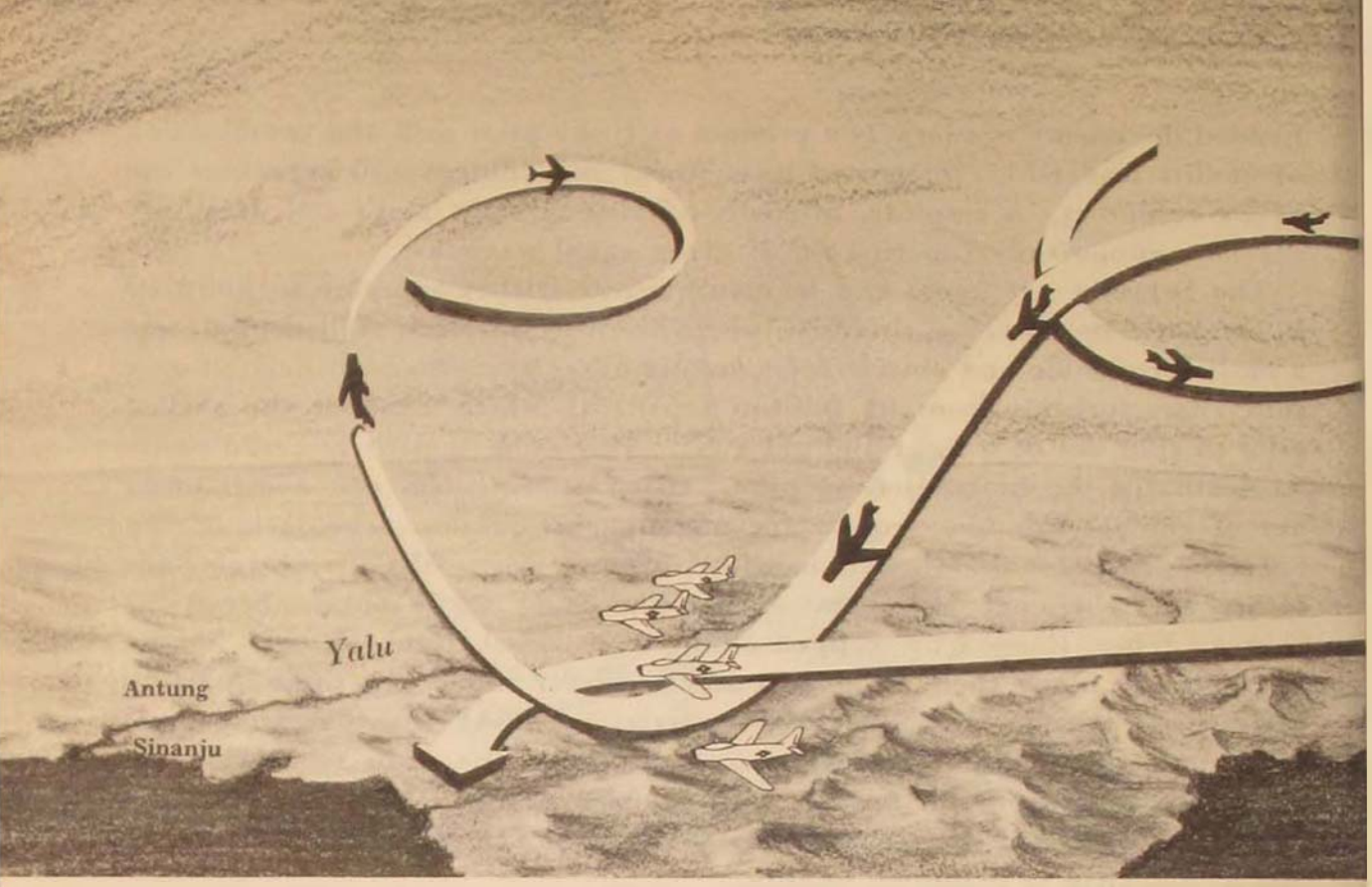
This phenomenal combat record has not lulled the United States Air Force into a false sense of technological superiority. The incredible 14-to-1 beating

handed the enemy was largely a product of USAF pilot skill and combination of quality leadership, integrated team work, and diligent and ingenious use of air resources. A resolute, offensive-minded military team can decisively defeat a numerically superior foe if given equal weapons.

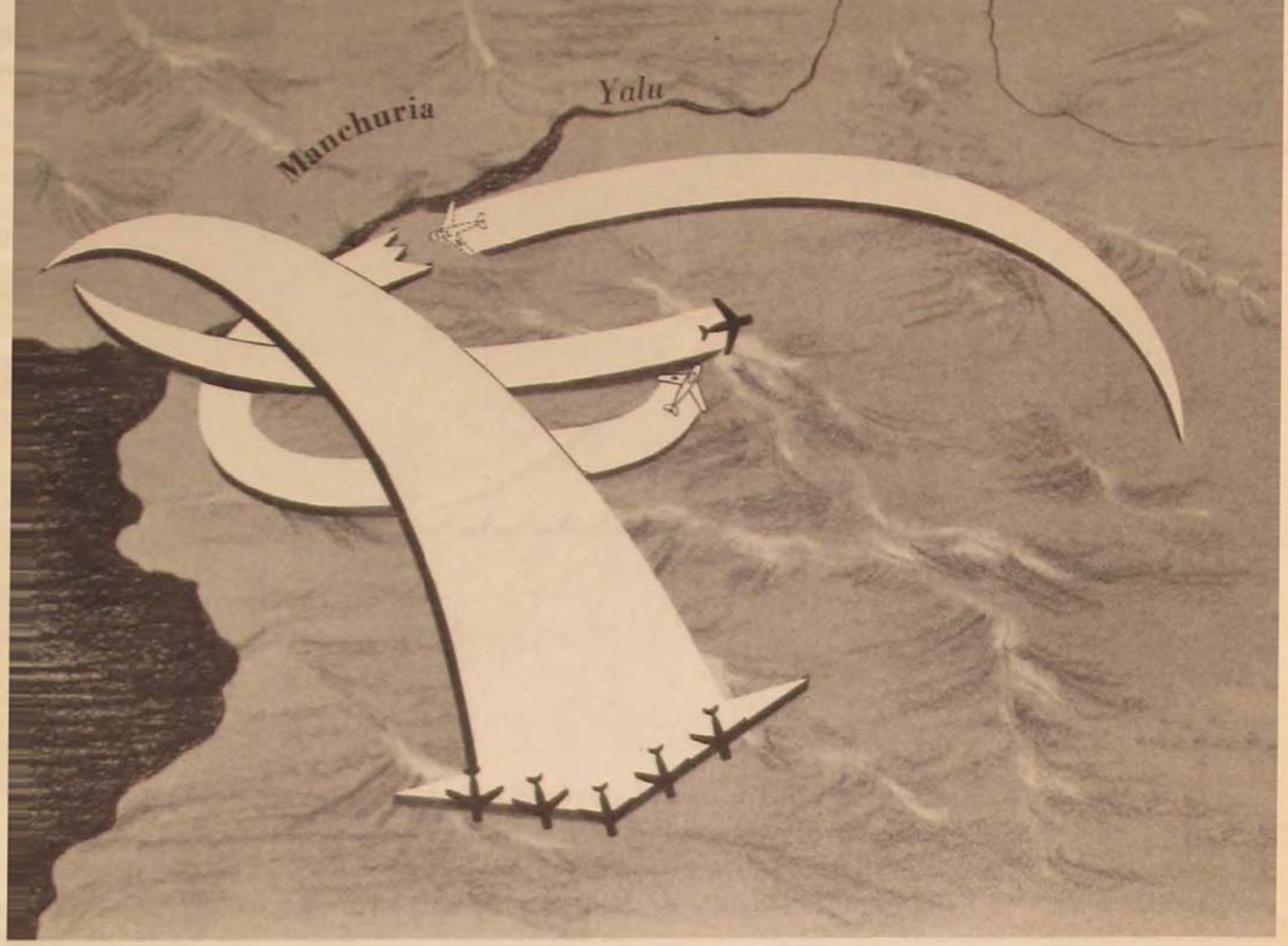
The Sabrejet was equal and in many characteristics superior to the MIG in combat capability, but the MIG, when flown by an alert, skilled pilot, was a most formidable and elusive foe. Among other advantages, it derived easy spin characteristics from its built-in sensitivity which enabled the skilled pilot to spin out of a fight and get away. This same sensitivity could easily be death for the inexperienced pilot. Often Sabre pilots saw a MIG spin out of combat into the ground for no apparent reason. The lack of the enemy's professional skill was manifest in other ways. MIGs were reluctant to accept a challenge of combat except when they vastly outnumbered the Sabres. When jumped or trapped alone or in small numbers, they hastily attempted to elude their opponents and head for home. In their hurry to get out of 'Sabrejet air," the MIGs entertained USAF pursuers with some highly satisfying mishaps. Scurrying back across the Yalu to airfields in plain view from the river border, MIG pilots sometimes came in on variant approach patterns at the same airfield, and, landing from opposite directions, met at mid-strip in explosive finality.

Displaying little in the way of organized tactics, the enemy behavior in aerial combat was no less unorthodox. Aside from generally attempting to take advantage of their exceptional rate of climb and their superior numbers, the MIGs usually tried one exploratory maneuver and then streaked for Manchuria. Even these maneuvers were not pursued with any regularity. Sabrejet pilots had to modify their tactics constantly as they followed through to the kill. Assisted by Hq Fifth Air Force, the *Quarterly Review* illustrates and explains a few of more than 30 "MIG Maneuvers" discernible in Korea.

Zoom and Sun. *Beginning in April 1951 MIG pilots became bolder and more aggressive. As their numbers increased, they ventured as far south as Sinanju. Employing a refined version of the hit-and-run, MIGs lingered over North Korea, hiding in the sun at 48,000 to 50,000 feet. When Sabres patrolling the Yalu at 40,000 feet were sighted, the Communists dived on them for one firing pass, pulled up sharply, evaded back into the sun with aid of the MIG's exceptional rate of climb.*



Yo-Yo. *By May and June 1951 the number of MIGs had increased tremendously, and Red pilots were venturing as far south as Pyongyang. Communist pilot proficiency and aggressiveness had improved. A typical maneuver of this period was the Yo-Yo. Twenty or more MIGs orbited in a Lufberry 5000 to 6000 feet higher than the Sabres on Yalu patrol. Single MIGs dived in a firing pass on the Sabre formation, then climbed into another Lufberry to await a second turn after the other MIGs had repeated the routine. The Yo-Yo frequently continued even after the Sabres had spiraled down to lower altitudes where MIG performance was inferior.*



End Run. *From May to July 1952 the enemy sortie rate slackened in daytime but was stepped-up at night. Increased Communist aggressiveness and pilot proficiency indicated that the enemy was committing his better-trained pilots to battle. A typical maneuver of this period was the end-run made around Sabres on the Yalu patrol to decoy them from their patrol and allow a second Red force to slip south and attack U.N. fighter bombers and reconnaissance aircraft. The enemy could use this device because the Sabrejets were so close to the Yalu that the Communist GCI system in Manchuria could locate the F-86's and direct their own aircraft into position.*

Pincer and Envelopment. *From September 1951 through April 1953 the enemy accented the mass employment of MIGs against small Sabre formations. The mass attack phase was attended by noticeable pilot inefficiency and poor gunnery, although the enemy was bold enough to send mass flights of MIGs down to Pyongyang, and lone MIGs occasionally even ventured south of Seoul. Generally formations contained as many as 180 MIGs. December 1951 was the enemy's record month of the air war with 3997 MIG sorties. A typical maneuver of this period was the pincer and envelopment. A formation of 60 to 80 MIGS would cross the Yalu at 35,000 feet and head southeast, dropping off small units to engage U.N. air patrols north of the Chongchon River. Scouting flights were dispatched to the Wonsan area for high-altitude flank patrol. A similar MIG force would head down the West Coast at 35,000 feet dropping off intruder and scout units near Chinnampo and Chodo Island. As these forces converged on Pyongyang, they dropped to 15,000 to 20,000 feet and swept back north over the main supply routes in search of U.N. fighter bombers and homeward-bound Sabres. An additional MIG force came straight down the jaws of the pincers to Sinanju to trap any aircraft caught in the pincer. This force also provided cover for the other MIGs who were by then homeward-bound to Manchuria and running low on fuel.*

A New Look at War

It's Time to Overhaul Basic Strategy

BRIGADIER GENERAL BONNER FELLERS, U.S. ARMY (RET)

THE true story of the World War II battle for Crete has never been told. This battle came during the dark days of the war when Britain was going it alone. Details were not released at the time because the tragic drama of the fall of Crete might have injured Britain's cause. Yet never in the history of British arms had her troops fought more valiantly. Only insuperable odds defeated them.

During the last third of May 1941, a Nazi air army—35,000 strong—was transported from Greece entirely by air and actually dropped on top of a numerically larger surface force fighting desperately to hold Crete. This air army was supplied and defended by air. In exactly eleven days it destroyed or captured or forced the evacuation of 28,500 British and 14,000 Greek troops!

During the previous month of April Nazi armies invading Greece had decisively defeated the Allies. The Allied troops who were able to reach sea transport evacuated to nearby Crete. There they arrived weaponless, tired, and disorganized.

Continuing a series of distinguished opinions on the status of air power and the most effective role for air forces in this time of obsolescent conventional weapons and threat of cold, peripheral, and unconventional total wars, the *Quarterly Review* presents the views of Brigadier General Bonner Fellers, U.S. Army (Ret). While recently brought to national attention by his stimulating book, *Wings for Peace* (reviewed in this issue), General Fellers earned the attention and the warm respect of students of air power as long ago as 1941. At that time a U.S. Army major on duty as military observer with the British forces in the Middle East, he had a ringside seat at the spectacular conquest of Crete by the Luftwaffe. His brilliant official report on the air invasion was a masterful appreciation of the total superiority of action that the Germans had obtained through control of the air. From the lessons of Crete and Korea General Fellers discerns only one response within American economic and manpower resources to the threat of war posed by the U.S.S.R. His incisive remarks on air power and military forces are certain to stimulate discussion among thinking military and civilian readers. In the interest of sound, thorough examination of modern capabilities for military offense and defense, the Editors of the *Quarterly Review* hope to present further opinions of authority and distinction on the vital relation of airpower and national security.

Shortly afterward British Intelligence revealed that a Nazi airborne attack against the three airdromes on Crete could be expected during the latter part of May. Accordingly General Freyberg, intrepid New Zealander in command of Crete's defenses, placed his forces in excellent positions covering the airdromes. Some 1500 fresh troops, together with stocks of additional weapons and ammunition, had arrived from Egypt. But the first twenty days of May had been insufficient time, even for seasoned troops, to rest, regroup, reequip, and prepare defenses.

Despite these handicaps the Allied troops met the invaders from the sky with amazing effectiveness. The British estimated that their fire destroyed 80 per cent of the German paratroopers during their jumps and that, in all, 4000 enemy were killed and 8000 wounded. It amounted to a loss of more than a third of the entire air army.

Why then did the British lose Crete?

The answer is—the defending forces were without air power. The German Luftwaffe dominated not only the sky but all combat on the ground. Before the invasion probing attacks by enemy airmen had located every antiaircraft battery and every element of the airdrome defenses. Before the paratroopers or the gliders came in for landing, barrages of machine-gun fire and bombs, laid down by enemy fighters and bombers, were more intense than any artillery barrage that the British had experienced in World War I. No one could survive outside of his slit trench. Antiaircraft crews, after firing a few rounds, were compelled to take cover lest they be machine-gunned from above. On Suda Bay, Crete's supply port, no vessel could stay afloat in daylight. Frantic unloading of supply ships was actually continued while the vessels were sinking.

Troop movement in the daytime was absolutely impossible.

After the invasion started on May 20, it was clear to General Freyberg that Crete could not hold out long. Even without machine gunning and bombing from the Luftwaffe, Crete would have fallen in a short time because it could not be supplied. The fleet and supply ships en route from the Alexandria base could not long have survived the air attacks against them.

About the time that the airborne invasion started, information came to the British Eastern Mediterranean Fleet that the enemy planned to send supplies and heavy weapons to Crete in confiscated Greek barges, or *caiques*. Admiral Rollins, in temporary command of the fleet, dispatched two cruisers through the Kythera Straits with the mission of intercepting the caiques.

On the night of May 21-22 the cruisers quickly destroyed the German surface supply mission. But the two cruisers were in turn heavily bombed by the Luftwaffe and sent a distress signal to Admiral Rollins. This daring but rash commander then drove the Eastern Mediterranean Fleet—consisting of two battleships, four cruisers, and sixteen destroyers—through the Kythera Straits to rescue the two cruisers. The fleet was struck by the entire Luftwaffe. At one time 320 planes were actively engaged in strafing, in high and low-level bombing, and in torpedo attacks. The British estimated that during the afternoon of May 22 a total of 1200 planes attacked the fleet.

The Eastern Mediterranean Fleet had often been under air attack by the Italians. But heavy antiaircraft barrages had usually caused Italian pilots to keep their distance. Thus the fleet, falsely confident of security from air attack, had been able to sweep the Eastern Mediterranean at will. But the German pilots were more skilled and aggressive than the Italian. From high altitudes, German pilots came out of the sun in steep power dives and released their bombs directly over the targets. Often bombs struck before the planes were seen. The fleet's antiaircraft fire failed to deter the attacks. An American newspaper man on the *Valiant,* who witnessed the attack, saw only seven planes shot down. He reported that a 2000-pound bomb was dropped ten feet off the port of the battleship *Valiant,* holing the ship badly beneath the water line, lifting her bow out of the water, and changing her course by 90 degrees.

On May 23, the day following the main attack, the fleet was ordered back to Alexandria. A fourth of the great Eastern Mediterranean Fleet had been totally damaged or sunk. Another fourth was barely able to limp back to Alexandria for major repairs; another fourth suffered superficial damage. In early June only the battleship *Queen Elizabeth* and four destroyers remained seaworthy.

The battle for Crete was the first convincing proof of the effectiveness of unopposed air power against surface forces. Unfortunately the British Navy was anxious that the story not be told and apparently neither the American Navy nor the American Army wanted to hear it.

After the United States had entered the war and the Nazi fangs had been pulled by tremendous battles, air supremacy fortunately passed from the Axis to the Allied Powers. There was then no longer any reason to suppress news of the Crete disaster. But by then there was no immediate necessity to heed the warning.

Had the lessons of Crete been observed in our recent defense planning, the United States would not today be in such an unenviable military position.

In the Korean war, our position would have been more hopeless than that of the British at Crete except that over Korea we had complete control of the air. Had the Communist forces been able to achieve air supremacy, our one suitable port, Pusan, would have been destroyed and the Korean effort would have collapsed. With our control of the air, adequate supply was certain, and our surface forces and rear installations were at all times free from enemy air attack.

After the Korean surface fighting stabilized along the 38th parallel in June 1951, United Nations ground forces were never permitted to seek a decision. However, because of our air attacks south of the Yalu, the Communist forces were never able to amass enough supplies to sustain a major ground effort, although they had ample troop strength to support one. Meanwhile our air forces became so effective against enemy troop and supply movement that only under cover of darkness was travel possible. Prisoners reported that reinforcing units required two and a half to four months to move south from the Yalu to the 38th parallel.

Since our ground forces had been denied decisive offensive missions, air power over North Korea became the relentless, pounding, continuous force which traditionally has been the role of land armies. But air power pressure covered a far greater area than that which land armies can influence. Pressure from land armies is limited in depth to the area of the battlefield and the range of the supporting artillery. In Korea, pressure from air power only began with close-support missions over the enemy front lines. It saturated the rear area all the way north to the Yalu.

Thus for more than two years, air attacks back of the enemy lines against his personnel, transport, railways, bridges, and supplies were savage and devastating. This incessant hammering from the sky constituted, in effect, a vertical envelopment. It was the sole force exercising continuous pressure. It could have been made decisive had higher authority been willing to press its terrific air advantage.

In popular theory, air forces supported ground forces in Korea. In fact, however, ground forces during the final two years of the war had no offensive mission. The only offensive effort was by

air, supported by ground forces which performed no military function except to protect South Korea and the air bases from which offensive strikes were launched.

Although air forces applied the bulk of the pressure on the Communist enemy during the final two years of the war, air losses compared to those of the ground forces were quite light. Throughout the war the U.S. Air Force lost 801 aircraft* and 1262 airmen, killed, wounded, and missing. On the other hand American ground forces, which for 25 of the 37 months of the war were merely containing forces, lost 138,551 men, killed, wounded, and missing. These figures make it obvious that air action against the enemy was far less costly in blood and treasure than was ground action.

Although the U.N. powers had as much as stated publicly that they would not attempt to win the war, the Communist position, shattered by our air strikes, was fast becoming untenable. Short of supplies and weary of bombing and strafing, the enemy proposed a truce.

The cease-fire has enabled him to amass supplies and to build the so-called "non-military" air bases south of the Yalu. These measures have enormously strengthened his military and bargaining position. Showing great foresight, the Communists have now rebuilt the North Korean air force and supplied it with an estimated 300 jet interceptors and jet light bombers. Our own ground-minded planning has failed to include the build-up of a South Korean (ROK) air force. As a result, a large segment of our own Air Force is tied down in Korea for an indefinite time. With more than twenty first-class Korean divisions at his disposal, President Syngman Rhee is more dependent upon our U.S. Air Force than upon our Army.

From the Crete and Korean operations, lessons of great moment readily derive themselves. In them lies the key to the security of the free world.

Crete was lost to an air army which was transported, supplied, and supported by overwhelming air power. The British Royal Air Force was so enormously outnumbered that it was unable to challenge this air support. The Luftwaffe quickly crippled Britain's sea power and drove it back to Alexandria. Without supplies Crete could not have been held, even if the British had been able to beat off the invading air army.

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*In addition, the Navy lost 541 aircraft.

TODAY in Europe we and our allies have deliberately undertaken obligations which are precisely parallel to those unfortunate situations which caused the British to lose Crete. Specifically, the NATO ground effort is dependent for its support on sea supply from the United States. In addition, our bases and lightly-manned outposts in Japan, Korea, North Africa, and the Middle East are also heavily dependent upon sea support. Unfortunately our air forces supporting Europe and these outposts are vastly inferior numerically to the Communist air forces.

If war came today, NATO ground forces could neither be supplied or be reinforced from the United States. Superior Communist air forces, inadequately opposed, could close the Mediterranean and other European waters, as well as Asiatic coastal waters, to our fleet just as the Luftwaffe closed the Eastern Mediterranean to the British fleet in its attempt to support Crete.

Britain could have held Crete had she been able to exercise air control over the Mediterranean. Likewise we can meet our obligations only by control of the air over the far-flung areas which we are committed to defend. This means Global Air Supremacy—something that our present air program does not provide.

Russia's and China's inexhaustible supply of manpower, their self-sufficiency in strategic materials, and their enormous land mass, have posed insuperable burdens on planners devoted to the traditional surface concepts of war. In fact, the NATO powers are so outnumbered in ground forces that they cannot hope for a favorable decision against the Red armies from a surface-dominated strategy. The self-sufficient Communist powers cannot be overcome by sea blockade. If a decision cannot be reached on the surface—land or sea—it can only be reached in the air.

As it should have been in Korea, the role of the fleet and ground forces in Europe should be one of support for air forces to secure and supply suitable bases from which air strikes are unleashed.

If another war should be forced on the United States an adequate air force, with intercontinental range and with atomic and hydrogen bombs, could hurl against the Communist powers a far more concentrated hammering than was imposed on North Korea. And the damage could be inflicted more quickly. The two contending colossi, the Soviet Union and the United States, both have intercontinental air forces capable of delivering atomic attacks

against one another. The side which wins the battle of the air will win the war. If war comes, this decision could come during the early phases of combat.

The ability of our air forces quickly to win the battle of the air would permit a great reduction in the size, composition, and cost of our surface—land and sea—forces. Relatively small surface forces, under friendly skies, could ensure the supply and retention of air bases, outside the range of all Red aircraft except intercontinental bombers. From these bases atomic and hydrogen bomb assaults of unprecedented intensity could be unleashed against enemy air bases, planes on the ground, fuel, war industry, and communications *throughout* the enemy's vast territory. This air action could be entirely independent of our surface forces except as they protect our bases.

Thus appalling devastation could be continued on the enemy from the air until he has had enough. In due course Communist ground forces would cease to be formidable. With their fuel, munitions, supplies, rations, and transport destroyed by bombing, the Red Armies would eventually be helpless.

Meanwhile, if necessary, Allied airborne forces could be landed in selected areas *inside the Soviet Union or Red China.* And these airborne forces could be defended and supplied by air. Just as in Crete, and to a limited extent in Korea, our air forces in the U.S.S.R. could perform a number of the roles normally assigned to sea and ground forces. Air forces could perform the roles of transport and supply. By bombing, they could fulfill the roles of artillery and engineer demolition. With machine guns and rockets they could take the place of many infantry weapons. Neither the Soviet's inexhaustible supply of manpower nor her unbearable winters which doomed Napoleon and Hitler could influence our ability to strike from the air.

Thus airpower could deny Red armies freedom of movement, pound them continuously, and destroy their supplies. In no other way have we the manpower, means, and economic capabilities to cope with the U.S.S.R.'s natural allies—Resources, Distance, Winter, and Manpower.

This is not to say that our European allies must defend themselves alone, that we cannot convoy supplies to support them nor aid them to preserve their properties and their populations. It is to say that to observe those purposes we must act in the light of our real experience and of our best vision. We must arm ourselves for our common defense with our strongest weapons. By our true power alone can we attain our firm intent, and honor not

alone our commitments but our duty to free men everywhere.

What is clear is that if war comes, our only hope of victory lies in the prompt achievement of overwhelming air supremacy Moreover, air supremacy is the best war deterrent because it can destroy the enemy war potential. With air supremacy in the hands of the United States, the chances of war are very remote indeed.

It is therefore suicidal for the United States not to direct its vast industrial potential into full-scale production to provide the best air force in the world. If we fail to do this and permit air supremacy to rest in Soviet hands, the U.S.S.R. could destroy the military potential of the United States. Such a disaster would be the death of freedom everywhere.

Washington, D. C.

Air University 2000 A.D.

BRIGADIER GENERAL DALE O. SMITH

WHEN he wrote his *Republic*, Plato started the fad of designing Utopias, and the pastime continues unabated today. Such mental gymnastics open the door to pure speculation, which is not always wasteful day-dreaming, for without speculation there would be no discovery, no invention, no research, and no progress in any human sphere. It is the first step, moreover, in setting goals for long-range planning.

Mankind's nimble mind can leap the barriers of dragging restrictions and dream of a new order, unknown to reality. When logically arrived at, this imaginative new order becomes an ideal toward which to strive. It provides a guide to action and permits consistency of purpose.

Every Air Force officer who serves in one position for very long has developed a set of ideas on how the mission of his command could be better accomplished. I am no exception. Through a five-year association with Air University I have conceived an ideal educational system. What would Air University look like, say, in 2000 A.D. if I could have my wishes?

To begin with, the headquarters would still be at Maxwell Air Force Base in 2000 A.D. It should be at Maxwell because Maxwell provides a symbol for advanced air education that was not easily acquired and that has incalculable intrinsic worth. Maxwell was built specifically for the old Air Corps Tactical School, and it was here that the basic concepts of air power were hammered out. There can be little question that most of these concepts were valid, because they were tested successfully in World War II. With its background, Maxwell has a reputation for producing air leaders. The inspiration provided by this great heritage should not be lightly discarded for any short-term expediency. Yes, the Air University Headquarters would be at Maxwell.

The three-stage ladder of schools for general duty officers as recommended by numerous study groups and as initiated by General Muir Fairchild (only to be emasculated following Korea) would be re-established and in full bloom. There would be a bona fide junior officer school—the Air Tactical School in place of the present Squadron Officer Course—and an Air Command

and Staff School for the Field Officer Course. These would not be get-smart-quick educational mills, but soberly developed institutions of higher learning backed by a philosophy that the great truths of air power cannot be acquired overnight nor be researched by novices to the profession of air science. The Air War College would be pretty much as it was in 1954.

How large would these schools be and where would they be located? What subjects would they teach and how would they be organized?

To begin with, the Air Tactical School would be on a base of its own with all the facilities of the Army's Fort Benning or the Navy's Line School at Monterey. This would have to be, because it would be our largest school, with perhaps as many as 10,000 students. (In 1952 the USAF brought 14,000 second lieutenants to active duty.) Moreover, the base would need to be completely operational if the school were to provide the practical exercises and laboratories for sound education. A base such as Tyndall, where the school was first organized after World War II, or one such as Keesler or Orlando, would fill the bill. To permit most help from other schools and facilities of Air University, and from the Air Proving Ground Command, Air Tactical School should be in the vicinity of Maxwell.

We would send all career officers to ATS for a full academic year of nine months (three quarters). Non-career officers who might serve for short two-year terms would be provided a one quarter course of eleven weeks similar to the Squadron Officer Course of 1954. Students would normally be in the junior grades, but lieutenant and captain ranks would not be a rigid requisite to admission. The school would be open to all ranks who might need the kind of education offered by that institution.

By 2000 A.D. the Air Force would have acquired a mature

A great university is a living tradition, its academic reputation respected and world wide. It is a creative, contributing force to the stature and well-being of the nation, the culmination of long years of far-sighted planning, rugged determination, and concerted, superlative effort by devoted men. Will the Air University sustain its march toward this ideal? What will be its philosophy, its curriculum, its organization, its physical facilities for the professional education of Air Force officers in the year 2000? Few men are more qualified to speculate than Brigadier General Dale O. Smith, Air University's Director of Education. With five years of varied assignments in the schools and headquarters of the Air University, he also holds the degree of Doctor of Education from Stanford University.

approach to education—it would believe that knowledge taught to lieutenants is every bit as respectable knowledge as that taught to colonels. Educational emphasis would rest upon truth and depth of learning rather than upon the prestige of certain subject matter. The tactics of a squadron would have equal significance to the tactics of an air force. The study of squadron leadership might be more valuable to a certain colonel of fighters than the study of international strategy. Conversely, the study of international strategy might be more pertinent to a lieutenant on an allied staff than the study of squadron leadership. Officers would study courses designed to meet specific Air Force needs, and *all* courses in *all* schools would be available to *all* officers, on the basis of those needs and certain educational prerequisites. It would not seem beneath his dignity for a colonel to take some work in the school for junior officers, nor would it be prohibitive for a brilliant lieutenant to matriculate in Air War College. These, however, would obviously be exceptions.

Why would we make the course nine months long? The 1947 ATS at Tyndall was only four and one-half months in length. Wouldn't nine months keep these young officers on the shelf too long and seriously endanger our effective H-hour operational force?

If a school of this sort is necessary, the total Air Force must be organized with the school in mind. As with the Training Command, the H-hour force should be adequate in numbers without including the pipe-line people in school. So the question is reduced to the necessity of a nine-month course for all junior officers.

No one will deny that the complexity of air war is snowballing. Equipment costs over ten times what it did a decade ago, even making adjustments for inflation. Can there be any question that tactics, too, are more complicated? Do we expect to employ modern equipment with outmoded tactics designed for relatively simple and now obsolete machines?

Both the Navy and Army conduct year-long junior officer schools. Are surface tactics and equipment so much more difficult than their air counterparts? Or do the older services expect a greater depth and breadth of understanding in their young officers?

The pre-war Air Corps Tactical School was a nine-month course. It was long enough to encourage constructive thinking by its students and even to permit practical air exercises for testing their ideas. About half of the graduates became generals. Of the graduates from the four short courses (three months) of ACTS in 1939-40, only one fourth became generals. From this

it would seem that the short course was not an adequate substitute for the nine-month course.

Air Force officers are procured in five different ways, and their backgrounds vary widely. A full academic year for these officers would provide a unifying influence and time to indoctrinate ideals of duty, courage, and service. Young officers learn rapidly, and these is much Air Force lore for them to learn. For these reasons this schooling will provide more net return to the Air Force than any later schooling.

Duty assignments cannot be a substitute for ATS. The junior officer becomes aware of a narrow slice of the Air Force in a duty assignment. Only in school can he gain the overview and learn the "whys" of air war. His broader understandings make him more productive in varied kinds of assignments. He becomes a true Air Force officer primarily, and a technical specialist secondarily.

What kind of a school would this ATS be? What would it teach? Well, first of all it would attempt to inspire its students with a feeling of dedication to the demands of their country. This dedication would take the form of a sense of deep personal responsibility. To gain this, students would not be treated like cadets and expected to lock-step through one class after another in unison. On the contrary, they would be given as much personal liberty as possible and be trusted to deport themselves according to the highest standards of the officer code. Any deviations would be dealt with by ruthless eliminations from the school. Such a school would be a fine screen to identify the deadbeats and "job holders" who creep into the officer corps.

All students would not take precisely the same courses. Perhaps as much as a third of the curriculum would be common to all students and provide them with the general and fundamental courses and exercises which all Air Force officers should have: leadership and command, staff work, tactics and strategy, oral and written expression, problem solving, and the like. But the ATS would recognize that all people have individual differences and would attempt to capitalize on the specific talents of each student officer. For example, flying training would be an integral part of the program for each rated officer. Graduates would have enhanced and broadened capabilities in the air. A few first-line aircraft would be assigned to check off students in modern types, and instrument flying would be a steady diet. While the rated officer was taking flying courses, the non-rated officer would be taking courses which would broaden his own specialty such as communications, logistics, intelligence, and statistics.

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Athletics, group and individual, would likewise be integral to the curriculum. Group games to help the student learn how to organize such activities in his later commands, and individual sports such as golf and tennis to prepare the young officer for a lifetime of physical conditioning in the less rigorous sports common to maturity.

Although first-line air units would not be assigned to the school, arrangements would be in force with the tactical air forces to permit numerous maneuvers in which students would intimately participate from planning stage through critiques. No student, rated or not, would graduate without a first-hand familiarity of the operations of air war.

After such a period of training, the young officer would have the attitude, knowledge, and basic abilities either to take command of a squadron or assume the position of group or wing staff officer. Of most importance his loyalty to the Air Force team and the nation would surmount any loyalty to a special field, and his ambitions and talents would be channeled into the most productive Air Force areas.

WHAT about the Air Command and Staff School? Where would it be and what would it look like?

The Air Command and Staff School would be the true postgraduate school of the Air Force. Normally majors and lieutenant colonels would be matriculated, but as in ATS the doors would be open to all officer ranks. It would be located at Maxwell as currently and organized along the lines of a first-class civilian university graduate school.

The regular program for the average officer would take three eleven-week quarters to complete approximately a nine-month academic year. But again not all officers would take precisely the same courses. Graduation would be based upon demonstrated performance, either in the field or in school. If an officer could show proficiency in any course, he would be excused and given constructive credit. This would be determined by a battery of tests, interviews, transcripts of previous schooling, and effectiveness reports. It would be possible to determine which officers should be excused altogether from attendance and which might be expected to graduate in one, two, or three quarters.

Programs of study would be prepared for each officer. Such programs would consider his background experience, his interests, and the Air Force requirements. All these programs would be

designed to assure that the officer would have a thorough understanding of Air Force organization, operations, and weapons; of leadership, management, and command; of strategy, tactics, and doctrine; and of staff work, instruction, and communication skills. But there would be time to specialize while concurrently acquiring these general duty abilities. An officer could "major" in operations, personnel, logistics, communications, intelligence, or armament at the general staff level.

When he was graduated, the Air Force could be certain that he not only understood the big picture but could operate on a high level in a major staff field. He would be a generalist-specialist, able to integrate his special knowledge with an over-all mission and to articulate his work with that of other team players. He would neither be a special staff school graduate with a superficial knowledge of the Air Force at large nor so drilled in the big picture as to ignore specialized tasks.

There would be up to 1000 students matriculated at this institution, giving all majors and lieutenant colonels about one chance in two of being selected. Entrance standards would be high and would include evidence of much individual study prior to entrance. ATS graduation or equivalent would be prerequisite for graduation, but not for attendance. Special shorter courses could be quickly designed to meet any crash educational need of the Air Force. Graduation, however, would require an accumulation of credits which would demand an ATS background or equivalent.

As with ATS, stress would be laid on individual responsibility and conduct consistent with the highest ethical standards. Elimination would be swift for those not adopting these personal responsibilities. The academic philosophy would focus on original and creative thought in the conduct of air war, and graduates would be prepared to be group commanders and higher staff officers. Numerous practical exercises, field trips, and maneuvers would add meaning to the course work, in addition to permitting the faculty to evaluate students under actual field conditions. Standards would be set high, and completion of school requirements would be based upon demonstrated proficiency. Students who complete all requirements for graduation would be awarded a degree of Master of Air Science.

FINALLY the Air War College, as now, would cap the system of air officer education. This school would not be located

at Maxwell, but at some small base nearby, such as Gunter or Craig. There it would develop a character of its own and provide facilities for more student intermingling and exclusive activities, the theory being that the more mutual appreciations and friendships formed among the top level air officers, the smoother will run the Air Force. Students successfully completing the nine-month course would be graduated as Doctor of Air Science.

Of course there would be much more to Air University. An undergraduate Air Academy similar to West Point, the AFROTC system, the School of Aviation Medicine, and the Institute of Technology. There would be research divisions integrated with each school and concerned with the substantive problems encountered in the curricula. There would be an Air University Press which would not only publish catalogs, bulletins, and journals but texts and books related to air power. And there would be a modern library at Maxwell, a central depository for all air science knowledge, housed in an impressive structure which would encourage profound research. Numerous other activities would be found at Air University 2000 A.D., but most striking would be the general physical layout at the schools.

All the World War II temporary shacks would have finally collapsed, and in their place will have arisen concrete and steel structures of architectural beauty. Convenient, efficient, and comfortable facilities will abound for study, instruction, laboratories, athletics, living, and social life. All faculties and students will live on the bases in air-conditioned quarters appropriate to their rank and status as dignified leaders of the Air Force. The schools will *look* like respectable American university campuses with integrated airfields, rather than vestiges of an old war.

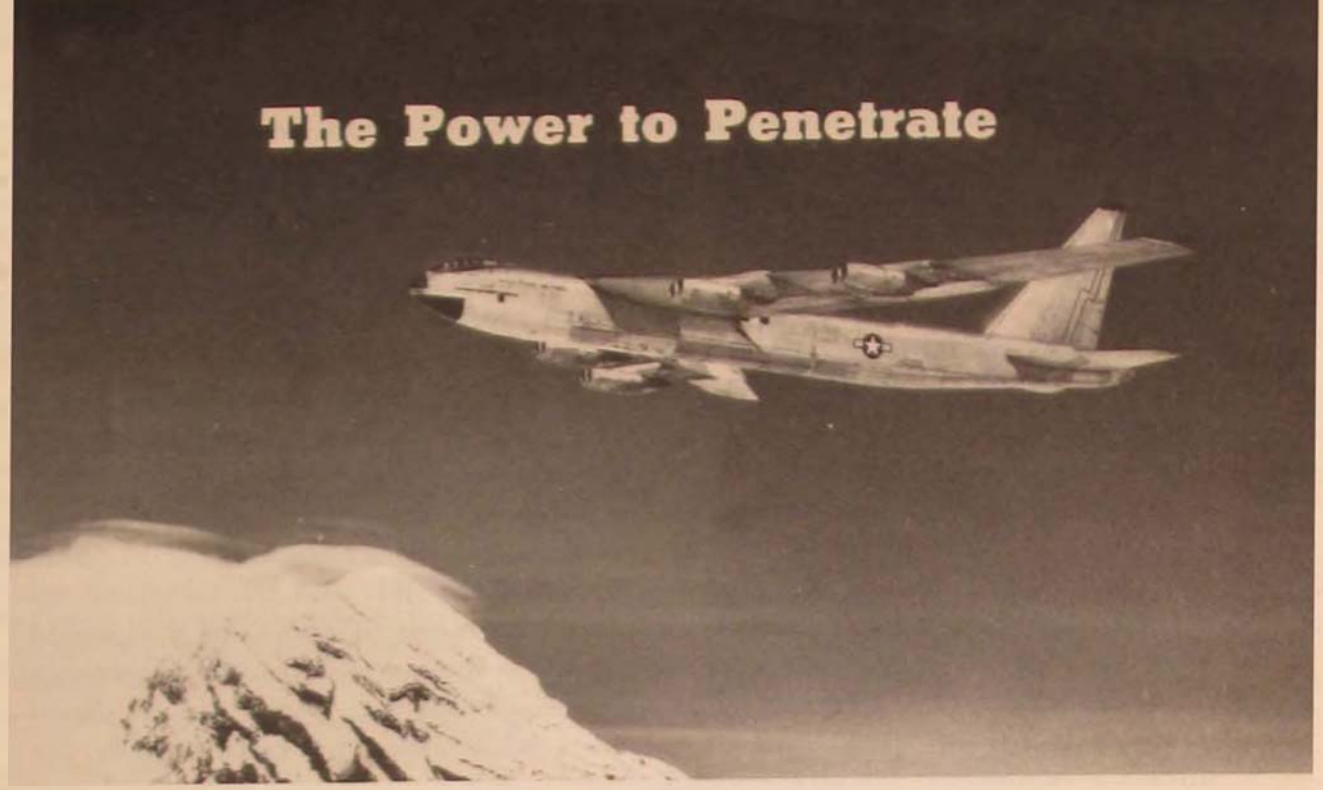
I can hear people remarking, "What a pipe dream! We'll be lucky to keep what we have in 1954. How can we hope to build an Air University of such magnitude?"

My answer is only to consider that such dreams have culminated with some fine service schools, such as Benning, Leavenworth, the Naval War College in Newport, and the National War College in Washington. Surely the need for education in the Air Force is as great today as it was in the past for the older services.

Will we keep the dream, believe in it, and bring it into reality before 2000 A.D.? We need it today, as the strong foundation of an enduring Air Force.

Headquarters, Air University

The Power to Penetrate



MAN'S history, legend, tradition, and much of his literature are laced with the continuity and development of land and naval warfare. The layman readily appreciates the importance and the implications of Patton's dash across France or the smashing of the Japanese fleet in the Battle of Leyte Gulf. But air power is new. Born of twentieth century technology, it is young, its growth meteoric. In spite of its tremendous contributions in World War II and in Korea, comparatively few men really understand its impact on military science. Thus when the Allies invaded Normandy in 1944 many people in and out of the services puzzled why the Luftwaffe did not swarm to attack the invasion beaches. A short time later they wondered why the Germans could not redeploy, reinforce, or supply their battered ground forces on the Western front. The public was simply unaware that Allied air forces had broken the back of the Luftwaffe, had paralyzed Germany internally, and had laid waste the transportation lines to France—all before the first Allied soldier landed on French soil. Again in the Korean War the public has not realized that throughout the war air forces were the primary offensive forces that first stemmed defeat, then wore away the enemy's strength, and finally pressed him to accept terms.

Now that possession of the atomic bomb might persuade the Communists that they have the lethal punch for world conquests, it is more important than ever that the Air Force speak out. It must make our own people aware, and our enemies aware, of the capability of a U.S. Air Force, properly manned and equipped, to bring devastating retaliation to the aggressor.

Air power alone can control the air spaces for offensive, defensive, and supply purposes and deny them to the enemy. Once the air spaces are dominated, air power can limit the enemy's use of the land and sea spaces below. A surface force cannot move in great strength nor act decisively if the air above it is filled with hostile aircraft.

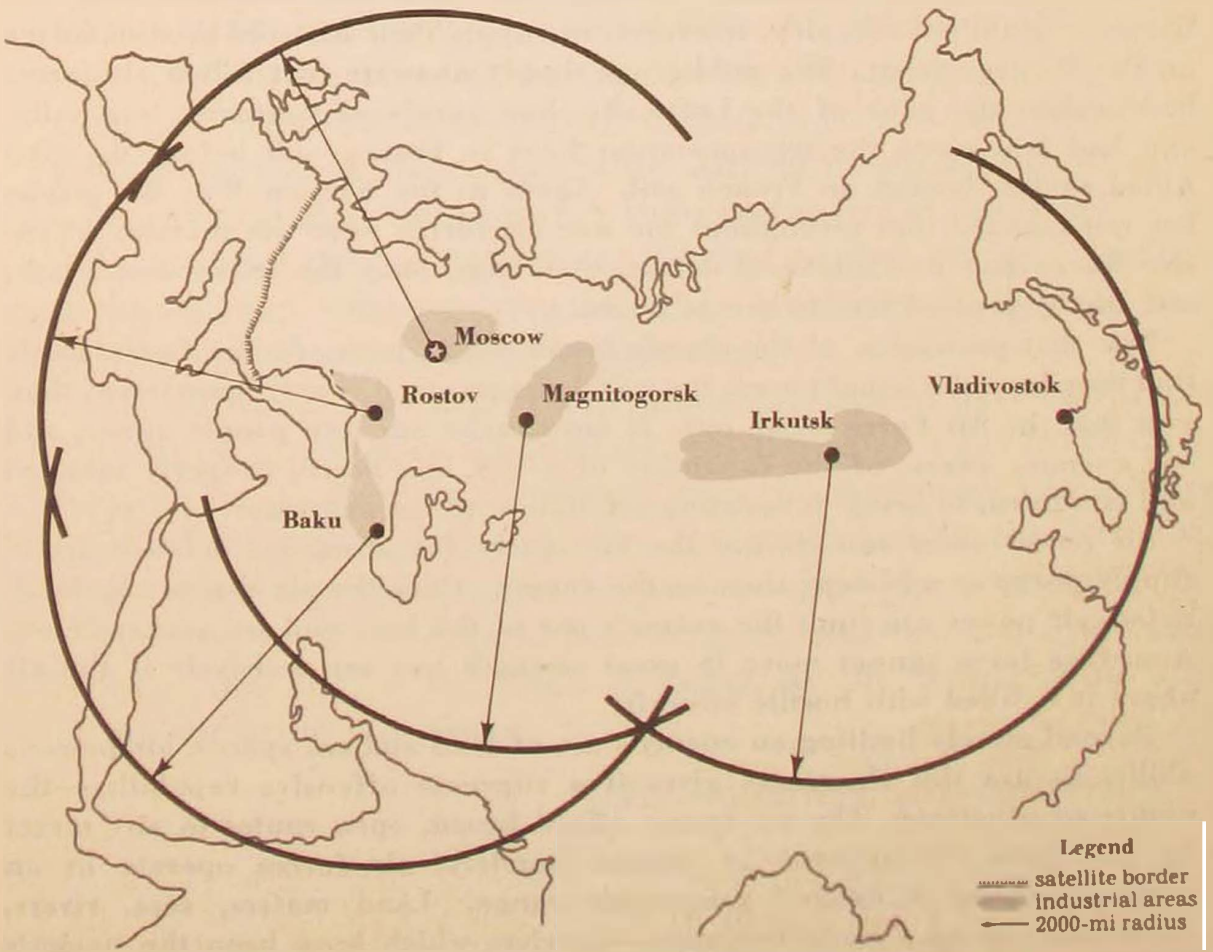
Beyond merely limiting an enemy's use of land and sea spaces, air power's ability to use the air spaces gives it a supreme offensive capability—the *ability to penetrate*. The air spaces afford broad, open routes to any target on the globe. Unaffected by natural barriers, air forces operate in an environment of unlimited geographic range. Land masses, seas, rivers, mountains, or man-made fortresses—barriers which have been the nemesis

of surface forces since the beginning of warfare—shrink to surface details of the terrain overflown far below. Modern long-range aircraft armed with the atomic bomb make vulnerable the entire spectrum of enemy targets, penetrating any land mass or ocean expanse with tremendous striking power.

In the past fifteen years proponents of air power have reiterated that the phenomenal degree to which air forces can realize the traditional principles of war such as mobility, flexibility, and concentration of force constitutes the revolution in war. The extent of that revolution is nowhere better shown than in the characteristic of air forces to make the inmost targets of any territory immediately accessible to overwhelming attack and destruction. This characteristic of air forces may well prove to be more important than any other military attribute if, for example, the Soviet Union should force us into a total war. In the age of the atomic bomb and the airplane we cannot expect the leisure to bring the enemy to terms by means of peripheral wars in which surface forces gradually claw their way into the enormous bulk of continental Eurasia. Our chances of survival would be in direct proportion to the speed and decisiveness with which we could smash the enemy's means of delivering the atomic bomb against our homeland and demolish the critical segments of his capacity to wage war.

The job may have to be done in critically few days—or even in hours—before we are mortally wounded ourselves, rather than in the years expended in pre-atomic wars. Only air forces can meet that deadline.

The U.S.S.R. and its European satellites stretch their vast area over the Eurasian continent. Shaded areas depict the heavy industry that furnishes the sinews of Soviet imperialism. The arcs struck from these areas join the places in the free world which are 2000 air miles distant from the Soviet heartland—a journey impossible for a navy, often years in length for an army, but only four hours by air.



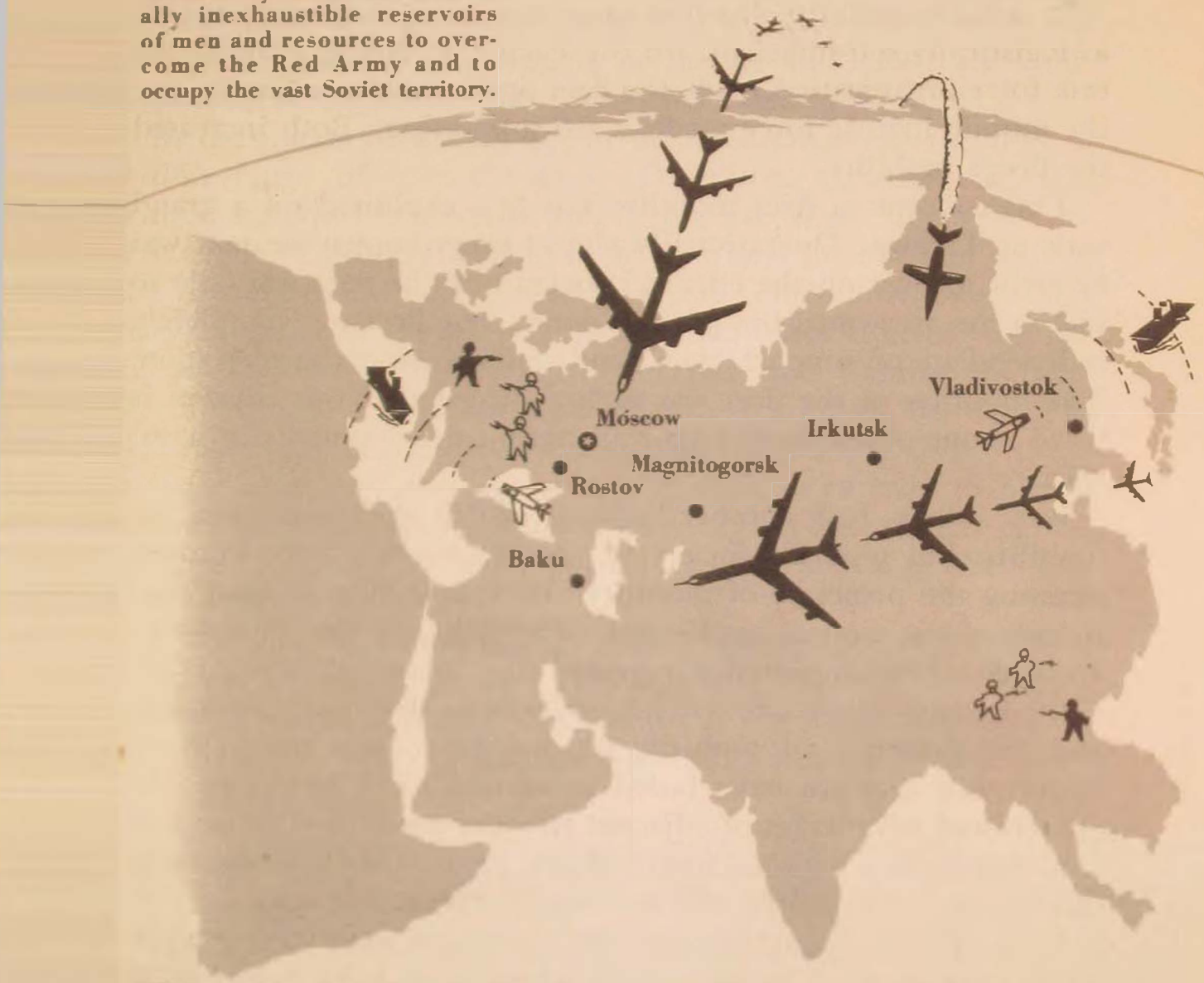
How Could the U.S.S.R.'s Heartland Be Smashed?

With a land invasion?

Napoleon and Hitler conquered vast areas of Russia, only to find final victory a mirage which their depleted armies could not overtake. Even the most mechanized army would need virtually inexhaustible reservoirs of men and resources to overcome the Red Army and to occupy the vast Soviet territory.

With pilotless aircraft?

For acceptable accuracy at the ranges required to strike targets within the Soviet Union, effective missile warfare may still be far in the future.



With carrier-based aircraft?

Those sea approaches to the U.S.S.R. which are ice-free are flanked by land under Communist Control. The history of the Second World War indicates that aircraft carriers for the most part were not committed in areas dominated by enemy land-based aircraft or submarines.

With nuclear-armed, land-based long-range aircraft?

Only land-based, nuclear-armed aircraft have the present means, in their globe-girdling base structure, to penetrate all the vast reaches of the U.S.S.R. and to cripple quickly Communism's war capacity with blows sufficiently devastating and sustained.

Big Ocean Navy in a Little Ocean War

Commander Carl H. Amme, Jr.

THERE is an axiom that the more dependent the fleet is upon support from land bases, the less mobile it becomes. To achieve mobility, the fleet must become operationally as well as logistically self-sufficient. In the Pacific in World War II, the task force organization made the fleet operationally self-sufficient; the mobile logistic force made it self-supporting. Both increased the fleet's mobility.

This concept of fleet mobility was first exploited on a grand scale at Tarawa. Operationally almost every known weapon was brought to bear on the enemy. Logistically the fleet was able to stay in the area until the job was done. The fleet was completely independent of support from land bases during the operation. The mobility of the fleet was such a success that this concept is rated as one of the most important recent developments in naval warfare.

But Mahan had another axiom: "Force does not exist for mobility, but mobility for force." Never sacrifice force by overstressing the principle of mobility. In World War II the signal success of the tactical application of mobility in the wide ocean areas of the Pacific actually increased the "force." As a result the United States Navy has tended to become "big-ocean" minded, and the principle of mobility has achieved such transcendent importance that we have failed in certain cases to exploit the operational advantages of adjacent friendly land-based forces and facilities to increase the "force" of the fleet. This is particularly true in the Japan-Korea and the Mediterranean areas.

In the Pacific during the last war operations were conducted in wide ocean areas. The only nearby shore bases were usually held by the enemy. Friendly bases were in most cases too far removed to provide operational support. The striking force found it had to look out for itself, and it did.

Today, at Korea and in the Mediterranean, conditions are different. Major operating areas are close to friendly bases as well as enemy shores. The operational self-sufficiency of the striking

forces, while maintaining its mobility, no longer adds to its strength. Self-dependence is not enough. Friendly shore-based forces and base facilities can help. This help should be exploited to increase the power of our striking force. Operational concepts must be changed to permit the fleet to operate in its fullest strength in the smaller seas of Japan and the Mediterranean.

THE modern fleet is made up of two parts: the striking force and the logistic force. The first cannot carry out its mission without the support of the second. Both are vital; both must be protected, particularly from enemy air attacks.

In the waters of Korea and in the Mediterranean the fleet is within range of enemy planes. Deception, concealment, and withdrawal into less vulnerable areas are used whenever the striking force requires refueling or resupply. Before and during the operation the fleet must carry out continuous search and reconnaissance of the enemy. It must maintain effective combat air patrols over both forces prior to and after joining up. But forces required to give adequate protection to both elements are lacking. Carriers and destroyers are in short supply. Since there is little likelihood that there will be enough carriers to attach to the logistic force to provide air cover, then the aircraft of the striking force carriers must protect both elements of the fleet. How is this to be done?

Jet aircraft are notably short-legged. Their endurance is low. They use a big part of their fuel in taking off and climbing to altitude. Range and endurance must be increased considerably to provide cover for both forces, especially when the logistic force

In considering the problems of operating an aircraft carrier force in seas dominated by adjacent hostile land areas and therefore by hostile land-based air forces, Commander Carl H. Amme, Jr., Air Plans Officer to the Commander-in-Chief, U.S. Naval Forces, Eastern Atlantic and Mediterranean, concludes that the carriers must rely on land-based aircraft for supply and reconnaissance. The Air Force can certainly agree with Commander Amme's basic statement, although it does not agree with his assumption of an affirmative answer to the larger question raised in Air Force minds—whether carrier aircraft, however alerted, refueled, or supplied, can successfully defend carriers against first-class, land-based air forces and still permit remunerative operations adjacent to hostile shores. Air Force strategists therefore could not agree that deployment of land-based air forces to accomplish these purposes is economically or militarily justified. The Editors of the *Quarterly Review* are pleased, however, to present Commander Amme's opinions.

is still some hundred miles away. In-flight refueling of jet fighters can give this increase. The Navy has developed a tanker aircraft, a modification of the AJ attack plane. This dual-purpose plane can operate either as an attack plane or a tanker. As a tanker it is designed to operate off carriers to refuel jet fighters after they are airborne, thus increasing their range and endurance. But the system has two significant weaknesses. First, the AJ can supply fuel to only a relatively small number of aircraft. Second, operating the AJ from the carrier as an inflight refueler cuts down the effective number of aircraft that can be launched into combat.

These disadvantages disappear if large shore-based tanker aircraft are used. In the restricted waters of the Mediterranean and at Korea where friendly shore bases are in easy distance, shore-based tankers can be used to increase the range and endurance of large numbers of carrier jet planes. The jet fighters of the striking force can then give the mobile logistic force as well as the task force the air protection they need. Defensively the fleet is stronger. Offensively the increased "force" is even more significant. Jet attack planes and fighters can be refueled at altitude over the striking force or en route to targets. Strikes can penetrate deep into the enemy land and hit vital targets otherwise out of range.

If large shore-based tanker aircraft can do all these things, then why hasn't the concept been adopted by the Navy? One answer is that the idea is new and hasn't been fully developed and tested. Second, the need for this increased air protection has not been demonstrated under wartime conditions.

In World War II ordinary deceptive and withdrawal methods were usually enough. Propeller-driven Corsair fighters, if required to protect the mobile logistic group, had more range and endurance and could remain on CAP longer. In Korea the fleet has enjoyed a somewhat spurious freedom from enemy air attack. The need to extend the range and endurance of the jet fighters in those waters has not been impelling.

Unfortunately in the war of the future to be fought in narrow seas, deceptive and withdrawal methods will no longer be enough, and propeller-driven fighters are no match against enemy jet planes, fighter-bombers, and bombers. There is no question that the enemy will be able to track our fleets in both Korean and Mediterranean waters continuously if he so desires. After finding us he will try to stop our punches merely by sinking our defenseless train. These oilers and ammunition ships must be protected. Carrier jet fighters, at the present time, are our best defense.

High-capacity, shore-based tankers, besides augmenting the

offensive and defensive strength of the fleet in the Sea of Japan and in the Mediterranean, can at the same time actually increase its effective mobility. The extra range and endurance afforded to the jet planes will widen the selection of launching and recovery points. Carriers won't be required to turn into the wind as often. Aviation fuel stocks aboard will last longer, and the striking force can venture further away from its train.

In the last analysis the question of mobility must be considered in relation to many factors. The fleet is always dependent on shore bases for aviation fuel, whether it is delivered to the carriers by fleet oilers or to the carrier aircraft by shore-based air tankers. In time of war both surface tankers and air tankers are vulnerable to enemy air attacks. But there is this to say: the air tankers can protect the sea tankers from these attacks by increasing the range of the carrier fighters to afford protection for all.

ADJACENT land bases are required in antisubmarine warfare. This is not meant to be a statement of the obvious, for antisubmarine warfare covers many techniques and tactics. In two fields of warfare against submarines that carrier aircraft handled in the "big-ocean" operations of World War II, shore-based patrol planes can take over in ocean areas close to friendly bases. These are hunter/killer operations and antisubmarine warfare (ASW) operations for the protection of the striking force itself.

As long as shore-based patrol planes are available and within a distance that will permit 24-hour coverage, there is no point in employing carrier aircraft in antisubmarine warfare. The larger patrol planes have more and better detection equipment, can carry more bombs, and have much more endurance. In sea waters close to friendly shores, patrol planes in conjunction with small ASW frigate-type vessels can do the job of submarine killing better than the carrier-destroyer hunter/killer groups of World War II. This makes the valuable carrier available for other fighting jobs. The waters around Korea and in the Mediterranean are ideally suited for the employment of shore-based patrol planes for this task.

It is the nature of the beast that enemy submarines will attack at the most unexpected places. The threat may appear in one area one week and in another sector many miles away the next. Hunting submarines at sea is one of the most expensive forms of warfare. It is absolutely prohibitive in cost to provide air coverage of all sea areas in which enemy submarines may attack shipping. To get around the cost, convoys are provided air and

surface escort, and aircraft are redeployed to different air bases to meet the current submarine threats.

In the ASW protection of the striking force itself, the same argument holds. Land-based patrol planes can do the job better than carrier planes, and there is the probability further that they can be made to operate as airborne early-warning planes to warn of approaching enemy air attacks. Patrol planes can provide ASW protection for the carriers whenever friendly shore bases are within easy range of major operating areas. They could not do so in the Pacific during the last war, and they still cannot do so in many ocean areas today because of the great distances involved. But in certain major operating areas like the Mediterranean and the Sea of Japan, shore-based patrol planes *can* be used to give ASW protection to the fleet. Shore-based ASW forces integrated into fleet operations will permit carriers to substitute more fighters and attack planes for the ASW aircraft normally part of their complements. This operational support from the shore certainly can strengthen the "force" of the fleet.

Again certain air bases are needed. But they are not needed exclusively for this purpose. The point of operational saturation in antisubmarine warfare limits the number of patrol planes that can be effectively operated from one base to around eighteen. Beyond that number is the point of diminishing returns. There will still be plenty of room on these fields for air groups devoted to other forms of air warfare.

FRIENDLY shore bases can be used as outposts of the fleet. Radar warning stations can be set up to give early warning of enemy attacks. In the Mediterranean in particular, stations along the friendly coast line between the striking force and the enemy can be used to flash the alert of enemy air strikes to the fleet. In this age of high-speed aircraft every second counts. A raid picked up over Sicily, Sardinia, or Crete adds many vital seconds to the time of intercept. The advantage of this added air raid warning cannot be over-emphasized, especially in constricted waters like the Sicilian straits. The distances there are short, and enemy planes may hide in the radar "shadow" of land masses to the last minute before making their attacks. Ship-board radar alone cannot be depended upon to give adequate warning. And radio and radar silence may be ordered to conceal movements of the force. In this case the shore radar stations will provide the

only early alert that the ships may receive before the enemy planes actually commence their runs.

The danger of these enemy air attacks is quite real. It must be remembered that the British had nearly 200 warships sunk in the Mediterranean during the last war. Of these one third were sent to the bottom by air attacks. It is no secret that the enemy mine and air threat through the Sicilian straits forced the Admiralty to divide the Mediterranean fleet into two major forces: one at Gibraltar and one at Alexandria. During the war it was normal practice for Force "H" at Gibraltar to turn back south of Sardinia, leaving the convoy to plug through "Bomb Alley" escorted only by destroyers.

The waters around Sicily would be no less dangerous in a World War III. The concentration of shipping there would make ideal hunting ground for enemy submarines and airplanes. Undoubtedly the enemy would attempt to mine them. In such waters the fleet must take full advantage of all the operational potentials of the surrounding friendly littoral. It only makes sense to tie shore-based radar into the air defense system of the fleet. Using shore-based radars in this manner is not something new. It is just a modern adaptation of the South Pacific "coast-watcher" who reported the movements of Japanese warships through the "Slot." There is one thing certain. If a modern "coast-watcher" shore-based radar station had been located at Savo Island, the battle would have had a different ending.

Operations in the Mediterranean and the Sea of Japan offer the fleet logistic air wings an opportunity to live up to their name in the fullest sense. Land bases are close enough to the fleet to permit door-step delivery of critical material. This delivery can be made day or night by employing carrier-type *transport* aircraft to make the final shuttle run to the carriers from distribution points ashore.

At the present time obsolescent combat types are utilized for this purpose. Their capacity and range are limited, and the service provided to the fleet falls far short of what is realy required. A brand new carrier transport design is needed, one that will combine excellent carrier landing features with long range and high cubic and weight capacity. Such a plane could deliver vital operations plans during periods of radio silence, critical materials following a period of intense operations, and key personnel to replace casualties.

There is no point in rushing key personnel by air all the way from the States to sit and wait for days and weeks for the mobile

support group to return to port in order that they may be eventually transferred at sea to the combatant ships to which they are ordered. The same applies to critical material. There is no reason to restrict intercourse only to those periods that the warships are in port or alongside support vessels which themselves have just left their bases. To do so would sacrifice the mobility as well as the strength of the fleet.

Much can be done on this score. Air logistic support from the nearby shores is an important technique in operations within restricted waters.

So far only the tactical aspects of force and mobility in relation to the friendly shore have been considered. Shore-based aerial tankers to extend the range of carrier jets; shore-based ASW aircraft to replace escort carriers and light carriers and to permit an increase in fighters and attack planes on attack carriers; shore-based radars to give early warning and to help in concealing the movements of the fleet; air logistic support direct to the fleet at sea —these are all factors in increasing the effectiveness of the striking force without sacrificing its mobility. There are others.

But beyond all this is the larger strategic question brought about by the change in the geographical complexion of the major operating areas. The Pacific and Atlantic of World War II were essentially great battlefields through which large, self-sufficient forces moved to join battle with the enemy. Possession of territory or actual segments of ocean area, while sometimes important, did not always affect the course or outcome of the engagements. Enemy-occupied islands were by-passed with impunity, and American task forces eventually moved in to launch strikes at the Japanese homeland itself.

The potentially explosive operations the Navy has been carrying out in the Sea of Japan and the wartime operations of the Sixth Fleet through the Mediterranean are quite different from the ocean operations of World War II. This difference centers on the more vital importance of control of territory in these two constricted seas. Without friendly control of the littoral, the operations of the fleets in these waters would be precarious at best and impossible at worst. Without the protective embrace of friendly shores the waters would become hazardous, and the fleet, continually subject to strong enemy air and submarine attacks, would suffer serious losses.

During the last war one of the most fateful decisions was made by the British early in 1940, the decision to hold on to Malta, to fight for the control of the central Mediterranean. Implicit in this decision was the intention to gain control of the Mediterranean, as an *area,* in order to use it as an Allied highway and base area from which attacks could be made on the southern flank of the enemy. There is no question that final victory *ashore* in North Africa was tied intimately to control of the sea.

The artificial situation in Korea which permitted our naval forces to operate relatively safe from enemy air and submarine attacks does not invalidate the vital importance of Japan and South Korea shores to successful naval maneuvers in these waters. In both the Sea of Japan and in the Mediterranean friendly shores make control of the sea possible. The strategic importance of these shores is generally understood and appreciated. The change in tactics and operational practices dictated by the geography of their adjacent restricted waters is not so readily accepted. It is a difficult thing to turn aside from the pattern of standardization drawn by a war-winning Navy in the wide Pacific. It is a hard thing to realize that in certain waters there can be closer coordination between ships and shore-based aircraft than ever was experienced before.

But the situation has changed. The "big-ocean" fleet must be prepared to fight a "little ocean" war. If mobility is to be retained, if the striking force is to be strengthened, then the operational advantages of friendly shore bases must be exploited to the fullest. The fleet must lose none of its punch in narrow seas.

U.S. Naval Forces, Eastern Atlantic and Mediterranean

The Attack on the Irrigation Dams in North Korea

A Quarterly Review Staff Study

On 13 May 1953 twenty USAF F-84 fighter-bombers swooped down in three successive waves over Toksan irrigation dam in North Korea. From an altitude of 300 feet they skip-bombed their loads of high explosives into the hard-packed earthen walls of the dam. The subsequent flash flood scooped clean 27 miles of valley below, and the plunging flood waters wiped out large segments of a main north-south communication and supply route to the front lines. The Toksan strike and similar attacks on the Chasan, Kuwonga, Kusong, and Toksang dams accounted for five of the more than twenty irrigation dams targeted for possible attack—dams up-stream from all the important enemy supply routes and furnishing 75 per cent of the controlled water supply for North Korea's rice production. These strikes, largely passed over by the press, the military observers, and news commentators in favor of attention-arresting but less meaningful operations events, constituted one of the most significant air operations of the Korean war. They sent the Communist military leaders and political commissars scurrying to their press and radio centers to blare to the world the most severe, hate-filled harangues to come from the Communist propaganda mill in the three years of warfare.

In striking one target system, the USAF had hit hard at two sensitive links in the enemy's armor—his capability to supply his front-line troops and his capability to produce food for his armies. To the U.N. Command the breaking of the irrigation dams meant disruption of the enemy's lines of communication and supply. But to the Communists the smashing of the dams meant primarily the destruction of their chief sustenance—rice. The Westerner can little conceive the awesome meaning which the loss of this staple food commodity has for the Asian—starvation and slow death. "Rice famine," for centuries the chronic scourge of the Orient, is more feared than the deadliest plague. Hence the show of rage, the flare of violent tempers, and the avowed threats of reprisals when bombs fell on five irrigation dams. Despite these reactions this same enemy agreed to sign an armistice less than one month later, and on terms which for two years he had adamantly proclaimed he would never accept—terms containing two provisions directly contrary to the announced Communist position: (1) a line north of the 38th parallel, and (2) voluntary repatriation of prisoners of war.

The Toksan-Chasan air strikes were an object lesson in air power to all the Communist world and especially to the Communists in North Korea. These strikes significantly pointed up their complete vulnerability to destruction from the air. More important, they indicated U.N. determination to increase pressure through air attack—a kind of war the enemy knew he could not survive. To the Communists the strikes may well have appeared to be the opening gun in a campaign to destroy the vital elements of his whole national economy—all basic elements required for continued military and political resistance.

The production of food in North Korea was the only major element of

North Korea's economy still functioning efficiently after three years of war. Despite the decisive military importance of the food supply and the irretrievable loss it would have been to the enemy, it had not been attacked by U.N. air during these years. The air campaign in the early days of the war had concentrated on paving the way for the Pusan break-out. Later it made possible the rapid drive to the Yalu, and shortly thereafter was the principal force responsible for stopping the auspicious Chinese Communist ground offensive south of the 38th parallel. The story of these phases of the air action in Korea is forcefully pointed out by the FEAF Commander, General Otto P. Weyland, in "The Air Campaign in Korea," *Air University Quarterly Review*, VI, 3 (Fall 1953), 3-28.

After the battle line stabilized and truce talks were begun in July 1951, FEAF's mission was to maintain military pressure from the air on the enemy in order to force an armistice. This FEAF did by providing round-the-clock offensive air action against the enemy's deployed military forces for over two years. Targets for air attack during this period ranged from front-line close support for U.N. ground forces to interdiction operations extending north to the border of the enemy's Manchurian sanctuary. Targets included every moving or stationary object of tactical value, the destruction of which would assist in attaining FEAF's objective of reducing the threat to U.N. ground forces and at the same time pressuring the enemy through the air. FEAF was always mindful of the theater political objectives and aware that sensitive targets did exist within North Korea—to attack which might disrupt the armistice or expand the war. The limited U.N. air forces were allocated to continuous pounding of only those targets directly related to the immediate military situation on the ground.

In June 1952, after 11 months of fruitless armistice negotiations, authority was granted to air forces in Korea to attack and destroy one of the so-called sensitive targets—North Korea's vast electric power industry. This was considered a test of whether destruction of sensitive enemy targets would goad the enemy into major reprisals. Electric power was attacked and destroyed in a series of simultaneous air strikes, and it became apparent the enemy was in no position for reprisals, nor did he wish to expand the war.

As the armistice negotiations dragged on and were finally suspended by the United Nations in October 1952, FEAF began targeting a second sensitive target system—a system so vital that its simultaneous destruction (like that of the electric power complex) might well produce sufficient military pressure to bring about immediate armistice agreement or even capitulation of the enemy armies. This target system was formed by the more than

The U.N. air attacks on the North Korean hydro-electric complex and on the irrigation dams have been cited among the important air actions of the Korean War. Each of the two target systems was of significant military value, but each was so entwined with political considerations that much deliberation preceded the final order to attack. Having studied the strikes on the hydro-electric system ("The Attack on Electric Power in North Korea," *Air University Quarterly Review*, VI, 2 (Summer 1953), 13-30), the Editors of the *Quarterly Review*, in conjunction with the Director of Targets and the Director of Reconnaissance, Hq FEAF, examine the irrigation dam target complex and review the air attacks on parts of the system.

twenty earthen and stone irrigation dams that furnished 75 per cent of the controlled water supply for the growing of North Korea's most important food, rice.

The immediate objective of breaking the dams was the wholesale disruption which a series of flash floods would bring to the entire west coast transportation system. This sudden and prolonged cut-off of the small amount of supplies getting through to the front could be fatal for the enemy. The destruction of the dams and flooding of the valleys would also turn North Korea from an exporter of rice (North Korea's only export surplus to be exchanged for war materiel) to a heavy importer of rice. But imported from where? Intelligence reports indicated serious rice famine in South China, the big rice-producing area of Asian Communism, which made it seem that little Chinese rice would be available for shipment to Communist armed forces in Korea. Soviet logistical support of the Communist armies in Korea included only "hardware." Even if rice should be imported from some source, it would have to pass over a transportation system already seriously overloaded and at the point of complete breakdown as a result of USAF day-and-night interdiction strikes. If 10 per cent of the imported rice got through—the percentage of other supplies successfully running the interdiction gantlet—this small quantity would be insufficient to feed armies. Hungry soldiers are poor fighters.

In the last part of April 1953, armistice negotiations were again resumed at the request of the Communists, only to fall into the familiar pattern of delay, stall, and stalemate. On 5 May 1953 a new impasse was reached at the conference table, and the U.N. Command warned the Communists, "Time in these talks is running out." Almost simultaneously FEAF attacked Toksan Dam—first in a series of strikes on five dams in the system.

Irrigation Dams: The Target System

THROUGHOUT the fertile valleys and broad lowlands of North Korea's Haeju peninsula many large earthen and stone dams impound the waters of small streams into reservoirs for the controlled irrigation of the "rice basket" of Communist North Korea. In a traditional war strategy these dams represent a target system of limited value. They constitute a certain unit of enemy resources, yet their destruction, in a static battle situation, could have only limited effect on the relative strength or disposition of the enemy forces.

But a theater air commander, responsible for planning and conducting air operations within the framework of an air strategy, could not consider these targets solely in relation to the front lines. Scanning the whole theater of war for all targets available to his air weapons, he must select for attack those whose destruction will effectively and economically accomplish the theater objectives. From this perspective certain of the irrigation dams appeared as targets of great significance—primarily of tactical and secondarily of strategic value.

Twenty dams in the Haeju area were selected for study to determine their value as tactical targets. With many it was found that floods resulting from breaching the dams would probably wash out whole sections of tracks and roadbed, undermine highways, destroy or weaken bridges, and inundate supply areas and military installations. It was determined that maximum

tactical results could be obtained at any time of the year, provided that the impounded water represented more than 80 per cent of the capacity of the reservoir. The resulting flash flood would constitute a critical, though temporary, blow to the west-coast main and secondary railroad and highway lines to the front.

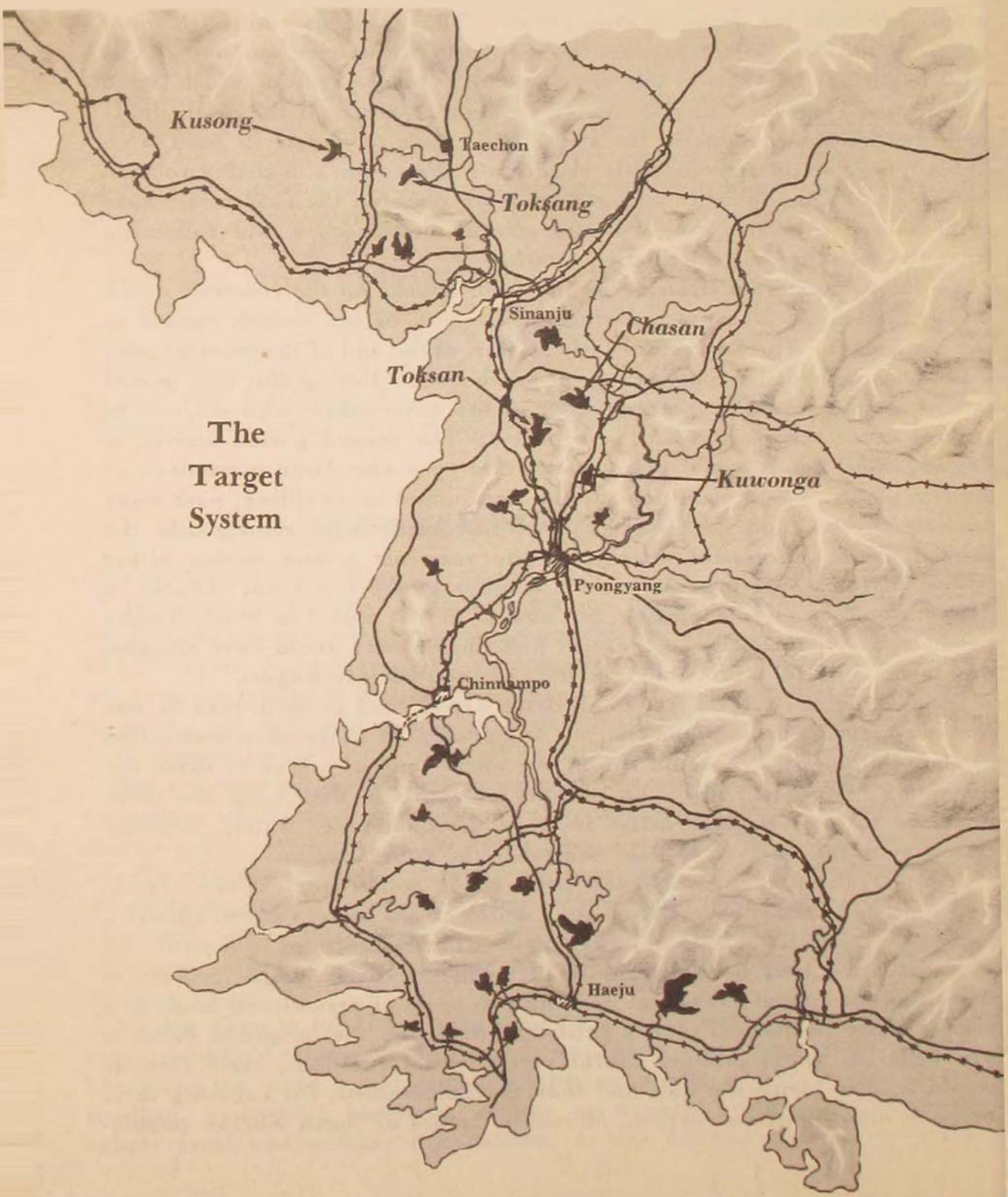
The strategic value of these targets stemmed from the vital relationship of the irrigation dam system to the enemy's whole national economy and the staple food supply of North Korea. Most of the rice produced in enemy-held areas of North Korea is grown in the valleys and low flatlands of the Haeju peninsula. In the south Pyongyang-Hwanghae region alone approximately 500,000 acres are planted in rice each year. Over 75 per cent of these important rice lands receive their water supply from controlled irrigation made possible by reservoirs. Less than 200,000 acres have a natural water supply sufficient for optimum crop growth. Thus a rigidly controlled water supply is the key to rice production. In North Korea rice was one of the most important elements in the war economy. The one crop of which North Korea grew a surplus, this rice fed the Communist army. If the local supply could be drastically reduced, the army would have to import its food from China. This would tremendously complicate the enemy's logistic problem. Not only was China already seriously short on rice, but the food would have to be moved over the supply routes already bottlenecked and collapsing from the relentless air interdiction attacks.

To obtain maximum strategic results from attacks on the reservoir dams, the strikes should take place during one or both of the periods critical to rice production. The first comes early in May, at the end of the transplanting season but before the roots are firmly embedded. During the first period excessive water would uproot numerous plants, cover others with silt, and in general cause the planting to be repeated. The second period arrives in August, when floods would permanently destroy a very large percentage of the rice plants. Flood conditions at any time would cause silting, wash away valuable topsoil, and increase the need for fertilizer to reinvigorate the flooded areas. Successful attacks on the reservoir system during either critical period would produce serious damage to the rice crop. Attacks in August would be more damaging, but attacks in May would be most effective psychologically, since the government and the farmers would have all summer to contemplate a probable repetition of the strikes in August.

For maximum strategic results all dams would need to be broken in one concerted attack on the whole system. Any attempt at progressive destruction by staggered air strikes would tip off the enemy and give time to drain the remaining reservoirs. Since the primary objective in destroying the dams would be to loose the destructive force of the impounded waters, lowering the water in the reservoirs would neutralize the target system.

It was realized that Communist propaganda would immediately scream that food had been snatched from the mouths of old folks, women, children, and babies. But if the sole objective of the attacks had been to destroy rice lands, it could have been accomplished by the relatively simple process of breaching the coastal dykes and flooding vast areas of agricultural lands in a region where no tactical targets existed. Attacks on the irrigation dams, it was believed, would produce useful psychological reactions, since farmers would tend to blame the war, and thus the Communists, for exposing their crops to attack and destruction. Moreover studies of North Korean popula-

tion trends indicated that less than 50 per cent of the 1950 civilian population still inhabited the land. Intelligence reports confirmed that "undesirable" farm personnel had been removed and their lands assigned to "loyal" farmers. Since all lucrative farm areas were under close control of Communist officials and government quotas were placed on rice production, most farmers in North Korea provided direct support to the Communist armed forces. Government rice quotas took the major portion of the crop, leaving the old folks, women, children, and babies to find what food they could. Ultimately, as has always been true, military decision must weigh the values of a proposed action in terms of its immediate military significance as opposed to its long-range effect on the public. The justification for over-



whelming pressure is that the enemy is quickly forced to terms rather than slowly and painfully whittled down to where he can no longer resist.

If the over-all theater objectives included war against the nation or forcing the enemy to meet terms, the strategic intent of breaking the dams would serve that objective as perhaps no other target could. And in striking the dams at one of the two times in the year when the target had strategic value, the tactical benefits would still occur. If attacked at any time other than spring or fall, only the tactical benefits would be gained.

If the theater objective was to attrite the enemy or a limited offensive to push him back for geographic advantages, attack any time of the year would be extremely helpful. It would not only cut off the flow of logistic support to the front by interdicting the vital lines of supply but would also destroy the rat-holed supplies dispersed throughout the valleys and rural villages and would destroy farm buildings and haystacks used to camouflage military stockpiles. The repair effort the enemy would have to throw into the flooded area would curtail the support activities of his armies and diminish his front-line capability for defense.

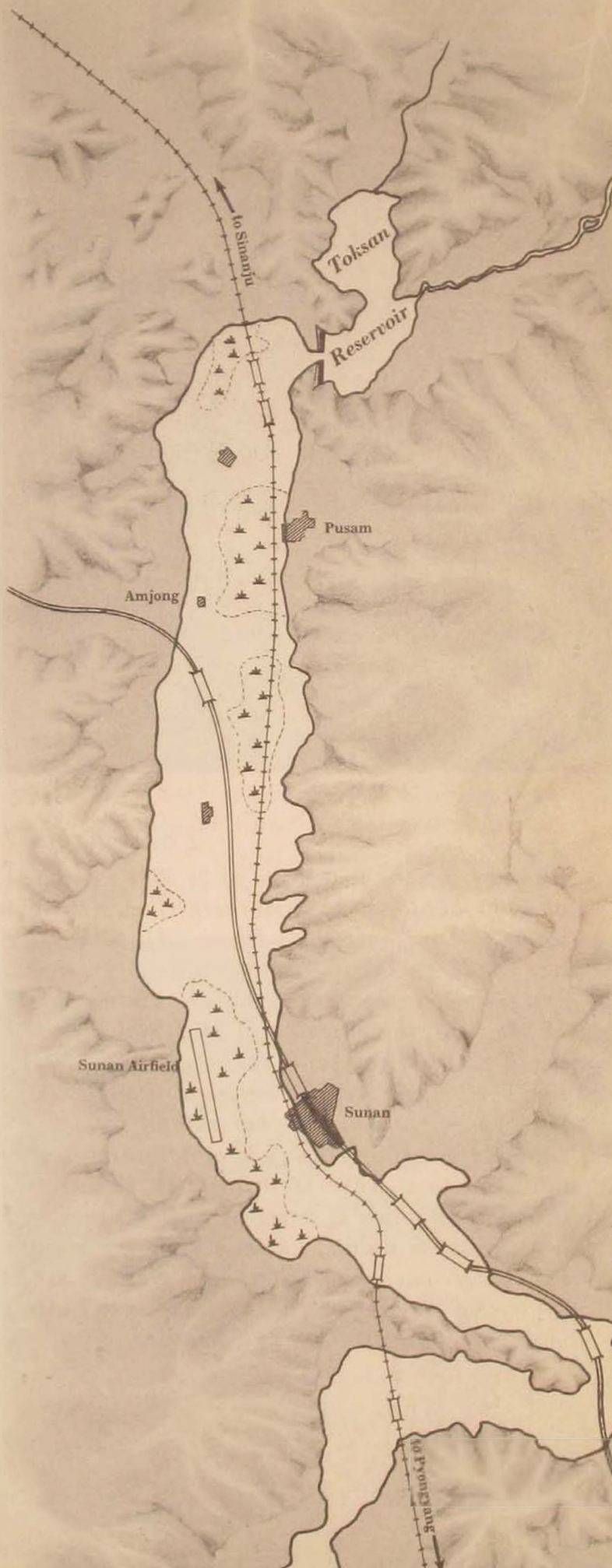
The Toksan Strike

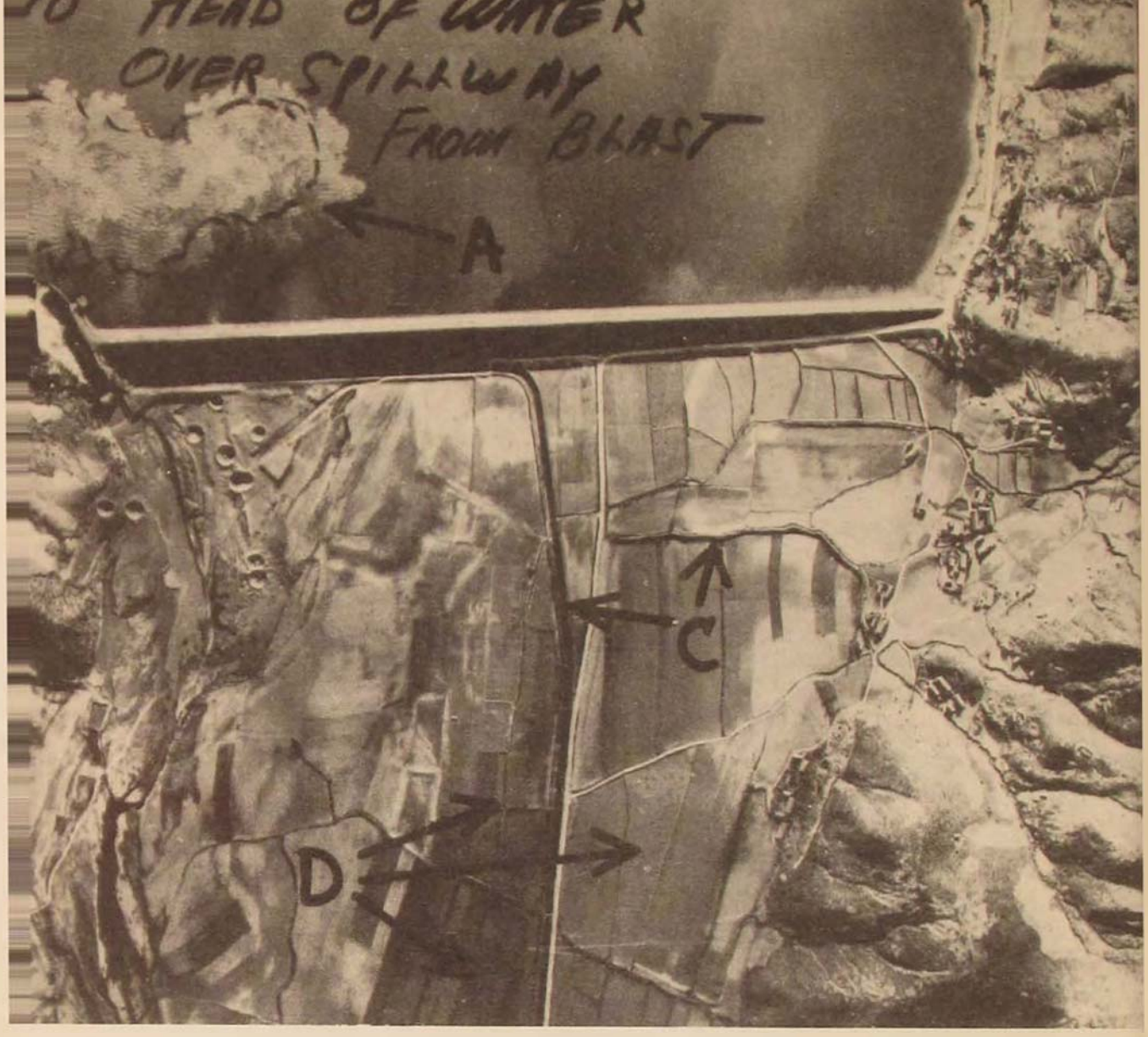
This pre-strike composite aerial photo shows the earthen and stone Toksan irrigation dam. Located about 20 air miles north of Pyongyang, the dam (A), 2500 feet long and 270 feet thick at its base, backs up the good waters of the Pot'ong River into a three-mile-long, one-mile-wide reservoir. Controlled water for thousands of acres of rice paddies flows from the base of the dam through irrigation canals (C) and (D) which snake down each side of the river valley. These canals in turn feed water to the paddies through a spiderweb of auxiliary channels. Seventy-five per cent of the rice in North Korea is grown with aid of similar reservoirs and irrigation networks. One of North Korea's main rail supply routes (B) from Manchuria to Pyongyang (via Sinanju) enters the valley from left of picture, crosses below Toksan dam, and runs the entire length of the river valley to Pyongyang. Numerous bomb craters indicate the scale of interdiction strikes against the railroad, although the nearby dam had been untouched. The area is loaded with prepared antiaircraft artillery and automatic weapon emplacements, all of them unmanned (E). A main north-south highway runs down the valley toward the capital city of Pyongyang.

Toksan was hit by 20 fighter-bombers of the USAF 58th Fighter-Bomber Wing on the afternoon of 13 May 1953. Darkness prevented post-strike surveillance. Pilots reported a small trickle of water down the face of the dam to the left of the spillway. When the planes of the "follow up" strike arrived at Toksan on the morning of 14 May, they found a section of the dam had collapsed during the night and the impounded waters had gushed through a 430-foot breach (A). This photo, taken at 0900 14 May, shows the striking results of the attack. Direct hits on the dam had weakened one section and caused a small breach that rapidly eroded during the night and emptied the reservoir. The channel dug by water cascading through the breach was cut far deeper than the base of the dam. Post-strike photography on the morning of 14 May revealed 27 miles of river valley completely flooded by the onrushing waters. Arrow (B) shows over 6000 feet of washed-out railroad bed, plus the elimination of the by-pass track, and 3 washed-out rail bridges. The track and bridges were part of the Kyongui main line railroad—supply route from the Yalu to front lines. The flood accomplished completely what dozens of interdiction strikes on the same section of rail bridge and roadbed had only partly achieved.

Toksan Flood

Twelve miles of the 27-mile length of the washed-out Pot'ong River valley from Toksan dam to the river mouth at Pyongyang. Flood waters were released by the successful attack on Toksan Dam on 13 May 1953. Toksan Dam was selected as the first of the irrigation dam attacks because of the strategic value of the valley below the dam. The important Kyongui main line railroad, connecting Sinanju with Pyongyang, ran the complete length of the valley from Toksan Dam to Pyongyang. The main highway route from Sinanju to Pyongyang also entered the valley south of Amjong below the dam and ran down the valley through Sunan to Kangdaedong, just north of Pyongyang. Complete statistics of damage includes: over 6 miles of rail line destroyed, 5 rail bridges destroyed or damaged; 2 miles of highway destroyed, 5 highway bridges destroyed or damaged; 700 building destroyed, 877 buildings damaged; Sunan airfield flooded and washed out; part of the town of Sunan flooded; 8 occupied AAA gun positions and an unidentified underground installation flooded; many sections of rail line and highway and many rail and highway bridges probably undermined or weakened by flood waters; inestimable damage to thousands of acres of growing rice; miles of irrigation canals washed out or silted. Flood conditions extended as far downstream as Pyongyang, causing considerable damage to the capital city.





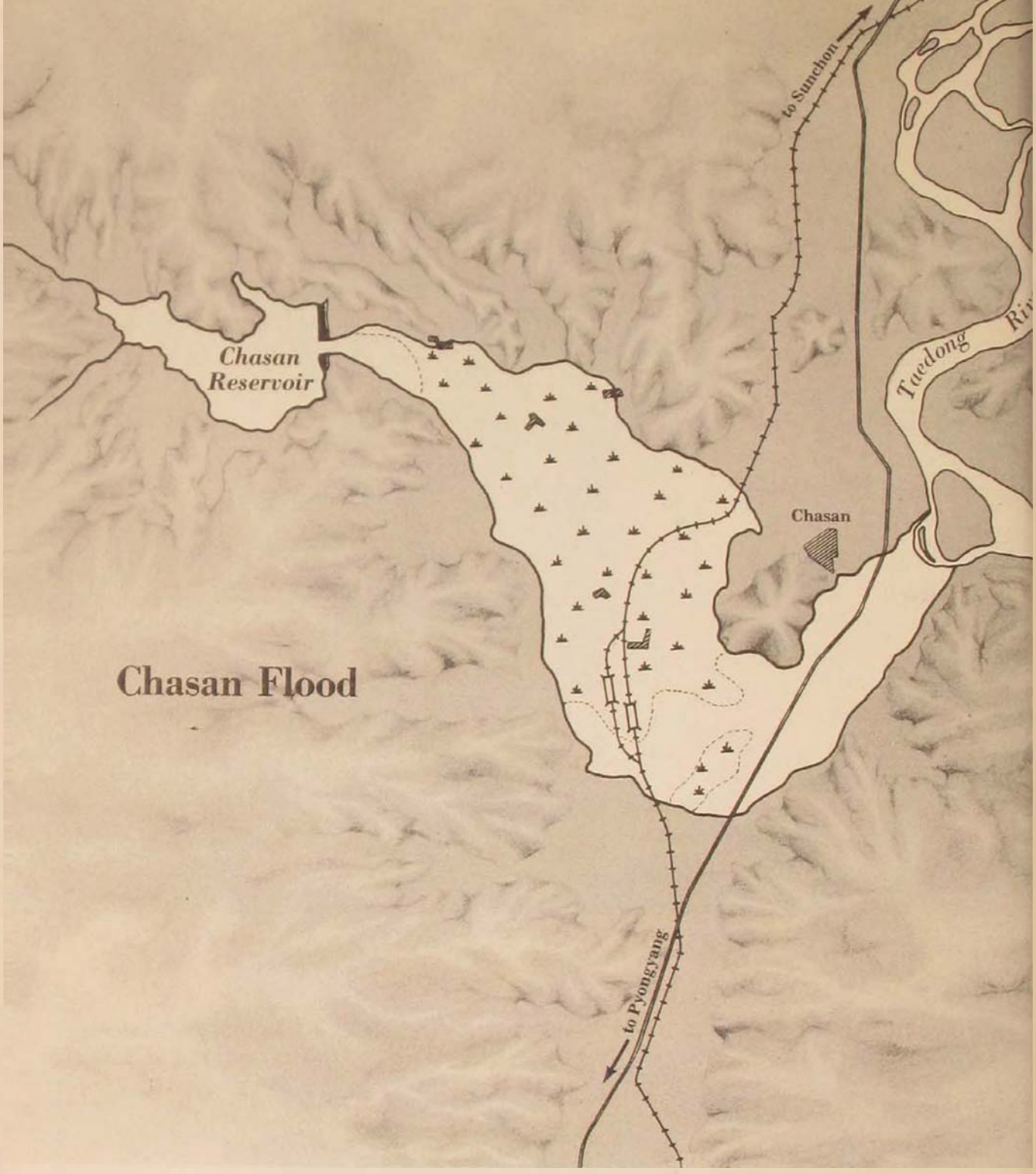
The Chasan Strike

Bombs from the first wave of 24 F-84's explode underwater (A) near the inside base of 2400-foot-long, 220-foot-thick Chasan irrigation dam, causing a 400-foot head of water to pour over the spillway (B). The successful dive-bombing attack on Chasan was made on the afternoon of 16 May 1953—three days after the Toksan strike—and followed two unsuccessful dive-bombing attacks made by 24-plane formations on 15 May and the morning of 16 May. Through an irrigation network (C) similar to the Toksan system and spider-webbing down a broad flat valley which runs into the Taedong River, the waters of Chasan reservoir irrigate thousands of acres of rice land. The paddies (D) that extend from the base of the dam down the valley are representative of this rich agricultural section. Several miles below the dam a vital rail line—from Manchuria to Kaechon to Sunchon to Pyongyang—crosses the broad valley over a series of rail viaducts and bridges. A main highway, connecting the same points, likewise runs for many miles across the low flatlands of the valley. It was estimated that a major wash-out on this rail and highway system, following closely on the heels of the Toksan raid, would close the enemy's two main north-south lines of communication and transportation for over two weeks.

Aiming at the hard-packed earthen and stone surface walls of the 230-foot thick Chasan Dam, the second wave of F-84 fighter-bombers pinpointed their bombs. A stick of bombs sliced obliquely across the dam—five direct hits in a concentrated area—and opened the original breach. Underwater bomb bursts behind the dam had already set in motion of small tidal wave which greatly widened the breach. Photo above, taken a very short time after the dam was broken, shows the swirling waters of the 1½-mile-long, 1-mile-wide reservoir pouring through a 150-foot breach —beginning a devastating flood vividly recorded by aerial cameras in succeeding photos. Onrushing waters surged over field after field of young rice. Bridges were washed out; rail trackage and highways were undermined. The photo below, taken about one half hour later, shows that the jagged breach had widened to over 200 feet and that the flood waters had spread out over the entire valley.

The devastating flood waters raced down the valley from Chasan, washing away everything in their path. Here (Photo 1) a section of one of the two main rail supply routes to Pyongyang is disintegrating under erosion. The buildings in the center of picture were soon undermined and collapsed. Photo 2 shows a small village in the irrigation section of the valley just before it was surrounded by the swift waters and washed downstream. Photo 3 is a dramatic view of the flood waters advancing on the village (A) and rail switch yard (B) of Pyongdong. Numerous bomb craters indicate previous air attacks on this supply center and rail switchyard. Tons of supplies and war materials (C) lie stacked or hidden in trenches around hills behind the village. Rural villages such as this were much used by Communists to store supplies—shielding their war build-up behind defenseless farmers and counting on the U.N. to restrict itself to traditional methods of waging war.

The breaking of the irrigation dams gave the Communists a dose of their own war-making medicine. So sure were they that the USAF would never resort to non-traditional war tactics, such as striking an element of the national economy affecting the whole nation, that the attacks came as complete shock. They produced the most violent propaganda reactions of the whole war. Scenes like the ones shown in this series of photos could have been multiplied at more than twenty irrigation dams.



Outline of the principal area washed out by the Chasan flood, from the foot of the dam to the Taedong River. One of two main rail and highway lines connecting Pyongyang with Sunchon, Kaechon, Sinanju, and the Manchurian supply areas extended for several miles across the broad, flat valley. With the Toksan strike completely cutting one main north-south transportation artery and the Chasan strike cutting the other, UNC estimated that all south-bound supplies destined for the western part of the front lines would be stopped for two to three weeks. Strikes such as these, with a ground offensive timed to coincide, can be decisive in war. Total damage caused by the Chasan flood includes: 2050 feet of rail track completely washed out; 9000 feet of rail track undermined and weakened by inundation; 2000 feet of rail by-pass washed out; two major railroad bridges destroyed; three miles of highway weakened or washed out by inundation; 18 buildings destroyed, 50 seriously damaged; miles of irrigation canals and connecting irrigation network washed out or silted; tremendous destruction of the rice crop and damage to flooded agricultural lands. The flood waters surging down the Taedong River inundated large parts of the North Korean capital city of Pyongyang.

Additional Strikes

The Kuwonga Strike

FEAF Bomber Command was ordered to attack the third irrigation dam—Kuwonga. Located about halfway between Chasan and Pyongyang. Kuwonga Dam backed up a small river flowing south out of the central mountain range towards the Taedong River. The fertile agricultural lands irrigated by the waters from its reservoir were crossed by the main highway and the rail line connecting Kaechon and Sunchon with Pyongyang, the same routes which the Chasan flood had washed out 15 miles to the north. Breaching Kuwonga would cut another 10 miles of this important supply lifeline. It would test the feasibility of medium bombardment against this type of target and its relative effectiveness in comparison with the fighter-bomber strikes.

On the night of 22 May 1953, seven B-29's saturated the dam and surrounding area with 56 2000-pound bombs fused to stagger the explosions. A number of direct hits tore into top and sides of the packed earthen surfaces. But by this time the enemy had learned from the Toksan and Chasan disasters, and had devised emergency procedures. The water level of the reservoir had been lowered to a point where nothing less than a complete, wide break in the dam would release a flood of the Toksan and Chasan magnitude.

Kuwonga was attacked again on 29 May. Fourteen B-29's dropped 112 variously-fused 2000-pound bombs, registering many direct hits on the dam. Again the enemy had drained the reservoir. The target no longer lucrative, the operation was discontinued. Shortly afterward, the Communists resumed repair work and refilled the reservoir.

Kusong and Toksang Dams

The last series of strikes against the irrigation dam system fell on Kusong and Toksang dams, the one 25, and other 35 miles northwest of the large enemy communication center at Sinanju. Kusong Dam opened into a broad, flat, rice-producing valley terminating in the Taeryong River below Taechon. About 8 miles of the north-south single-track Chongsu rail line and a parallel main highway connecting Kusong with Chongju crossed the valley below the dam. Another highway connecting Kusong and Taechon also followed the valley for several miles west of Taechon. The valley of the Toksang Dam broadened as it angled toward Taechon where it also emptied into the Taeryong River. Crossing it were several miles of the north-south highway out of Taechon to Sinanju.

Breaking the Kusong and Toksang dams and flash-flooding their valleys would break two of the six main west-coast supply routes leading from Manchuria and converging from the north on Sinanju. With the Toksan-Chasan floods eliminating the two main routes south of Sinanju, Communist logistics would be temporarily paralyzed. The Kusong-Toksang valleys contained thousands of acres of fertile rice paddies laved by the controlled water supply flowing from the dams through vast networks of canals and irrigation ditches.

The Kusong Strikes

On 13 June 1953 fifty-four fighter-bombers skip-bombed Kusong. The first wave of 26 F-84's appeared on target at 1700 hours and concentrated their bombs beneath the water level near the center of the reservoir side of the dam. Ten minutes later the second wave of 28 F-84's came in from the other direction, hitting the outside face of the dam opposite the point hit by the first strike. Reconnaissance late in the evening revealed that despite the underwater bursts, six craters directly below the dam, and eight direct hits on the crest, the dam, though greatly weakened at the center, had not been breached. The next day, 14 June, 41 F-84's attacked again. Reconnaissance showed five new craters on the crest. Huge piles of dirt had already been stacked near the craters indicating the intensity of the efforts to forestall any seepage and prevent the dam's destruction. Aerial photography on 15 June revealed frantic repair activity on and around Kusong.

On 16 June 8 F-84's and 16 Marine Corsairs struck again, cutting a deep 3-crater swath across the dam's south-center section. The enemy was alert for this attack, and his quick repair narrowly averted a catastrophe of Toksan-Chasan proportions. But only two flimsy crater ridges now held the water in the reservoir.

Returning on 18 June to deal the *coup de grâce* to Kusong, 7 F-84's and 16 Marine Corsairs found the enemy had drained the reservoir to prevent the weakened dam from breaking and to facilitate the repairs. Without the force of the impounded waters to provide the break, the bomb damage of this strike was fruitless.

The Toksang Strikes

Forty minutes after the initial attack on Kusong on 13 June, at 1740 hours 40 F-84 fighter-bombers slashed at Toksang with the same "pincer" tactics used on the Kusong strike. The bombs did little more than dent the hard-packed earthen and stone surfaces. The following day, 56 fighter-bombers in three waves again struck Toksang, registering many hits—9 directly on the crest—but still the dam held. Heavy truck and vehicular activity indicated that repair effort had been quickly organized.

On the night of 14 June ten B-29's dropped 120 1000-pound bombs on the target, leaving four large new craters on the crest and over 60 at the dam's base. Numerous buildings in the area were destroyed. Reconnaissance the next day revealed unusually heavy repair activity. The medium-bomber strike was followed on 18 June by 8 F-84's and 16 Marine Corsairs. The same night 16 B-29's dropped 154,000 pounds of instantaneous and delayed-action bombs, demolishing the west-northwest end of the dam. Reconnaissance on 19 June revealed Toksang badly battered but still serviceable. The water level had been lowered to prevent a breakthrough. Forced-labor battalions were feverishly filling craters.

On 20 June further operations against Kusong and Toksang dams were cancelled in favor of strikes against rail and supply centers and close support of front-line ground forces.

The series of air attacks on five of the dams in the system provided the Communists a sample of the fatal military pressure which U.N. air forces could apply through a concerted and simultaneous attack on the whole irrigation system. The "writing on the wall" was sufficient. The over-all

attack plan, held in abeyance by FEAF pending development of the truce negotiations, never had to be scheduled.

The Enemy Reaction

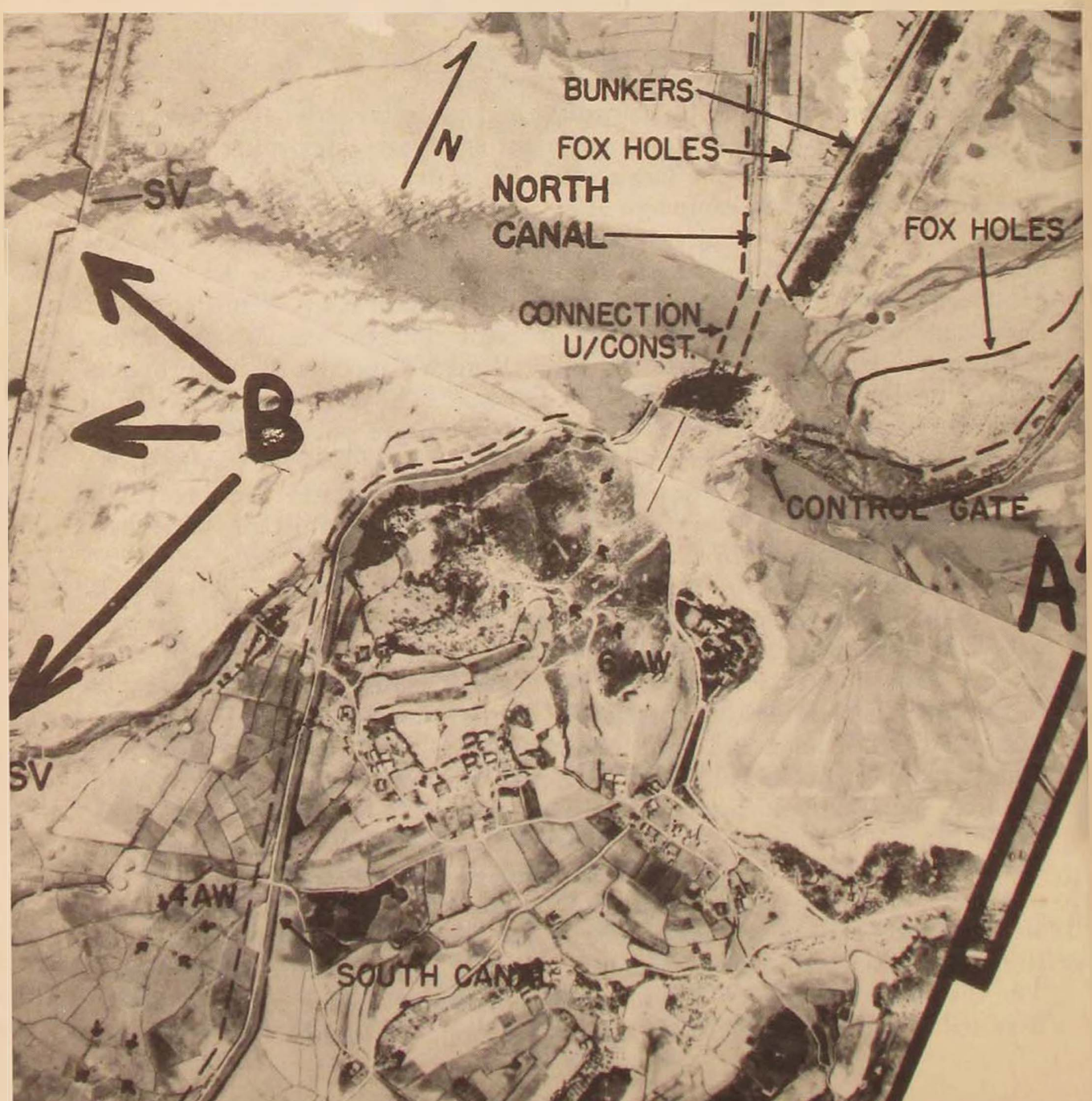
IMMEDIATE enemy reaction to the bombings took the form of the most vindictive, vitriolic propaganda indictments made against the United States in the three years of the Korean war. Attacks on the precious water supply had struck where it hurt the most. The enemy could sustain steady attrition of war materials inflicted by the USAF day-and-night interdiction program, so long as at least a minimum quantity arrived at the static battle front. He could stand the loss of industry, so long as the loss was offset by procurement from Manchuria and Soviet Russia. He could sustain great loss of human life, for life is plentiful and apparently cheap in the Orient. But the extensive destruction and flood damage to his two main rail lines into Pyongyang was a critical blow to his transport capabilities. Not only was he faced with a tremendous reconstruction problem involving replacement of miles of track, road-bed and bridges, but the impact was further compounded by the coincidental flood damage to large areas of agricultural lands, which seriously threatened his basic source of military food supply.

The strikes were followed by immediate and extensive radio and newspaper blasts labeling the United States "imperialist aggressors attempting to destroy the rice crop by denying the farmers the life water necessary to grow rice." A concerted propaganda campaign attempted to make the world believe that the whole irrigation system lay desolate and the entire Korean rice crop destroyed. In vengeful broadcasts to all Asia and the West the Red propagandists gave the impression that dozens of irrigation dams were destroyed. Each dam was referred to by seven or eight different names—alternating between its Japanese name, two or three Korean equivalents, the province name, a nearby village name, or a fictitious name. The goal—to marshal world opinion against this type of warfare, to bring censure on the United States Air Force, and to generate international pressure in the hope of forcing U.N. air forces to spare the irrigation dams from future air attack. Fully realizing what air attacks on the other dams would mean, Communist propagandists used every devious trick in their trade to forestall them.

Reactions at the destroyed dam sites were equally strenuous. A study of post-strike aerial reconnaissance of Toksan Dam reveals repair activity unequalled during the Korean War. Only the efforts to repair the damaged bridges across the Yalu approached the Toksan effort. Some indication of the enemy's desperate straits is shown in the vigor of restoring the vital dams and washed-out rail and highway lines: over 4000 laborers were immediately dispatched to Toksan to repair the dam and the flood-damaged rail line, highways, and bridges. A special railroad was constructed to bring in the heavy equipment and the repair materials. The work was carried out round-the-clock, with complete disregard to the delayed-action bombs strewn over the target area. Had this level of activity been simultaneously required at 20 irrigation dams, the magnitude of the repair job would have severely strained the military support resources of the Communists in North Korea. The diversion of 20 times this amount of personnel and equipment would have materially affected military operations along the battle line.

Repairs, Most Urgent

Aerial reconnaissance of Toksan on 23 May (not shown, but keyed to photo below), 10 days after the breaking of the dam, revealed a temporary dam (A) under construction and 30 per cent completed. This temporary wall was constructed to divert waters around the 450-foot gap in the main dam. The north irrigation channel was being cleared of silt. The main line rail track and two rail bridges (B), washed out directly below the dam, were under repair with 60 per cent of the track ready for laying and 30 per cent of the road bed serviceable. The two rail bridges were still out. Heavy equipment, including bulldozers, road graders, and hundreds of trucks, was noted in the area. Approximately 4000 laborers worked feverishly on repairs. Six antiaircraft automatic weapons had been moved in near the dam. Three days later (see photo below)—13 days after the original strike—the temporary dam was completed, the two railroad bridges were in place, and the entire main stretch of rail line serviceable—an engineering feat next to phenomenal. Intense repair activity was noted on the north canal. A connecting canal between the control gate and the north canal was under construction. Two additional groups of 4 automatic weapons had been added west of the 6-gun automatic weapon position.



Cover on 10 June indicated the main dam was partially rebuilt and that a rail by-pass had been begun and almost finished in the five days since the last coverage. All of its roadbed was serviceable, but work still continued on three bridges. Preliminary repairs were shown on cover on 5 June. The temporary dam had filled to capacity. Both north (A) and south (B) irrigation channels were carrying water. Some 270 new buildings had been erected, probably to house the workers. An 8-gun heavy antiaircraft battery had been set up southeast of the dam. Approximately 50 trucks and several thousands of laborers were working on the main dam.

On 20 July, just 67 days after the strike which destroyed Toksan and washed out the valley, the main dam was almost completely repaired. Water in the reservoir was rapidly rising to pre-strike level and had covered the temporary dam. The north and south irrigation channels were in full operation, and the rail line and highways again carried supplies to Pyongyang and the front lines. Six automatic weapons had been permanently placed just south of the dam, while the 8-gun heavy antiaircraft battery was still about a half mile to the southeast. In rebuilding Toksan Dam, the Communists used the "double-wall, hand-fill center" method. The first step (completed in photo) entailed construction of one wall on the inner or reservoir side of the dam. Another wall was then built on the outer side (still under construction), and the center space between the two walls was filled with hard material—probably dried clay and rock. The completed structure was then faced with rock and sandy loam.

The rapid and almost phenomenal repair of Toksan was duplicated at the other sites—Chasan and Kuwonga, Kusong and Toksang. By the sheer bulk effort of thousands of regimented laborers in well-organized labor battalions, the enemy again demonstrated to the West the amazing recuperative power which alone enabled him to survive constant United Nations air attack throughout the war. That the North Koreans and Chinese were furnished technical "know-how" and skilled supervision by Soviet engineers and scientists is substantiated both by the amazing engineering ingenuity with which they repaired the serious damage from devastating air attacks and by authoritative intelligence reports coming from inside enemy territory.

That the enemy immediately threw the greatest repair effort of the Korean War into the irrigation strike areas leads to interesting speculations in regard to his pre-armistice military position in Korea and his future intentions.

The two main rail and highway lines washed out by the Toksan and Chasan floods provided logistic support to Communist military forces on the western half of the front. Both lines were repaired and serviceable in less than 14 days—only two thirds of the minimum time estimated by FEAF intelligence. It is quite possible that their incredible repair efforts were spurred by a lack of reserve stockpiles of food and ammunition on the front, so that a cut-off of the main supply pipeline for more than 14 days would have been critical.

The order of priority of the enemy's repair efforts was (1) rail and highway lines—to resume logistics support for front line armed forces; (2) irrigation channels and canal network—to control water for rice growth; and (3) the main dams—to provide surplus water and to ensure flood control.

The first and second jobs were accomplished within 14 days after the strikes, indicating their repair was essential to the military position and to the success of the rice crop. The dams were repaired several weeks before the armistice was signed. This might indicate the Communists always intended to sign an armistice despite threats to break off the talks, insistence on recapture of the liberated prisoners as an "absolute prerequisite to an armistice," and the slow-down technique of negotiation. Otherwise why throw tremendous effort into repairing the dams if a single air strike could negate the huge outlay of expense, labor, and resources?

If the irrigation dams were vital to the Communist military position in North Korea, there was really no acceptable way of defending them short of signing an armistice. The only military means of parrying another air attack would have been by a counter air attack on the United Nation air forces. But the Communists had no air power in North Korea. Had this counter air attack been mounted from bases in Manchuria, the enemy would have risked losing his sanctuary behind the Yalu. It would be hard to say whether anything in North Korea would be worth the risking of the security of Manchuria. The U.N. high command had made it clear to the enemy that if U.N. forces were attacked by aircraft based in Manchuria, the U.N. would no longer be bound to stop its retaliation at the Yalu. The enemy obviously had no desire to bring on any such expansion of the war. To place his Manchurian-based air force on North Korean airfields was impossible so long as the USAF maintained air superiority in North Korea—a fact the enemy had already learned the hard way. Only an armistice would give him the opportunity to move his airpower into North Korea.

Also interesting is the relation of the dam strikes to the enemy's behavior at the truce table. On 30 April 1953 the armistice negotiations were resumed at the request of the Communists in conformance to the new world-wide peace offensive and "soft talk from the Kremlin" initiated after the death of Joseph Stalin. By 5 May it had become apparent that the Communists were again resorting to "stall tactics." It was on this date that the U.N. informed the Communists their time for discussion was running out. On 7 May the Communists introduced their version of the prisoner exchange plan as "absolutely the last concession" on the plan for voluntary repatriation of prisoners of war—the big issue blocking the armistice proceedings. This plan, actually only a restatement of the previous Communist stand, was rejected by the United Nations.

On 13, 16, and 22 May FEAF launched the attacks on the irrigation dams, Toksan, Chasan, and Kuwonga, respectively. This military action was followed on 25 May by the U.N.'s "now or never" counterproposals, embodying the Western world's firm stand on voluntary repatriation of prisoners of war. Again the Communists immediately denounced the proposal as unacceptable, but requested a week for study and formalizing an official reply. On 4 June the Communists called for a resumption of the truce talks, and four days later, on 8 June, the prisoner exchange agreement was signed, ending the deadlock in the 23 month-long armistice negotiations. The U.N. had won its victory on voluntary repatriation. Thus three weeks after the initial attacks disrupted the west-coast transport network and revealed the U.N. air capability to make serious inroads on food supply, the Communists signed an agreement on terms he had proclaimed for over two years he would never accept, and which but a few days before the attack on the irrigation dams he termed "absolutely unacceptable."

It would of course be extremely presumptuous to claim that the Communists signed the armistice solely as a result of the pressure put upon them by air strikes against the irrigation dams and the threat of further attacks. But for three years U.N. air and ground action had combined to make the Korean war far more costly to the enemy than he had ever bargained for. During two years of truce talks the air campaign had relentlessly wrecked his supply and transportation system. To an enemy in such a plight, the strikes against the irrigation dams may well have been the final pressure needed to end his stalling. Viewing these strikes against the stiff warning he had recently received in the truce sessions, the enemy may have concluded that U.N. patience was finally exhausted—that the U.N. would now commit its air power to all-out war in Korea.

The Lesson

THE irrigation dam attacks, though small in scale and relatively unimportant strategically in comparison to what could have been exerted against 20 dams instead of 5, gave the enemy a sample of the totality of war that an air strategy makes possible—a totality embracing the whole of a nation's economy and its people, the whole of a nation's deployed military forces in being. Modern war mobilizes total national resources. Only warfare that cuts sharply across the entire depth of the enemy's effort can bring the war to an end short of exhaustion and economic collapse for both sides. The strikes demonstrated that by means of its air forces the U.N. possessed the capability to attack this totality in Korea. Further, and more important, they surely led the enemy to believe that a command decision had been made to employ U.N. air forces in the Far East against it—a decision which for three years of the Korean war was held in abeyance.

Toksan-Chasan was military strategy employing air forces as a decisive means to accomplish an objective of war—peace terms acceptable to the U.N. It is the same kind of military-political pressure through air power which our long-range strategic air forces have maintained on Soviet Russia since 1945, and which the world's leading military and civilian chiefs agree has maintained the peace and deterred a third world war. Should a third world war

be thrust upon us, strong air forces in being, properly organized, controlled, and employed, will be the key to victory against a massive land power with unlimited military reserves, war resources, and geographic depth.

The Toksan-Chasan strikes, in themselves, were ordinary interdiction missions utilizing conventional ordnance and routine interdiction tactics. But their real meaning to the enemy stemmed from the value of the target attacked relative to his over-all ability to continue military resistance. This real meaning the Communists fully understood, even if the lesson has been obscure to us.

General Weyland, Commander of FEAF, has termed the Toksan-Chasan strikes one of the most significant air operations in the Korean War. If history proves them to have been the decisive pressure which produced an immediate signing of the armistice, then certainly they were a lesson of importance to our past and of portent to our future.

Air University Quarterly Review

Command of Reconnaisance Aviation

*A Study in the Control of Air Forces**

DR. ROBERT F. FUTRELL

DURING the summer of 1950 the United States Eighth Army, with strong support from the Far East Air Forces, weathered the crisis resulting from what at first appeared to be an overwhelming assault by the determined and fanatical North Korean Peoples' Army. According to the mass of testimony the air attacks launched by the United Nations air forces initially blunted the North Korean assault, successfully interdicted the flow of Communist supplies to the battlefield, and destroyed a majority of the enemy's equipment and troops. Such a vigorous air action was facilitated by the virtual absence of North Korean air opposition.

Despite the exceptional circumstance of the absence of enemy air power during these initial months in Korea, the former commander of the U.S. X Corps has expressed dissatisfaction with the manner in which air power is applied in "modern battle." He questioned the wisdom of the "preconceived doctrine" whereby close-support effort is assigned at the joint operations center after discussion of aircraft availability versus army-wide need by representatives of the field army and tactical air force. It is instead his belief that air elements should be "allocated" either to corps or divisions. The primary mission of air units so allocated would be close support of ground troops, and the pilots of such units would benefit from periods of infantry service.[1] In December 1950, with the Korean experience in mind, the Chief of Army Field Forces expressed the need for a specially designed close-support aircraft: "The aircraft which is to provide close tactical

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*This article represents a condensation of USAF Historical Study No. 24: Command of Observation Aviation, 26 August 1952. Full documentation may be had from this study, which may be obtained on loan from the Historical Division, Research Studies Institute, Air University.

[1]Interview with Lieut. Gen. E. M. Almond, "Mistakes in Air Support Methods in Korea," in *U.S. News and World Report*, 6 March 1953, pp. 58-61.

The long-continued exceptions to the Air Force concept of control and employment of tactical air forces would seem to have been exploded by the hard facts of Air Force performance in World War II and in Korea. But the debate has continued. Dr. Robert F. Futrell, Historian, Pacific Theater, Research Studies Institute, Air University, traces the history of tactical observation under the Army prior to World War II and contrasts the abandoned system with the centralized-control, deep-coverage method that the Air Force has employed in two wars with success.

support," he said, "should be designed specifically for that mission and not be compromised by a primary requirement to engage in air to air battles." The plane he described would be all-weather, capable of 3000-foot take-off, and with enough fuel to remain over the battle area for at least two hours. If it required protection from enemy fighters, the support plane was to be escorted by Air Force jet fighters.[2]

The views of these high-ranking Army officers on tactical aviation are reminiscent of the early years of World War II, when commanders interested in observation aviation were seeking the most useful means to control, command, and use it. Of all the elements of tactical air power, none was so intimately related to the ground force mission as "observation aviation," and prior to 1941 observation squadrons were assigned to the ground forces. The history of observation under ground force control, of its transfer to the Army Air Forces, and of the eventual reorganization of observation and its redesignation as reconnaissance carries lessons for those military leaders pondering the best means to command tactical air power in the 1950's.

"Observation" Between Two World Wars

"OBSERVATION Aviation . . . is included as an integral part of armies, corps and divisions, and as such must operate in close liaison with all arms," read the Air Corps Tactical School manual in 1926. Eleven years later in August 1937, Brigadier General H. H. Arnold reiterated: "Corps and Army observation must be considered a more integral part of the Army organization than other classifications of aviation." In these and all other statements of doctrine between the two world wars, observation aviation was considered an integral and organic part of the ground forces.

While the doctrine remained unchanged certain organizational

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[2]Gen. Mark W. Clark, C/Army Field Forces, "What Kind of Air Support Does the Army Want?" in *Air Force*, vol. 33, no. 12 (Dec. 1950), pp. 24-25, 52.

changes in observation aviation assignments were undertaken to increase the mobility of the ground armies. In November 1929 the War Department announced a sharp curtailment of army and corps observation units, and by actions taken in the early 1930's the infantry division lost its previously assigned observation squadron when its aviation complement was cut back to a division air officer and a small enlisted force. By 1936 observation groups, now standardized with a headquarters, four observation squadrons, and a service squadron, were assigned to each corps and army. After field tests held between 1937-1939 the War Department General Staff, reasoning that smaller and more mobile divisions would seldom be expected to operate independently of a corps, decided to eliminate the last aviation vestige from the new-style "triangular" infantry divisions. Although the Air Corps protested that division air officers and their staffs would be needed to direct such observation squadrons as might be attached from the corps groups to the triangular divisions, the final decision to delete the aviation section from such divisions' headquarters was taken without reference to the Chief of Air Corps. This reduction in the division air complement, like the other reorganizations of the 1930's, was undertaken by the War Department to benefit the mobility and effectiveness of the ground armies.

While planners wrote tables of organization contemplating group strengths to be achieved upon mobilization, the regular army observation establishment of the 1930's was measured in lesser units, and not until fiscal year 1938 was the Air Corps allowed to expand its existing eight corps and army observation squadrons (two were assigned to service schools) to eleven, so providing one squadron for each of the nine corps areas. But both by doctrine and practice these observation squadrons were an integral part of the corps areas or service schools to which they were assigned. The Air Corps could make suggestions as to observation squadron training and employment to the War Department, but the Chief of Air Corps had no jurisdiction of any importance over the units, other than the routine responsibility for providing them personnel and equipment. Execution of War Department policy directives, moreover, depended upon nine different corps area commanders, each acting on his own initiative. As Major General George H. Brett, Chief of Air Corps, viewed it in June 1941, the observation squadrons had long been "more or less orphans."

The Air Corps was responsible for the procurement of an air-

plane able to meet the doctrinal concepts of observation and the specifications of using services. Until the early 1930's most observation aircraft were the Curtis O-1 and Douglas O-2 models, both two-place planes with maximum speeds of 145 miles per hour. In 1930, however, need was stated for a three-place and twin-engine plane to be used for GHQ and Air Corps observation. In 1936 the Air Corps designated its organic "long range multiple engine observation airplane" as a "reconnaissance airplane," thus beginning the segregation of observation into two categories: "reconnaissance" for the Air Corps and "observation" for the ground forces. Design characteristics for a corps and army observation plane announced in 1934 brought forth the slow and unmaneuverable North American O-47 which was subsequently purchased in large numbers.

Using arms were additionally interested in some other type of air vehicle more suited for front-line observation. The War Department devoted a good share of limited experimental funds to the development of an autogiro suitable for military usage, but no suitable autogiro was available for production as late as 1939. Cognizant of the fact that fixed balloons had furnished some 93 per cent of front-line observation during static phases of World War I, the Air Corps perfected a C-6 motorized balloon which possessed mobility comparable to the ground units it was to serve. The Air Corps also argued that a "short range liaison observation" plane could match most of the characteristics of an autogiro (such had been demonstrated in the mid-1930's by the German *Fiesler Storch*), but the competition of balloons and rotary-wing aircraft delayed design competitions for such a plane until 1939. In September of that year, however, the Air Corps accepted contracts for 100 Stinson YO-49's, three Bellanca YO-50's, and three Ryan YO-51's.

The Impact of World War II

THAT observation doctrines and materiel based on World War I experience had been overtaken by improvements in military aviation should have been evident before the outbreak of World War II, but in the fall of 1939 each belligerent attempted to employ observation planes very much similar to the U.S. Air Corps' O-47. France had the Mureaux-115, Germany the Henschel-126, and the British the Westland Lysander and Fairey Battle. These planes were lightly armed with speeds in the neighborhood of 200 miles per hour, but they were all theoretically designed to

execute missions of close cooperation, artillery spotting, command, and photo reconnaissance. Each was equally vulnerable to high-speed fighter attack. With their Battles and Lysanders unable to operate in the face of hostile air superiority, the British soon found it necessary to employ fighter types of observation in "tip and run" missions. From Paris Lt. Colonel George C. Kenney forwarded the news that the captive balloon was "completely out of the picture as far as modern warfare is concerned."

Success or failure of aircraft in combat was easier to assess than were the command organizations of the belligerents. A bifurcated RAF command organization in France lasted only until 15 January 1940, when the Air Ministry established the British Air Forces in France and put all air units there under a single air commander who was required to ensure full air support for the British Expeditionary Force. The German Luftwaffe jealously preserved the integrity of its tactical air units, while making prodigiously successful efforts to support the ground war. Initially the Germans allotted observation aircraft to corps, armies, and groups of armies to form teams for special missions, but only in exceptional circumstances were observation squadrons allotted to divisions. In 1942, moreover, the German army relinquished such tenuous control as it still retained over reconnaissance units to the German air ministry. Early experience in World War II thus pointed to the need for centralizing control of tactical air power in order to exploit its inherent flexibility.

Although Air Corps officers perceived the command and control lesson of World War II, their immediate business in 1940 and 1941 was to develop new materiel, train and experiment, and to reorganize units, which would in turn influence air tactics. In the fall of 1940 a War Department committee representing interested arms and services examined observation in the light of the European war. Observation balloons were abandoned and requirements stated for two distinct types of observation aircraft: a short-range, unarmed, single-engine light plane and a longer range, twin-engine plane capable of tactical and minor strategic observation, reconnaissance, and photographic missions. But these decisions were apparently a short-lived compromise. The Air Corps recognized that the British were turning increasingly to modified combat aircraft for reconnaissance, and in April 1941 General Arnold directed that the Air Corps test stripped-down P-40's for its own organic reconnaissance. Other arms, particularly the Field Artillery, were preoccupied with light observation planes; as one Air Corps officer expressed it: "The British Army

Air Cooperative Squadrons are . . . being equipped with P-40's. We apparently are going to Piper Cubs." Further progress in the selection of observation aircraft would await field and maneuver tests in the summer of 1941.

Meanwhile the Air Corps was facing the multitude of problems incidental to the ordering of National Guard observation squadrons into the Federal service. While these squadrons were corps troops, many of them were attached to divisions for administration and training, to the added confusion of units already perplexed at the chain of command confronting them—posts, corps area, divisions, corps, armies, maintenance commands, materiel division—none of which had a complete interest in the squadrons. Training varied in quality and quantity in the nine corps areas, there being no standardized observation training program. Most squadrons also performed a variety of missions not connected with their tactical specialty: towing targets, flying photo missions for construction quartermasters, inspecting camouflage. Colonel Robert M. Goolrick, commanding Air Corps troops, IX Corps, loosed a particularly severe indictment of the situation in February 1941:

> I had not served with Observation Aviation for nine or ten years until returning to this station. I find, after all these years, practically no change in the basic theories of the branch and very little change in the equipment assigned. . . . This important branch of the Air Corps has stagnated for the past fifteen years.

Desiring to emphasize the lessons of European combat, the Air Corps secured publication of a training circular on observation aviation on 1 June 1941. Complete control of the air, cautioned this circular, might permit a detailed and deliberate surveillance of hostile territory, but hostile air and ground fire would more likely necessitate daylight reconnaissance of hostile territory at high altitudes and maximum speed, making the greatest use of photography. Ground commanders must have shown little regard for these lessons, for in the summer maneuvers of 1941 Lt. Gen. Leslie J. McNair, commanding GHQ, U.S. Army, observed planes floating leisurely along directing artillery fire from points well within hostile small-arms range. Photography was little used; some commanders still required "aerial sketching" of targets, although it would be suicide for a plane to remain over an enemy-held area for such a length of time. In short, General McNair concluded:

> Training and employment of observation aviation today is progressing along lines almost identical to those of 1918, and is predicated on the

assumption that we will have superiority of the air, and that observation aircraft will be able to operate over and behind hostile lines without interference from either ground or air.

Organization of Air Support Commands

By the middle of 1941 observation aviation required a complete reorganization, and on 25 July the War Department directive for such action appeared. Five air support commands were constituted, one for each of the four armies and the fifth for the armored force. On 30 August the Air Force Combat Command activated the five new commands and eleven new observation group headquarters. Although the observation squadrons were relieved of their assignment to ground units, provision was made that the squadrons "will remain attached to their present assignments." All observation squadrons, however, were to be detached from the ground forces for a portion of each year in order that the air support commanders might supervise their basic Air Corps training. Most of the squadrons were so detached for Air Corps training on 10 December 1941, but only with the proviso that they would continue to support their ground organizations and to perform other missions required by the war emergency.

Once again there was no ready solution to the question of what aircraft could best meet the observation mission, or where these planes could be obtained in quantity. In the 1941 maneuvers light commercial aircraft proved well suited for artillery observation and communications purposes, and they had the additional advantage of availability in quantity through "off-the-shelf" purchases. The Air Force Combat Command procurement objective issued on 27 October conceded that such light planes could operate "effectively and profitably" over friendly troops, but it asserted that well-defended twin-engine bomber and high-performance fighter types would be required where enemy air parity or superiority was expected. On 10 December 1941 the War Department approved the equipping of "light" and "medium" observation squadrons with light planes, fighters, and bombers, and after maneuver tests one standard observation squadron was ordered on 1 July 1942, equipped with six high-performance fighters, six twin-engine bombers, and nine light plane types.

The decision to employ modified combat airplanes recognized that only the best combat types could survive enemy air opposition. Economy in production, maintenance, and tactical operation was to be expected with the employment of the minimum

number of different plane types. The decision was reasonable, but the War Department G-3 was willing to concur only if the observation program did not interfere with the organization of bombardment and pursuit elements of the AAF. The low priority accorded observation by this proviso meant that few combat-type planes could be made available. Lend-lease allocations of P-39's and A-20's also cut into observation quotas during 1942.

Light commercial aircraft were nevertheless obtainable in quantity, and during 1942 a suitable tactical usage was worked out for these "puddle jumpers." Although too vulnerable to penetrate enemy lines and actually little more than a vertical extension of the observation post, the light planes were still officially designated as "observation" aircraft and their pilots frequently took them into exposed maneuver positions. Properly to establish their tactical role, the AAF secured their redesignation as "liaison" aircraft in April 1942. There was no longer any objection to the decentralization of the "puddle jumper" aircraft, and on 6 June 1942 the War Department made a team of two liaison planes organic in each Field Artillery battalion, division artillery, and Field Artillery brigade or group. In December 1942 the AAF directed that liaison flights of observation squadrons were to be attached to supported ground units.

In 1941-42 field maneuvers the tactical mission of the air support commands, left unsaid in the original directives, received partial clarification. Initially the air support commander was seen as a combination commander and staff officer: preparatory to 1941 maneuvers in Louisiana, General McNair stressed that air action should be at the initiative of the air commanders, who "should beat the Army Commanders to a decision by suggesting or recommending." This conception permitted the elimination of army, corps, and such division air officers as remained early in 1942. Still there was no exact statement of the role of an air support command in doctrine. Field Manual 31-35, *Aviation in Support of Ground Forces*, merely prescribed that: "An air support command is habitually attached to or supports an army in the theater."

The manner in which air support commands would manage observation squadrons in combat was also obscure. The reorganization left these units attached to ground commands, and it appears that the ground commanders continued to order unrealistic missions. In Second versus Third Army maneuvers General McNair noted numerous observation flights in excess of two hours duration over enemy territory. In the Carolina maneuvers IV

Corps first demanded "continuous reconnaissance" over enemy lines and then changed its requirement to have its observation planes "report hourly" which meant about the same thing. Because of a lack of adequate ground communications, corps and division observation units had to duplicate each others' missions. While the attachment of observation to using ground units continued, successive maneuvers indicated advantages to its centralization under the air support commander. In June 1942 a War Department training circular vested control of all observation in the air support commander, who might either designate units to support ground headquarters or reserve a definite number of sorties for a given ground headquarters from a centrally located observation squadron. The air support commander would lay general plans for covering the whole area of ground operations, thus eliminating overlapping and unnecessary missions previously ordered by lower ground units. This idea of centralized control of observation was dubiously received by the Army Ground Forces: coordination of area coverage, urged one ground officer, "can be automatically accomplished by decentralizing operation of squadrons to corps and divisions, which are assigned areas of responsibility."

Lessons of North Africa: Observation Becomes Reconnaissance

THE first major offensive undertaken by the United States forces in World War II was the invasion and campaign for North Africa, and here the concept of an air support command and the other theoretical air-ground doctrines would receive their initial test in battle. The XII Air Support Command, with the 68th Observation Group and other units assigned, would be charged with support of ground troops. The 3d Photographic Group would provide photographic reconnaissance for the Twelfth Air Force. The result of the experience in North Africa would be a thorough reorganization of U.S. tactical air concepts and a complete overhaul of observation aviation.

Attached to the SATIN Task Force (U.S. II Corps) on 6 January 1943, the XII Air Support Command was in full support of the corps attack through central Tunisia after 13 January. Axis counterattacks soon revealed the weakness of attaching air units to a ground command: strong German blows threatened to dislodge the French XIX Corps, which requested observation missions only to have the II Corps refuse them on the grounds that

it had no responsibilities in the French sector. Combat also revealed the inherent weakness of the observation squadrons: daily reconnaissance of areas and roads, normally flown by two P-39 observation planes, almost invariably required the escort of at least twelve fighters. Spot reconnaissance missions, made by two P-39's, were found to be of more value than area coverages and far less expensive in sortie rates of the observation and fighter force. Photographic aircraft were generally unavailable to the ground forces, although for a while the XII Air Support Command employed A-20 observation planes with strong fighter escort.

The North African campaign thus confirmed the Air Force argument that observation aircraft had to be ranked with the fastest hostile fighters. To keep escort missions to a minimum and permit fighters to execute their normal offensive role, the XII Air Support Command recommended use of P-51's for visual reconnaissance and F-5's (P-38's) for photographic missions. General Carl Spaatz specified that the tactical reconnaissance squadron "must be equipped with the fastest airplane in existence, normally the single seater fighter." Combat also demonstrated a fundamental reason why observation could not function when attached to subordinate ground commands. This system would lead to such a wide dispersal of air units that the small number of aircraft available for each particular mission could accomplish little; aircraft would also be idle when their services were urgently needed on another part of the front. Decentralized control was hazardous, since observation flights had to be coordinated with friendly fighters and preferably would have the benefit of aircraft warning services. Therefore a common commander had to coordinate both fighter and observation activities. To relieve duplication, it had been necessary to centralize control of the U.S. 3d Photo Group and the RAF No. 4 Photographic Reconnaissance Unit, an action resulting in the formation of the North African Photo Reconnaissance Wing at Algiers in February 1943.

Remedial action for the deficiencies of air-ground doctrine would result in local command reorganizations in North Africa, and the co-equality of air and ground forces would be established within the U.S. armed forces by War Department Field Manual 100-20, *Command and Employment of Air Power,* 21 July 1943. As a token of their emancipation, the air support commands would be redesignated tactical air divisions. Complete reformation of observation was also in order. A board assembled in Washington in February 1943 recommended the creation of homogeneous squadrons by segregating fighter, bomber, and

The experience clearly reveals the impracticability of compartmentalizing air power. The metamorphosis of observation into reconnaissance represented an economy of strength in a combination of two force commitments, one seeking intelligence for the ground troops and the other for air units, into a single reconnaissance establishment under the tactical air force. While the subject deserves further development which escapes a story limited to the study of observation, it may also be suggested that the real gain represented in the creation of the tactical air force was the integration of the old air defense and air support commands into one well-ordered establishment, capable of both defensive and offensive employment. Contemporary proposals to allocate air elements to corps and divisions have forgotten the requirement for the most economical employment of air strength, which will always be available in amounts too limited and too expensive to permit dissipation.

The whole course in the reorganizations of observation, whether the changes were made at the suggestion of air or ground officers, was away from the assignment or attachment (operational control) of observation squadrons to ground organizations. Dictates of good administration and proper training demanded that the squadrons be removed from assignment to ground commands in 1941. Tactical experience in North Africa revealed the inefficiency, inequity, and danger of attaching penny-packets of aviation to ground units. When the experience of North Africa showed that observation aircraft could not operate without fighter escort, it was mandatory that the observation units should be placed under the control of an air commander who could coordinate observation missions with those of friendly fighters. Such lessons would appear equally applicable to the current proposals that army or corps commanders should have operational control over supporting tactical air units.

Consideration of the search for an "ideal" observation aircraft, tailored to meet ground needs but utterly incapable of operating against enemy opposition, casts doubt upon the practicality of the suggestions in 1950: "The aircraft which is to provide close tactical support should be designed specifically for that mission and not be compromised by a primary requirement to engage in air to air battles." It has been seen that observation aircraft were originally designed for the accomplishment of a particular type of air effort. European combatants soon lost all of their specially designed observation planes to enemy pursuit attacks, and fortunately U.S. Air Corps leaders perceived that such planes could not

live against enemy air opposition. Even the modified combat-type planes employed in North Africa could not operate without friendly fighter protection. Employment of specially designed tactical air support aircraft would doubtless impose inordinate demands upon the Air Force for fighter escort or cover, especially in view of the dictum that air defense and control of the air should be the missions of other aircraft. And, as was the case in the long and fruitless search for an "ideal" observation plane, the designing of a special-purpose tactical air support plane would be expensive in time, effort, and funds available for military development.

The story of observation aviation is one involving a consideration of the necessity for the transfer of those air units which were most intimately associated with the ground mission from the control of the Army to the Army Air Forces. There is an element of irony in the fact that these aerial intelligence squadrons were unable efficiently to perform their missions under ground command and that they were able to accomplish their duties only after ground and air had been recognized as independent equals. The story furnishes clear and unmistakable lessons regarding the most efficient ordering and control of tactical air power.

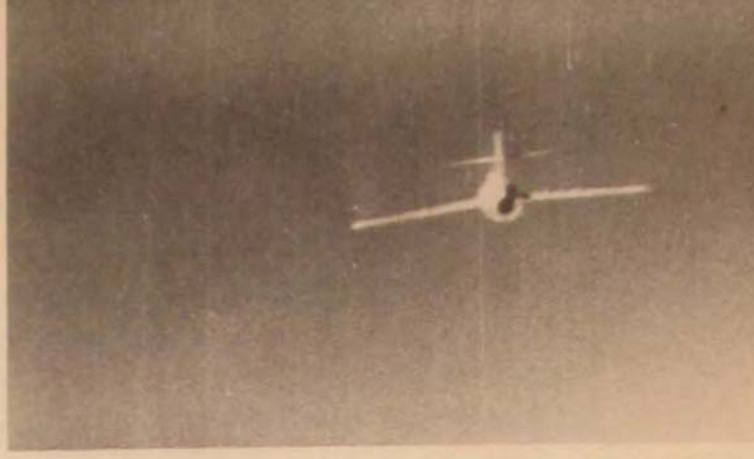
USAF Historical Division

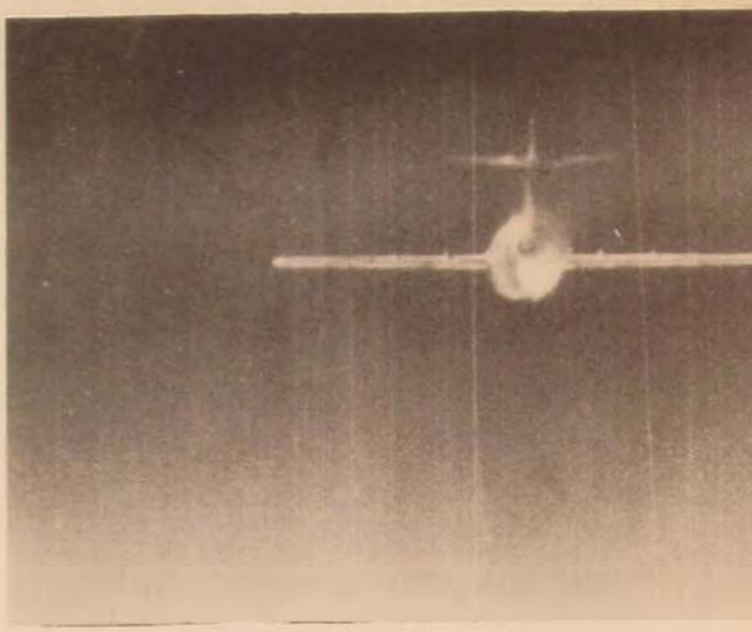
Debriefing

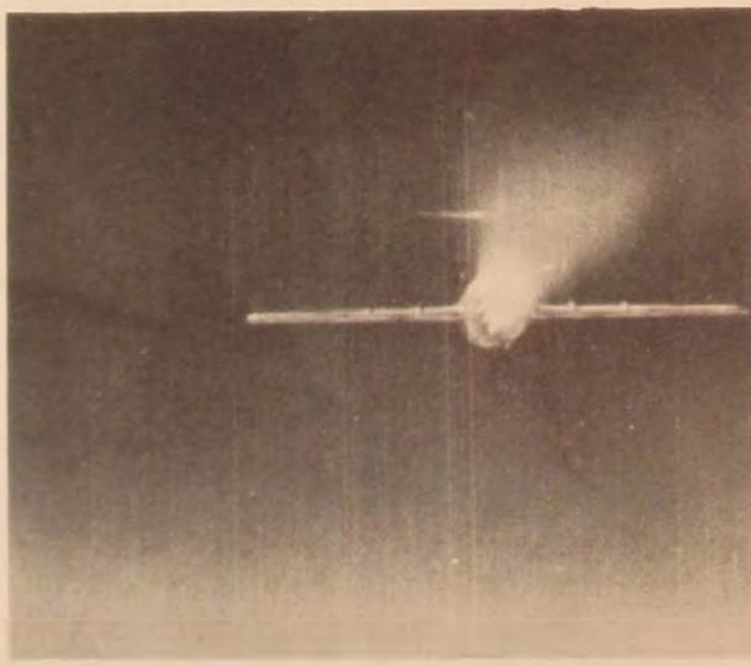
The Return from Combat Mission

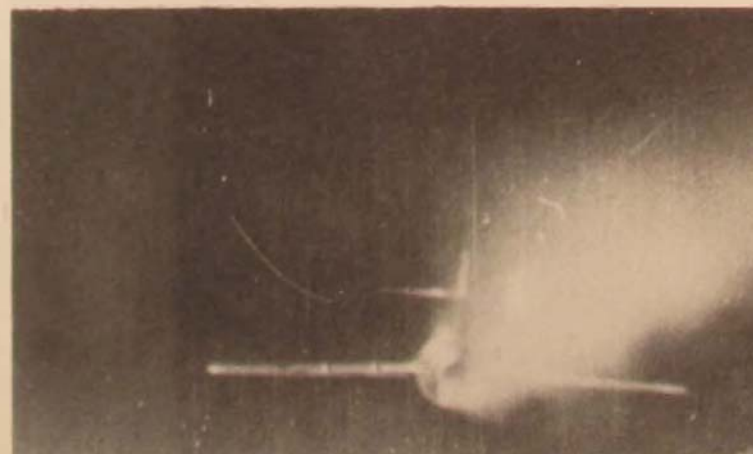
WHEN the Sabrejet pilot climbed wearily down from the cockpit after a trip to MIG Alley, his responsibility for the mission was not ended. He must yet attend debriefing. Still in sweat-stained flying suit, he related to the intelligence officer the blow-by-blow action in his dogfight staged high in the skies over North Korea only half an hour before. He told the story of his mission from take-off to sighting, to kill, to landing—how he spotted the enemy, stalked him, out-maneuvered him, closed in, and with split-second timing fired the burst that sent his foe crashing to earth. The salient points of his narrative were entered in the records and his description of the kill evaluated against the pictorial record from his gun-cameras. Debriefing reports, distilled into the summaries which appear on charts and forms, become the commander's and ultimately the historian's guide to the progress of the air battle. Invaluable first-hand information for the development of counter-air tactics and strategy, these reports and the pilot's "barracks-tips" may mean life or death to fellow pilots. From them are built up axioms of jet air warfare that have their impact all the way down the industrial and training ladder to the drafting boards and primary flying schools.

For the Air Force pilot, air-to-air combat in the jet age is still a personal dogfight. Once the convulsive air battle has been joined, no electronic guiding device yet developed can substitute for a pair of sharp eyes, skilled senses, and an alert human mind capable of translating into stick and rudder action the "decisions" that produce a kill. Sober analysis of air warfare and homage to technological progress sometimes lose sight of this man. He is yet the physical, mental, and emotional mechanism that can transcend the insensate limitations of highly developed technology to permit selective reaction, subtle interpretation, and command decision. The greatest technical accomplishments have merely supplemented his skill, ingenuity, and adaptability. Without him they are as meaningless as any other tools without a craftsman.









The gun camera records the final seconds of victory as the .50 caliber slugs tear into the MIG. Photographic proof from gun-camera film, plus written statements by other jet pilots who witnessed the "kill," must be evaluated before official confirmation or a "kill" credit is given. If no film and eyewitness support is available, the kill becomes a "probable" and did not score towards the making of a USAF "Korean ace." So rigid was the Air Force accounting and accrediting system in the Korean War that the total of 841 MIGs officially listed as destroyed—802 by Sabrejets, 23 by Fifth Air Force fighter-bombers, and 16 by skilled gun crews of Bomber Command B-29's—is undoubtedly extremely conservative. Only the enemy knows how many of the 154 MIGs "probably destroyed" and 919 "damaged" ever got back home to Manchuria.

In My Opinion . . .

"POLITICAL AIR SUPERIORITY" IN THE KOREAN CONFLICT

LIEUTENANT COLONEL GEORGE E. TORMOEN

IT is imperative that the public, the government, and the military understand the Korean half-war in the proper perspective. The political and strategic limitations of the conflict must be critically evaluated to the end that the growth and capabilities of air power are not hampered by short-sighted concepts which do not recognize the offensive and defensive might present in properly employed air power.

Our nation and the United Nations applies military force as an instrument of national policy only after all other instruments of policy—political, psychological, and economic—have failed to avert the threat to our security. In the past, when our country has found it necessary to resort to the military instrument of national policy, that instrument has been applied with all the force and ingenuity at our command. But in Korea the United Nations had the dual purpose of stopping Communist aggression in Korea and of preventing World War III, which threatened if the war expanded in Asia.

To limit the scope of the war, the United Nations decided to establish the "Yalu River barrier," a line beyond which the U.N. did not carry its military operations and which in effect created a "Manchurian sanctuary" for the enemy. This decision, although it greatly limited the capabilities of the United Nations forces by granting the enemy "political air superiority" beyond the Yalu, was somewhat balanced by the Communists' decision to withhold offensive support of their war effort by the thousands of modern, first-line combat aircraft available to them in the Far East. This decision on the part of the enemy was apparently made because of similar reluctance on their part to take any action that might "trigger" World War III, and of apprehension that the U.N. might lift the barrier and attack the lucrative and vital targets in Manchuria. The enemy decision was probably tempered also by the tactical situation and the fact that the U.N. forces had control of the air.

The decisions by the United Nations to establish the Yalu

River barrier and by the Communists not to utilize in force their combat aircraft from Manchuria, generally established areas of "policital air superiority" for both sides and created an extraordinary situation, one that had far-reaching effect upon all phases of the Korean War. These decisions made the Korean conflict one of the most unorthodox in modern history—much like a medieval field of battle where bilateral agreements on methods of fighting were sworn to before the battle was joined. In Korea these decisions created unusual military opportunities which in an all-out war would only have existed under a condition of absolute military control of the air by the non-Communist powers.

In the first few days of the Korean War the inadequate North Korean Air Force was destroyed by U.N. fighters and fighter-bombers. This established complete U.N. control of the air below the Yalu. The continual U.N. bombardment of the enemy's airfields in North Korea prevented the enemy from shifting his strong, jet-equipped Manchurian-based air force to bases in North Korea from which air power could be "legally" thrown against U.N. ground and sea forces. Although the enemy's commitment of MIGs in the air battle was considerable, it was soundly defeated by the U.N. Sabrejets. Throughout the conflict control of the air gave the United Nations Forces wide latitude in committing and deploying their land and sea forces, in moving supplies unmolested, and in conducting the operations most advantageous to them. These freedoms of warfare permitted certain operations which would not have been feasible in the presence of active enemy air opposition.

Under these conditions it was possible to use many obsolete and non-combat type aircraft in air operations in Korea; the obsolete F-51 was used for fighter-bomber operations; T-6's were used for airborne tactical air control; C-47's were used as flare aircraft and airborne VHF relay stations. Army and Air Force liaison aircraft and helicopters roved freely along the front lines. Air Rescue

The Korean War, with its political and military restrictions, must be studied with caution by the military planner, especially when he draws conclusions from its operations about the future composition or employment of military forces. As Colonel Tormoen, of the Directorate of Operations, Hq Far East Air Forces, points out, the United Nations possessed a "political air superiority' in Korea. The U.N. air forces were not compelled to fight a constant, all-out battle for control of the air. Friendly surface forces and lines of communication were consequently not exposed to air attack, and U.N. air, land, and sea forces could engage in many deployments and operations that would be suicidal in unconfined war.

Service helicopters and amphibious aircraft operated in enemy as well as friendly territory, and the large number of pilots and crew members that were rescued from the very hands of the enemy was a great boost to morale. Transport type aircraft, helicopters, and liaison aircraft were used for air evacuation to hospitals in Japan. Airlift was used to compensate for inadequacies in logistical foresight and planning. All commands and units came to depend to an excessive degree on theater airlift for movement of equipment, supplies, and personnel along routes normally highly vulnerable to enemy air.

Political air superiority made it possible for the Navy to operate aircraft carriers in the Sea of Japan and the Yellow Sea, the latter a finger of water only 300 miles wide and surrounded on three sides by hostile territory. This placed their carrier aircraft within the range of the battle line and permitted Navy participation in close support of ground operations, as well as freedom to conduct unhindered amphibious landings (Inchon and Wonsan), coastal bombardments (two years at Wonsan), and continual unobstructed mine-sweeping operations. In the presence of active enemy air opposition (using World War II experience as a criterion), the aircraft carriers would have been forced to operate from more remote areas, probably the open seas east of Japan. This would have made any effective continual naval air support to ground operations extremely doubtful.

Control of the air enabled airpower to capitalize on the fluid ground situation which existed in Korea during the first six months of the war. This war of maneuver was ideal for employment of air forces in interdiction and close-support roles, and the USAF was able further to establish its claims of the tremendous capabilities and flexibility of air power. This is borne out by the statements of ground commanders.

In early 1951, when the ground armies settled down to the static ground situation that was to exist for the remainder of the war, the Air Force concentrated on an interdiction campaign. That interdiction program largely restricted the enemy to movement by night, and even movement at night became extremely hazardous because of our night intruder aircraft. The enemy's major railheads were pushed back of the Yalu, causing him to rely increasingly on truck and the snail-pace ox cart and A-frame transportation. As rail transport collapsed, vehicles became critical, and those operated on the highways had to contend with constant attack, wrecked bridges, and pitted roads. In brief we robbed the enemy of his mobility and shattered his logistic net-

work south of the Yalu. We knew his every move in force. We allowed only 10 per cent of his ammunition and supplies to reach his front lines. For our ground forces, the situation was reversed. Although the static, inactive ground situation and the lack of a U.N. offensive ground effort did not permit full exploitation of this interdiction campaign, its effectiveness was proven to a large extent by the fact that the Army was able to hold the numerically superior enemy at the established battle line.

During the latter part of the war an unusually large proportion of U.N. aircraft were diverted from interdiction to close-support missions to supplement the fire of ground forces. This was contrary to established doctrine and procedure, and in the judgment of the air commander it was an improper and relatively unproductive use of air power. Because of the peculiarity of the combat situation many requests for air support were approved which otherwise would not have been granted. Such targets as caves, bunkers, and supply shelters and mortar and artillery positions which might more economically have been knocked out by ground weapons were considered suitable targets by ground commanders for air strikes. Aircraft were called upon in many instances to replace artillery. The economical disadvantage of this type operation is readily apparent. And in a static battle situation or in the presence of enemy air opposition, these types of close-support missions must be subordinated to interdiction requirements and to the counter-air battle, which constitute a more realistic and profitable employment of air power. Enemy ammunition, weapons, supplies, and troop reinforcements are much more easily destroyed en route to the front than they are when widely deployed over mountainous terrain.

UP to this point I have discussed the unusual operations that were possible because of the absolute control of the air enjoyed by the U.N. forces. These operations were of tremendous advantage. Grim as the war seemed to our soldiers, when compared to the slaughter, havoc, and destruction we were able to impose upon the enemy through the air compared to our own freedom from air attack—ours was a relatively privileged war. But these same operations, which were to our advantage, may also have been the root of the major disadvantage to grow out of the Korean War—that is, the manner in which they colored the thinking of non-Air Force commanders and the public about the proper

employment of air power and about the types and scope of air, land, and sea operations that are possible in the presence of active enemy air opposition.

Since the decisions of Congress create our national military forces and these decisions are guided by the thinking of the American people and the recommendations of our military leaders, it is apparent that misconceptions in command and public thinking will affect their outcome.

An unrestricted war may be expected to provide military forces with an adequate test of existing theory and doctrine. The test, properly interpreted, should result in sounder military thinking and a better concept for conducting future military operations. If the war is a genuine test and not simply a case of "swamping" it should afford the American people and Congress with information on the relative capabilities and limitations of each of our military forces, thereby furnishing a basis for sound governmental decisions as to the amount and ratio of future defense dollars that would be allotted toward military air, land, and sea forces. The same cannot be said of the Korean War. The advantages that can accrue in an unrestricted conflict, with the impression created by public information generally verified or refuted by the concrete result of victory or defeat, cannot accrue from a war hedged by artificial restrictions on the employment of forces—especially air forces—and ending in an armistice produced by political and military compromise.

Thinking on the relative capabilities and limitations of air, land, and sea forces has been influenced by the day-to-day account of certain Korean operations that would not have been possible in the presence of enemy air opposition. It is not to say that public information articles should state accomplishments and then go on to explain that the operation was only possible because of the existing situation and would not be feasible under other conditions. But it is imperative that the American public get the "whole story." The practice of not telling the "whole story" is an old advertising gimmick that has caused consumers to spend billions of dollars yearly for products not the best buy for the money. It might not only be a waste of money but also invitation to catastrophe if a misinformed public misapportioned its defense resources because it had been incorrectly told that a certain combination and aggregate of forces would adequately protect it. For this "part story" has neglected the fact that the greatest threat to the free world is the enemy's huge air forces capable of delivering atomic and hydrogen bombs. And it takes air power to win the air battle.

With the advent of nuclear weapons and their ever-increasing, tremendous destructive power, World War III becomes a more and more dreadful prospect. For that reason achieving a proper "balance of power" and determining the proper employment of air power is vital to our survival. We must evaluate all forces, all doctrine, all concepts for their applicability for decisive action in global conflict. A paramount consideration must be that while our world's surface is one third land and two thirds sea, the *whole* world is wrapped in a thick blanket of air—the limitless medium through which the air weapon can be operated. Only the airplane can carry and deliver the devastating destruction of modern weapons on all targets wherever located. And this delivery can be accomplished in a matter of hours—not years, months, or weeks. It then logically follows that of a nation's defense forces, air forces in being, properly constituted, organized, and employed, will be the dominant factor in preventing, or, if necessary, winning World War III. The control of the air spaces will be decisive.

Korea found us with our military forces organized, equipped, and deployed in accordance with the traditional "balanced force concept." More serious, our over-all strategy assumed that we would control the air and blandly delegated to our air forces assignments other than that of gaining air superiority. Yet the air section of this military team—the section that provides this vital element of battle—remained far understrength and under-equipped to ensure that superiority *in any event*. Across the Yalu River the Chinese Communists had based the world's third largest air force. It was equipped with more than 2500 modern jet fighters and bombers. In South Korea the U.N. forces had the USAF's Fifth Air Force with its dozen or so combat wings and attached units. Some of these units were equipped with World War II conventional aircraft. Additional air support or air reinforcements were already spread thin to the point of real danger throughout the entire Far East. The lesson is clear and cuts across the board deep to the roots of modern military forces. If we persist in predicating the operations of our military team on the conditions of control of the air, we should build the air sinews of that team to such strength and durability that it can wrest such superiority from any potential enemy and maintain it under all contingencies.

The "political air superiority" in Korea which gave our land, sea, and air forces tremendous advantages over a numerically superior enemy should be considered for the phony piece of military realism it was. Although we profited by it, we can bet our last defense dollar it will never happen again—not even in Korea

if war breaks out anew there. The enemy learned a bitter lesson. Next time, wherever he strikes, we shall have to win control of the air by military measures. May the powers that be have mercy on our military team if it is not "balanced" with adequate air forces to win this real air battle.

Headquarters, Far East Air Forces

Basic Research in the Air Force

Dr. O. G. Haywood, Jr.

A LEADING industrial executive was recently asked, "How is it that your company stumbles upon so many new products?" The executive pointed to his research laboratory across the street and replied. "To insure a flow of new products, we maintain our stumbling department."

The stumbling department of the Air Research and Development Command is the Office of Scientific Research. It is a small office located at command headquarters in Baltimore, Maryland. The office has the mission of sponsoring basic research in fields of science of interest to the Air Force.

What do we mean by basic research? Many people have defined basic research; unfortunately, almost all differently. We can discuss basic research, in terms of its difficulty, or scientific nature, or practical or immediate usefulness, or other such characteristics. But discussing these factors is not useful in the management of the Air Force research and development program. Instead it is more profitable to ask: Why is the Air Force supporting the research? What is the Air Force motivation?

On the basis of motivation we may look at research and development as four interlocking channels of effort. The natural philosopher looks out on the natural world. His curiosity is aroused by

The astounding rate of climb of technology in the mid-twentieth century has already created some semblance of Frankenstein's monster. Each spectacular advance demands other advances to counter or to capitalize on it. But in any production process, output is dependent on input. Raw materials precede finished products. Yet preoccupation with fascinating end-products is apt to bring scorn as "ivory tower" upon any scientific research not promising immediate application in new "hardware." In science the raw material for new designs is the understanding of nature and its forces. This basic understanding must be furnished the inventor or engineer to apply to his particular problem. Founded two years ago, the Office of Scientific Research, of Headquarters, Air Research and Development Command, strives to anticipate the needs of the Air Force for specific basic research, letting contracts to attempt to satisfy them in time for the next development in a weapons system. Dr. Oliver G. Haywood, who before resigning his commission as colonel in the USAF in September 1953 was organizer and Chief of the Office of Scientific Research, explains the regenerative cycle that operates in science and reviews the Air Force way of getting the basic research so essential to its future.

what he sees. So he takes an assortment from the myriad of data available and tries to organize these data into some satisfying pattern—some pattern that will give him better understanding. With this pattern or theory he and other scientists look again at nature. They see more than they saw before. They can now look with more discernment. Thus we have a closed or regenerative circuit, where advances generated anywhere in the circuit are transferred around and around, generating further advances. We may call this circuit of the natural philosopher the regenerative circuit of pure research. Observation of nature leads to research and thus to understanding, and this understanding feeds back into more discerning observation of nature.

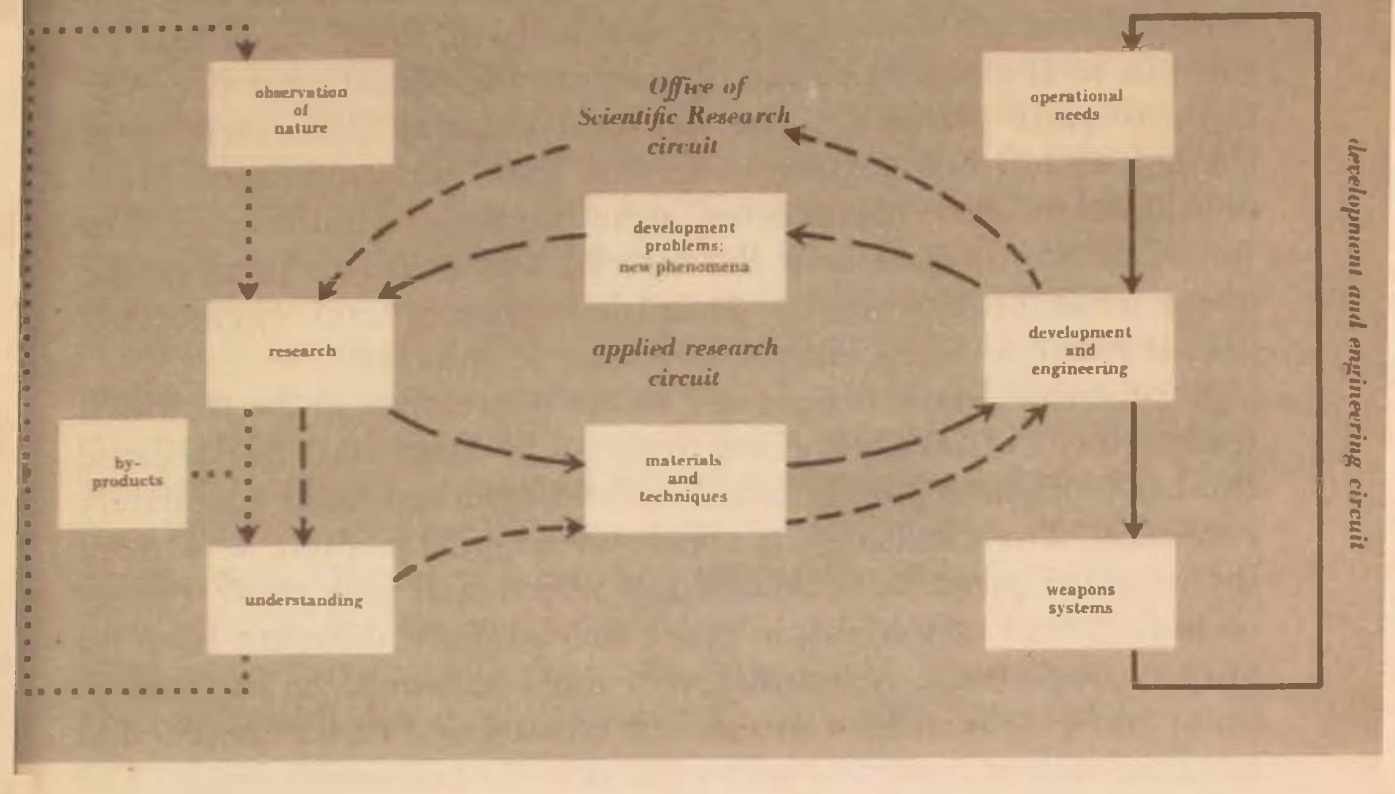
The four regenerative circuits of air science and technology are shown in the chart*. The circuit just described as pure research is at the extreme left. Occasionally some one in this pure research comes up with something immediately useful, shown in the chart as a by-product. A well-known example of such a by-product is the discovery of penicillin by Dr. Fleming. The vexing mold which kept destroying Fleming's bacteria specimens became suddenly one of our famous wonder drugs.

At the other end of the spectrum, at the extreme right of the chart, is the regenerative circuit of development and engineering. This cycle was illustrated immediately after World War II when the Air Force recognized an operational need for a new fighter

*This chart, written in Air Force language, is patterned after one originally prepared by Dr. R. E. Gibson, Director of the Applied Physics Laboratory of The Johns Hopkins University. The original chart can be found in his article, "The Arts and the Sciences," *American Scientist*, July 1953.

USAF research and development interests may be depicted as operating in two circuits, which are themselves interlocked by an additional two circuits. The pure research circuit (left in the diagram) represents the study of natural phenomena for the purpose of coming to a precise understanding of selected processes of nature. The development and engineering circuit (right) represents the use of this understanding in fulfilling an operational requirement in the Air Force. The product of this circuit is not "understanding" but "hardware," the piece of equipment to fit a specific requirement. Under expanding USAF operational needs, the second circuit developed in complexity and intensity until it threatened to outstrip the creative flow from the circuit of pure research, as conducted by private interests and non-Air Force activity. The USAF was compelled itself to sponsor basic research in its own fields of special interest, adding its resources and giving specialized impetus to the flow of scientific investigation. Applied research (represented by the center connecting circuit) has always linked basic research with

Regenerative Circuits of Air Science and Technology



development and engineering. Problems arising in development which cannot be surmounted by redesign or other engineering techniques are sent back for applied research on new materials or techniques. The newest element in the meshing of research with development is the Office of Scientific Research. This office anticipates development problems which will require additional basic understanding of natural phenomena before applied research can work out an end-product. It lets contracts for the necessary basic research and monitors it, with the view of having the information available by the time applied research will need it.

The regenerative impetus provided by the circuits of air science and technology is displayed in the event of operational need for a guided weapon of much higher performance than any yet developed. Development and engineering personnel anticipate that a technological advance of this magnitude requires an entirely new type of rocket propellant—a substance that generates much more power, or burns differently, or is much more economical than the propellants now available. This requirement in turn poses a large query to research. Reshuffling existing knowledge or coming up with a slight improvement on an existing propellant will not serve. More must be known about what really happens in the process of combustion before a propellant with this new order of power can be developed. The Office of Scientific Research contracts for scientists to study the nature of flames. What really happens, physically and chemically, when something burns? What, precisely, are the properties of flame? What are their relations to the properties of fuels? When these and similar questions are clarified by basic research, then applied research can put the knowledge to work in creating a new propellant. With the new propellant in hand, development and engineering can build a weapon around it and develop the other components to make the final product a complete weapons system.

aircraft. To meet this need, engineers drew on their accumulated experience and the available store of scientific data and came up with a design. This design gave us a weapon, the F-86. The F-86 was put to the test in Korea of meeting the operational need. It did not quite match up, the required military characteristics of the fighter not being quite those that had been visualized. More development and engineering were needed. Modification kits were quickly devised, and the aircraft was modified to meet the operational requirement. Thus development and engineering goes through a closed circuit, as shown in the chart.

A problem frequently arises in the development cycle which the engineer cannot solve, not because he lacks skill but because the basic physical phenomena involved have not been adequately explored. For example, in rocket development there is a need for a better propellant, something which will give more energy or burn better or have some other characteristic different from all known propellants. Something new must be found. So in development and engineering, a problem is created or a new phenomenon is noted which scientists and engineers do not understand. The research workers get going on this problem, with research oriented toward solving the development difficulty. They are looking for something that the engineer can use—a technique, a material, an electronic hookup, or something else that the development engineer needs. Thus there is a regenerative circuit of applied research linking the scientist to the engineer: when the problem comes out of development, research is done to give the engineer a new material or technique to feed into the development circuit and solve his engineering problem.

What about the circuit shown in the chart as the circuit for the Office of Scientific Research? The natural philosopher in his ivory tower does not have to look up at nature. He can look across (the chart) at the treatment and mistreatment of nature by man. In other words, he can take a look at what the engineers are doing with nature. The scientist's curiosity can be aroused—the same type of curiosity as that motivating scientists in the pure research circuit. To take the propulsion problem again, people have used fire for a long time, but no one yet understands the basic phenomena of flames—the intermediary products that are formed and almost immediately destroyed in the burning of a flame. Thus the research scientist may have his curiosity aroused by some difficulty in the Air Force development program. He proceeds with research just as any other natural philosopher, not with a specific objective but simply to understand the nature of the basic phenomena

involved. We all recognize that from this understanding often comes new techniques, new materials, other design data for the development engineer. In the OSR circuit curiosity stems from the development program. The research is of the same type as in the pure research circuit. It leads to understanding, and it is expected that this understanding will help the Air Force in its development problems. This expectation is by no means unreasonable, since the Air Force interest in the particular area of science stemmed from the Air Force development program.

Most of the money of the Air Research and Development Command is spent in the regenerative circuit of development and engineering. This work is handled by people in Air Research and Development Command Centers: Cambridge Research Center, Wright Air Development Center, Rome Air Development Center, etc. Of course most of the actual technical work is handled for the Air Force by contractors. Engineers in the ARDC Centers give direction to the contract program. These same Centers are responsible for doing or contracting for the applied research needed for solution of their own engineering problems. Thus the ARDC Centers are responsible for two of the regenerative circuits—the development circuit and the applied research circuit. The Headquarters in Baltimore furnishes staff direction for this work. The OSR circuit in the chart is the responsibility of the Office of Scientific Research. This Office is the only operating element of the staff at command headquarters.

It may be well to mention that, insofar as government financing or sponsorship is concerned, the Air Force considers the circuit of pure research to be the responsibility of the National Science Foundation. Although value to the Air Force may be expected from pure research, the Air Force does not feel that pure research is associated closely enough with Air Force responsibilities to justify support with Air Force funds. For example the Air Force in 1928 had no logical basis for sponsorship of the mathematical research of Dr. Albert Einstein. Yet we all now recognize that his genius gave the world one of the key contributions to the release of atomic energy—an achievement of vital significance to the Air Force and one that may well make possible the supremacy of air warfare as visualized by air-minded military prophets.

The Air Force has recognized by policy statements and active support that an adequately funded National Science Foundation is in the Air Force interest. On the other hand the Foundation does not take the place of basic research in the Air Force. The sincere and public-spirited individuals who labored for creation

of the National Science Foundation certainly intended it to be more than a program in support of development work of the military services. Incidentally the Office of Scientific Research was established after the National Science Foundation, because it was evident that an Air Force need for sponsorship of fundamental research existed and would continue to exist even after the Foundation was fully operational.

THE program of the Office of Scientific Research consists of some two hundred projects at the present time. Information on the program is disseminated widely in a book, brought up to date monthly, which tells who is doing what, where, for how long, and for how much. Government research offices exchange copies of their programs, proposals under study, and reports received from their contractors. It has been proposed at times that centralization of all Government-sponsored research would avoid "waste and duplication." The Air Force has the needed information and certainly the greatest incentive in its own self-interest to avoid unintentional duplication. The Air Force must conserve its limited basic research funds for work not being sponsored by anyone else. A single government agency to sponsor research would be a serious mistake. It is difficult to select the significant research and the geniuses of the future. The nation must continue to bring to this problem of the effective distribution of research funds, not the talents, techniques, procedures, motivation, and prejudices of one organization but rather the decentralized judgments which are the true strength of democracy.

The OSR program emphasizes research in chemistry, physics, fluid mechanics, mathematics, and the life sciences—all sciences which have contributed greatly to the realization of flight and may be excepted in the future to speed the advance of air power.

Let us look at some specific projects. A Chief Justice of the United States once said: "Law is not made by banal generalities." Neither is research. Rocket propellants have already been mentioned. The Office of Scientific Research has six projects in the chemical kinetics of combustion, at five different institutions: Princeton University, Ohio State University, University of Texas, University of Utah, and Catholic University of Washington, D. C. In another field, physics, Dr. Gordy at Duke University is using radar not to detect aircraft at a great distance but to find out more about the energy holding atoms together in a molecule. In fluid

mechanics Dr. Clauser and his associates at The Johns Hopkins University are doing wind-tunnel research on the boundary layer, that layer of air next to a moving surface which accounts for almost the entire frictional drag on an aircraft. Clauser obtains a boundary layer some 18 inches thick, about ten times as thick as that obtained over an aircraft wing in normal flight. It is hoped that the increase in knowledge gained from his studies will lead to engineering improvements which will reduce drag on aircraft. In mathematics Dr. Perry at the Massachusetts Institute of Technology has done some exploratory work on translating Russian into English by means of an electronic digital computer, a high-speed calculator of the type known colloquially as a mechanical brain. Translation is toward the applied end of the research spectrum. It is difficult to select a project in the field of pure mathematics which would be of interest to the general reader. Some may question Air Force support of the more abstract mathematics. But one must remember that Dr. von Neumann of the Institute of Advanced Study developed his famous theory of strategic decision from pure mathematics—the theory of sets.* Whether or not the von Neumann theory improves our military doctrine of decision, it has certainly provided a basis for more penetrating analysis of what is meant by strategic decision.

It may be well to emphasize that while the program of the Office of Scientific Research is centered largely in the universities, it represents by no means the total university work of the Air Force. In fact it is only about 10 per cent of the total. Few people realize the vast increase in the past few years in research sponsored in universities by the Air Force. In 1939 the Air Force had one university contract for $15,000. Today the Air Force has contracts totaling something like $60,000,000 with institutions in 40 states. The bulk of Air Force-sponsored university research is, of course, in the circuit on the chart for applied research.

Now for a few of OSR operating policies. Although the Office of Scientific Research is a relatively new organization, established about two years ago, it does have some firm views on operating policies for sponsorship of research:

(1) It does not do any research itself. The entire program is

*[Readers interested in an elementary treatment of the mathematical theory of decision are referred to an article by Dr. Haywood entitled "Military Decision and the Mathematical Theory of Games," *Air University Quarterly Review*, IV, 1 (Summer 1950), 17-30.—*Ed.*]

handled by contract, normally with universities. For basic research the best use of scientists is to let them work in their native habitat.

(2) In the entire program every one of the contracts is sole source. None of the projects was put out for competitive bids. No one is asked to bid on a new scientific theory. People are encouraged to come to OSR with their ideas of what they would like to do. If it seems a good idea and is of interest to the Air Force, OSR sponsors it. Obviously the contract must be sole source because a scientist has proprietary interest in his own ideas. In a broader sense one may consider that competition exists, but award is not to the scientist who offers the lowest cost but rather the maximum promise of significant research. Dr. Theodore Theodorsen, working for the Office of Scientific Research at the University of Maryland, has proposed a new theory of turbulence in fluids. But as Douhet said concerning the principles of war, "The worth of a doctrine is not measured by its similarity to established doctrines but by the way it conforms to reality." OSR asked some eight universities with highly qualified aerodynamic departments whether they could devise an experimental approach which might prove or disprove the theory. The development of an experimental technique to establish the instantaneous flow pattern of a fluid is a problem of great difficulty. Three proposals were sufficiently promising to warrant Air Force support. Rensselaer Polytechnic Institute will use a low turbulence air channel and visual techniques. The National Bureau of Standards method is to visualize flow patterns using a new dye-emission technique developed in Germany and high-speed (3000 frames per second) photography. At the University of Maryland a color technique will be used in conjunction with a water tunnel, with emphasis on a "tripping" device to produce the peculiar flow formations predicted by Theodorsen.

(3) OSR recognizes that many great advances are made by large scientific teams drawing from the various scientific disciplines in working together on some problem. This is often the strong approach to a problem in a field of applied research but it is not as applicable to basic research. Most OSR contracts are small—half of them under $20,000. OSR wants this situation to continue.

(4) Michael Faraday said a number of years ago: "There are three parts to research—to begin it, to complete it, to publish it." Since almost all OSR-sponsored work is unclassified, scientists are encouraged to publish their unclassified results in technical journals. To encourage publication OSR accepts a copy of a manu-

script submitted to a scientific journal in lieu of a final report to the Air Force. Scientific accuracy, completeness, and good editorial style are responsibilities of the scientist and his university. Naturally such factors are considered in periodic reviews to determine whether continuance of Air Force sponsorship is justified. But OSR contracts now provide that the contractor may publish, regardless of whether or not the Air Force agrees with the scientific competency or significance of the research. Of course the Air Force does retain authority to classify results if necessary in the national interest. Such authority need rarely be used in the OSR program of basic research.

(5) Research is not a type of activity that can be turned on and off with a faucet. If the Air Force is to receive the maximum value from its research funds, it must provide a reasonably long-term stability of funding. Basic research contracts are normally written for one and a half to two years. Contract extensions are handled with corresponding lead time so that universities can maintain a balanced and stable staff.

(6) The Air Force needs scientists who can devote the bulk of their time to research rather than to research administration. Distinguished scientists have already contributed very materially to the Air Force research program through part-time service on advisory committees.

WHAT are the benefits of the OSR program to the Air Force and to the nation? There are substantial benefits to the nation. First, publication of results is encouraged. The program is supported for research results of benefit to the Air Force, but the published research results are frequently as valuable to industry in general. Second, the program assists a substantial number of students in their academic training. Participation of students, particularly graduate students, on a part-time, paid basis, is encouraged. There are more graduate students working part time on Air Force university contracts and spending the remainder of their time studying for higher degrees than there are in the fellowship program of the National Science Foundation. The Air Force has no authority to conduct a fellowship program, nor is it seeking such authority. But in a sense the Air Force does have a program of institutional fellowships, in that the training of students selected by the university is expected as part of an Air Force research contract. This is not pure benevolence, nor is it that the Air Force will need trained people in the future. Such

student participation is one of the most effective ways of getting research done in universities. Third, although some people will contest this point, the Air Force program of basic research contributes to the academic freedom of American universities. What is academic freedom without research? It is simply the freedom to choose one established text or belief in preference to another. It is research which gives the individual professor ability to discriminate on his own. If he questions all that is published, he can seek the truth for himself. Since most universities are pinched between the realities of decreased gifts to endowment funds and decreased purchasing value of the dollar, the Air Force research program, by stimulating and supporting research, contributes to true academic freedom.

These benefits are of value to the nation. But they are not the reason for the Air Force program. There is but one reason. It is the reason for which all Air Force money is spent, the reason that it is entrusted to the Air Force by the taxpayers—the defense of the nation by air power. A strong basic research program is as essential as any other element of the research and development program. The great advances of World War II in radar did not stem from attempts to meet an operational requirement. They came because scientists, motivated primarily by curiosity, investigated the basic phenomena of electromagnetic radiation. We have known such radiation for a long time. On the first day of creation, the Lord said, "Let there by light"—a form of electromagnetic radiation. But it was not until research scientists converted knowledge from qualitative generalities into quantitative understanding that the knowledge became of value as design data for development engineers.

There has been a tremendous advance in the technology of the United States in the last decade. There has been an even greater advance in the technology of air power. This advance has stemmed largely from the exploitation of known science, of scientific discoveries of earlier days. If the nation is to continue its advance in air technology, it must not only maintain a strong developmental program but must continue to expand the base of fundamental knowledge upon which air technology rests.

New York

THE AIR FORCE WAR ON THE GROUND

A Quarterly Review Staff Study

THE tech sergeant climbed down from the last of the long row of B-47's poised on the edge of the ramp. He had just finished checking the electronic systems on each of the aircraft. Sauntering across the ramp with his repair kit, he stood aside and chatted with the guard as the crews came out, got in their planes, started the engines, and began taxiing to the end of the runway. He and the guard watched as one by one the sleek bombers streaked along the runway and climbed away toward the coast. Then with a friendly wave to the guard, the sergeant crossed the field, entered his shop, checked in his kit, and angled out the back door, flashing his pass at the guard on the door as he went out.

At the same time, inside the heavy wire fence surrounding the fuel storage for the base, the driver of a gasoline truck finished rerolling the hose into the back compartment of the truck. Glancing around, he quickly stooped and laid a small pencil-like object in the puddle of fuel at his feet, then straightened up and studied the thin stream of fuel trailing from the puddle to the nearest storage tank and to the truck. He walked out the gate, telling the guard that he would return for his truck in a minute, as soon as he could get back from the PX. The guard nodded and watched idly as the man crossed the street and turned the corner.

At the gate to the motor pool the guard grinned as the motor pool officer muttered viciously at the sight of a huge trailer truck which, in backing through the gate, had hung up on the fence and then had promptly developed engine trouble. Already a long line of staff cars, pick-up trucks, and jeeps waited for the gateway to be cleared. A sergeant ran up to the motor pool officer with the news that the wrecker would not start either. All base transportation was bottled up within the sturdy fence surrounding the motor pool.

At wing headquarters the busy clerks and officers scarcely glanced at the young supply officer who went from office to office taking an inventory of filing cabinets. No one paid any attention as he poked around in the corners of each office and hastily fumbled in his briefcase just before he walked out.

An hour later the wing commander grimly slammed down his phone after the last of a series of phone calls trying to locate the key members of his staff. All were away answering urgent summons to widely separate areas. It was another two hours before he could assemble enough of his staff to convene a meeting. When he spoke, his face was drawn, his voice harsh.

"Gentlemen, this afternoon our entire wing of B-47's has been blown up in mid-air one hour out from this base. All crews were lost."

The room bulged with tension and bewilderment. The Old Man must be joking. Yet a look at his face showed it could be no joke.

"In addition this airfield has been virtually demolished," the Colonel continued. "While you gentlemen were out chasing your tails as a result of

those faked phone calls, wing headquarters, most of its personnel, and all the records were destroyed by four time bombs and six fire bombs. Our whole POL was burned out by one thermite stick. All electric power was knocked out. The motor pool was completely useless. Fires were set in every restricted area, and all but one are total losses. All this was done in broad daylight right under the noses of our guards, in the midst of 6000 people. Eight men rigged the whole job in about fifteen minutes."

The tension broke. Someone in the back of the room giggled nervously. "A vulnerability test, that's all," another muttered.

"Thank your maple leaves that's what it was. This test has made a Christian out of me. If it hasn't done the same to you, then I'll finish your conversion myself." The Colonel ran his fingers through his hair. "I thought this base was airtight. We built miles of fences. Every restricted area was crawling with guards. We set up elaborate pass systems. We drew up a very fancy defense plan. And we were wrecked in fifteen minutes by eight men who wandered in and out of here unchallenged and unsuspected."

The Colonel turned to a major who had been sitting quietly in the corner of the room. "The Major here is in charge of the vulnerability team. He will show you how they clobbered us and will help us plug the holes. I expect you to listen as if your lives depended on it. Because they do. And a large chunk of the country's safety depends on it too."

The major rose and faced his subdued and now very attentive audience. "Gentlemen, your whole wing of B-47's was destroyed by the action of one man. One of my lieutenants dressed as a tech sergeant and carried a phony pass that would not have held up under inspection. He placed a simulated time bomb in each plane. He was able to do this because there was a hole in your security system. You took elaborate precautions to see that each aircrew entered no other aircraft but their own. You posted guards around the planes and sealed off the flight line. But you forgot that a systems technician, such as an electronics expert, is presently allowed in every plane on the line. Because you were used to seeing somebody with sergeant's stripes

"A fence keeps only honest men out." This is a lesson that trusting Americans have been reluctant to learn. Even after years of experience in the ruthless, dog-eat-dog tactics of the cold war and ideological warfare, after watching nations succumb to fifth-column movements backed by external military pressure, after the unmasking of spy rings that have penetrated our country's inmost military secrets, we bask in the false sunlight of security by isolation. We in the Air Force have accepted with pride the acknowledged position of being the first line of offense and the first line of defense of the United States. We must also accept the full responsibility that accompanies the honor of the vanguard position: the responsibility of unceasing vigilance to protect those vital missions against any form of attack that the enemy might bring against them. We must not become so exclusively air-minded that we conclude an enemy can attack us only by air. The most profitable and economical attack the enemy could launch against the Air Force might well be sabotage at home and guerrilla or partisan attacks on our air bases overseas. Deeply concerned over the need for constant and adequate defenses against internal and external ground attack, the Editors of *Quarterly Review*, in collaboration with the Air Base Defense School, Parks Air Force Base, California, summarize the present air base ground defense situation in the Air Force.

check the electronics in all these planes, you did not really evaluate the risk to your entire security structure when you allowed this one man unrestricted access to every plane on the line. You were so used to the familiar figure of a sergeant carrying a kit that you did not even bother to verify his identification. Yet any intelligent saboteur will rely on camouflaging himself within the established pattern of activity. If this had been for real this afternoon, your little oversight would have cost the United States a crippling percentage of its strategic air arm—not to mention the many millions of dollars invested in the aircraft and their equipment, or the lives of men who had trained for ten years to do their jobs. And all this would have been lost at the moment of greatest need. This sabotage would have been one phase of the enemy's D-Day for a third world war. Now for your other mistakes: . . ."

A State of Readiness

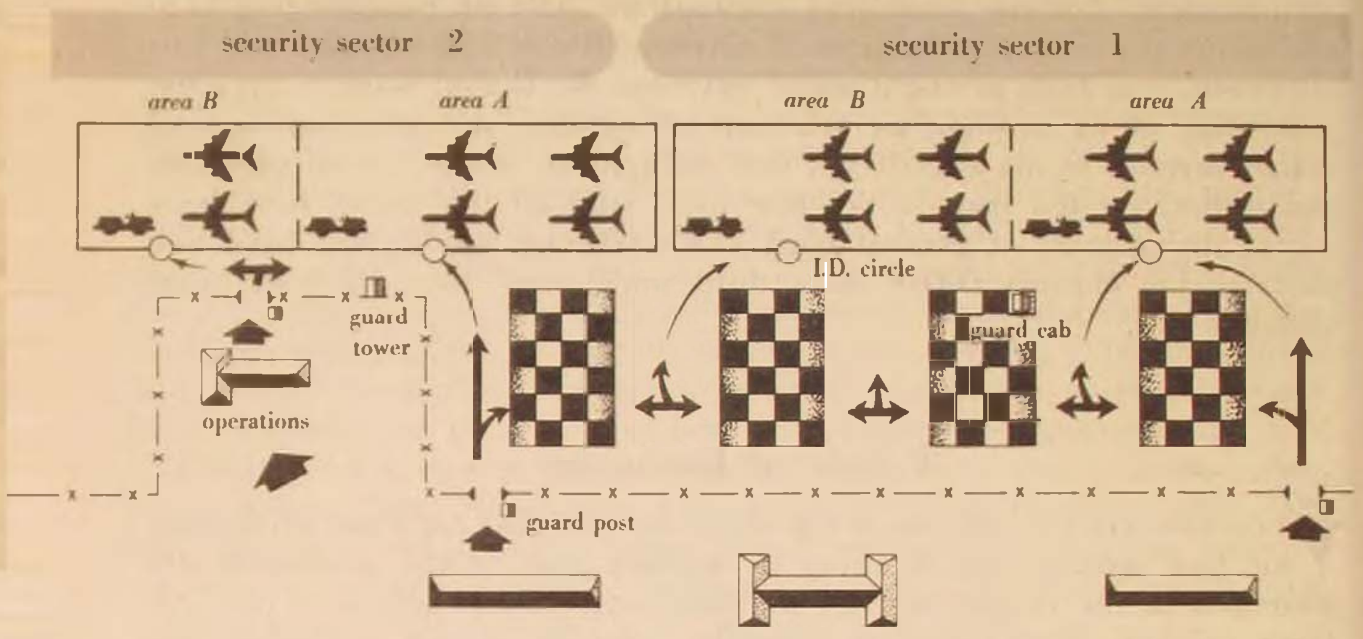
VULNERABILITY tests are one of the means by which the Air Force is checking air base security and shocking its military and civilian personnel into awareness of the critical urgency for improved ground defense of the Air Force mission. This testing is especially valuable because it probes base defenses so realistically that it changes attitudes of the people who make up the Air Force. It puts grim life in the old slogan that "security is everybody's business."

The new look at defense of air bases in the light of world events of the last ten years has sweeping implications. The development of the atomic bomb and the long-range vehicles to deliver it have made our strategic air arm and our air defense forces the most essential components of the free world's defense structure. If an enemy attacks us, these forces are necessarily his priority-one targets. We must defend their effectiveness at all costs.

With these forces now more critical to survival than ever before and with other Air Force missions only slightly less critical—such as the MATS mission to provide logistical support to overseas SAC bases—an Air Force estimate of its capabilities for ground defense is urgently needed. Such an estimate must recognize two predominant facts. First, within the ZI the threat of covert acts of sabotage, espionage, and subversion to critical Air Force missions is extremely serious. If, as the vulnerability tests have indicated, as few as eight men could immobilize a vital airbase and destroy its aircraft, the method must have great appeal for an enemy. Under relatively lax provisions for security, concerted subversive attacks against a series of air bases would be a relatively uncomplicated operation. The slight manpower and resources to be committed in proportion to the damage effected would make them by far the most economical and reliable action for the enemy. Americans, lulled by the historical precedent that "it never has happened here," ignore worldwide evidence of the past few years that "it *can* happen *anywhere*." What base commander could certify that there are not eight men among the 6000 men on his base who are disloyal or who could not be reached by bribery, blackmail, threats against overseas relatives, or the other vicious pressures which Communists have employed so effectively throughout the world?

Our air defense of the ZI depends to a large extent on our net of long-range radar stations. If hostile aircraft approach, these stations must furnish

Circulation Control



Important to preventing or minimizing the danger of sabotage on an air base is "circulation control." Its purpose is to set up defense in depth around the base elements essential to its mission. To pass through a progressive series of checks that become more rigid as they near the heart of the defended area, each person must establish "a right and a need" to be where he is and must confine himself to his specific duty. If his job takes him into the most critical part of the restricted area, the system should also provide, as far as possible, that he remain under observation while he works. Thus on a flight line, guards at the gates in the fence separating the flight-line area from the housing and administrative area will pass all persons authorized to enter the flight-line area. Guards in vehicles in the flight-line security sectors will pass through their identification circles only persons authorized access to the aircraft. Aircraft crews will pass to the aircraft only supervisory and specialized maintenance personnel required to maintain and inspect the aircraft. Transient personnel are escorted to and from their aircraft and the operations building by a security patrol and the Airdrome Officer. No member of an aircrew is allowed to enter any aircraft other than his own. Specialized maintenance personnel can enter an aircraft only when a member of the crew is present. The system is set up to provide a maximum of security with a minimum interefernce with operational functions. Like any defense system its success depends on thoroughness of planning and on the vigilance and consistency with which individual guards and base personnel observe basic rules of security.

the early warning necessary to get our air defense forces into action before the enemy reaches his bomb release line. Most of these big radar units are located in isolated spots, on mountain tops or lonely beaches. Each one is a $1,500,000 installation, manned by 300 men. Yet only a small number of trained guards is assigned to the 24-hour-a-day job of protecting each of these vital links in the defense chain. A handful of saboteurs could infiltrate isolated stations and knock a hole in our radar screen big enough to drive an air armada through.

Second, overseas bases are in varying degrees of danger not only from subversive attack but from infiltration, guerrilla warfare, partisan raids, or tactical operations by regular land, sea, air, or airborne forces. In World War II few air bases were singled out for special ground or airborne attack, but the situation today is markedly different. For one thing, many of our present overseas bases are in areas where the United States neither has nor is allowed to have ground troops. Unless they can protect themselves, these air bases can only rely for protection on local governments, some of which may be uncertain in strength or stability. For another thing, we are faced by a potential enemy who has learned the value of such tactics, who is experienced in their use, who realizes our weakness, and who has an almost global capability for organizing and fomenting covert and overt fifth-column operations. Finally, the presence on air bases of long-range aircraft to deliver atomic bombs tremendously raises the bases on the target priority list. On the first day of a world war, which would be more immediately important to the enemy: to eliminate Chicago with atomic bombs or to neutralize the three strategic air bases in North Africa?

Confronted by the high target priority of the air striking forces, the vulnerability of our overseas air base structure, and the capability of our potential enemy to make extensive use of espionage, sabotage, subversion, infiltration, partisan raids, guerrilla warfare, and local land, sea, air, and airborne attacks to neutralize our striking forces, the Air Force must solve a new order of security problem. "Security" is only a condition resulting from a successful defense. "Defense" is an act. Though interrelated, the two words are not interchangeable. In the past our local defense against possible enemy ground operations included little more than the routine activity of provost marshals and the air police—providing guards for entry gates and restricted areas, setting up and operating pass systems, monitoring the flow of security information, and performing the routine police duties on the air base. Important and necessary as these functions are, they no longer constitute a state of defense. Although the air police establishment can be retrained to become the nucleus for planning and implementing realistic defense plans, the job is too big for the air police alone. They must be supplemented by other troops sufficient in number, training, and equipment to foil enemy attacks. Security and defense are more than glorified police jobs.

Where will the additional troops come from? How will they be organized and dispersed to be at the right place at the right time? How will we train them? What should we equip them with?

The largest answer to the question "where do we get the manpower?" is that all airmen and officers in the Air Force must be the manpower. Every man must be trained, at least to the point that he is familiar with his weapon and knows the basic tactics of the ground defense of a limited area. Every man must fully understand his security responsibilities. No one expects

The Royal Air Force Regiment

The RAF Regiment, an integral part of the Royal Air Force, was formed in 1942 primarily to provide local ground defense for airfields and other air installations. Composed of rifle, armored car, and light antiaircraft units, the Regiment is deployed for the most part at air bases overseas as the core around which the air base personnel must be diverted from their primary job to take up defensive troops, guerrilla forces, airborne troops, or low-level air attacks. The reconnaissance screen protects the base from surprise attack, harasses enemy ground troops advancing into the area, and in general delays as long as possible the time when air base personnel must be diverted from their primary job to take up defensive positions. Trained in the use of the rifle, the light machine gun, antitank weapons, and mortars, the men of the RAF Regiment are also "shock troops" in the defense-in-depth strategy, providing the skilled ground fighting and firepower needed to repel enemy penetrations of the main defense line.

Corollary to the RAF Regiment is the training given to all RAF personnel in the elements of ground defense. Basic instruction in the subject is given in all training camps, schools, and officer training courses. Later, usually within one year of his basic training, each man takes the "advanced" course. After that he must take a refresher course each year. The individual's progress in ground defense training is made a part of his personnel record, and all commanders are responsible for ensuring that their men continue training, both as individuals and as part of the unit training. A standardized training program is followed, so that wherever the airman may be transferred he will fit into the local ground defense organization.

every man in the Air Force to become a skilled infantryman. But every man should be able to take care of himself, to man his position, and to know enough about local ground defense so that he can obey orders intelligently.

In a concerted overt attack on an air base, these men would form the main line of resistance. In addition to them, we must have a hard core of better-trained troops, equipped with weapons of greater firepower. These "shock troops" will usually man the outposts beyond the main line of resistance and will form a mobile, hard-hitting reserve which can move to bolster weak points in the main line. Where do we get these highly trained troops? The RAF, no more flush with manpower than we are, has its RAF Regiment. Ultimately the Air Force may have to provide a similar organization. But with the present Air Force expansion already straining the manpower pool to the limit, the best compromise solution seems to be to train the air police and their officers to furnish the punch for ground defense.

The organization of base defense forces and their employment in event of attack will be established by an air base defense plan drawn up individually to fit each air base. On the one hand, the plan must provide a continuous defense against espionage and sabotage—internal defense. On the other hand, it must detail operations for local ground defense in depth against an overt attack. Each plan will be different, since there is no typical air base. Each will have different tactical problems. Yet planning must be uniform and the various formats consistent, especially in the way operations orders are written and defense actions are coordinated with those of other

friendly forces in the area. A bad defense plan can be worse than no plan. Planners must be trained in a new skill—ground defense operations.

Because ground defense requires extended training of numerous personnel, most of it must be on-the-job training. When air police men, non-coms, and officers have been to school and completed their intensive training, they will be assigned to bases throughout the Air Force to conduct the less rigorous training programs for the bulk of Air Force personnel. Obviously the difficulties of such a program are enormous. The local commander, already hard pressed for manpower, may resent a major activity that diverts man hours from his basic mission. Clear-cut and forceful direction must be given to all levels of command, underlining the importance of the program. Intensive indoctrination must stir all ranks with the urgency of ground defense training. All must realize that unless the Air Force can defend its mission on the ground, it can lose its air battle before a single plane takes off. Ground defense must become a part of basic training, of officer training programs, and of Air Force professional school programs. The Air Force technician will still be a technician, but he will be able to defend himself and his job.

The defense of air bases against overt ground attacks involves equipment not now in use in the Air Force. Rifles, automatic rifles, machine guns, hand grenades, and mortars must be integrated into the USAF supply and maintenance systems. Few air bases have ranges suitable for firing the new weapons. Either ranges must be developed or training must compromise on the use of sub-caliber devices. A reliable, flexible communications system is a "must" for defense in depth of a constricted area like an air base. Other new equipment will be needed. Provisions must be made for determining the requirements for additional equipment, and for developing and testing it.

Special Characteristics of Air Base Defense

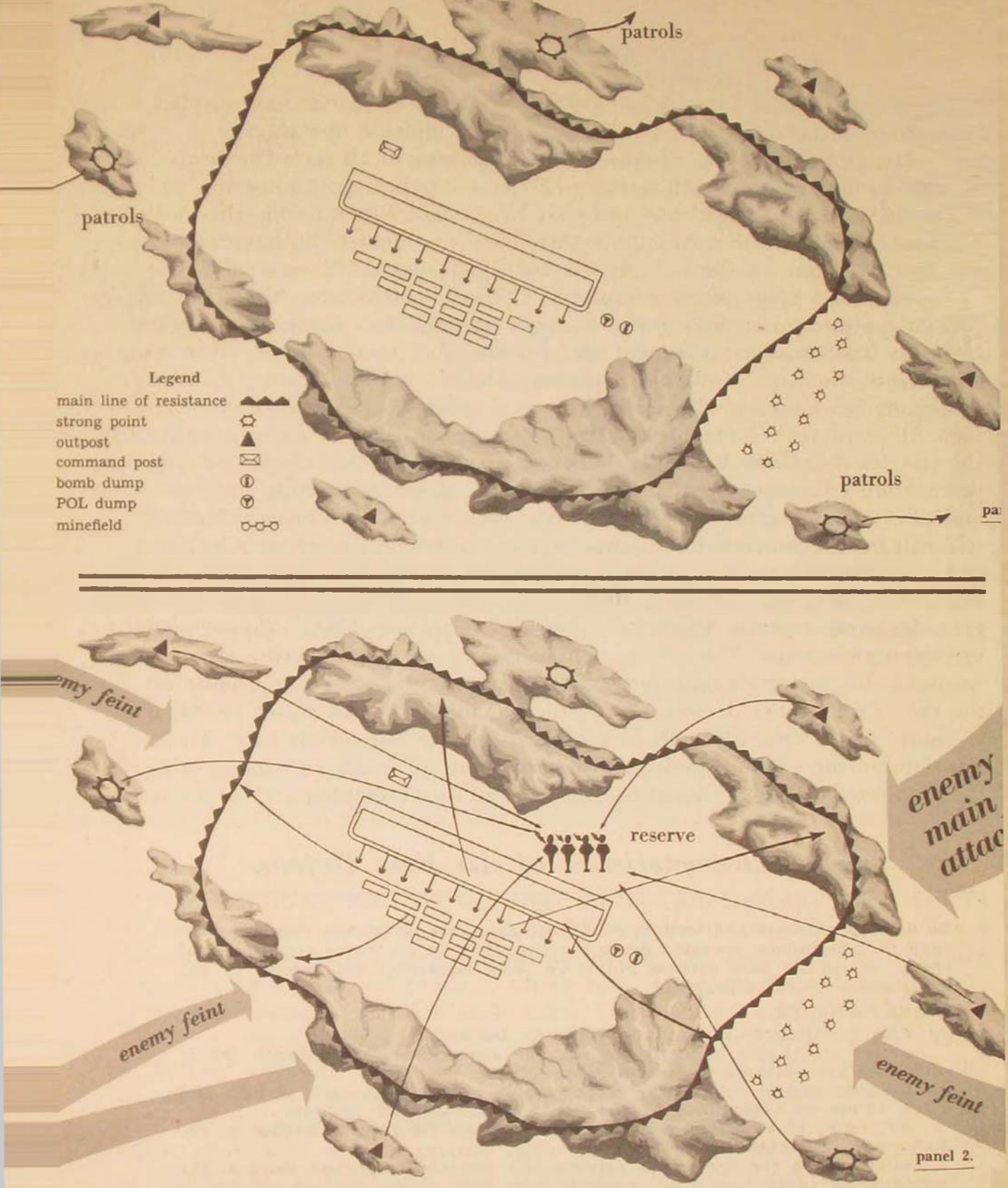
To develop concepts and techniques for air base ground defense requires more than to superimpose accepted Army practice with an Air Force organizational chart. Sound air base defense builds on some equations not present in the usual ground defense problem:

Disadvantages

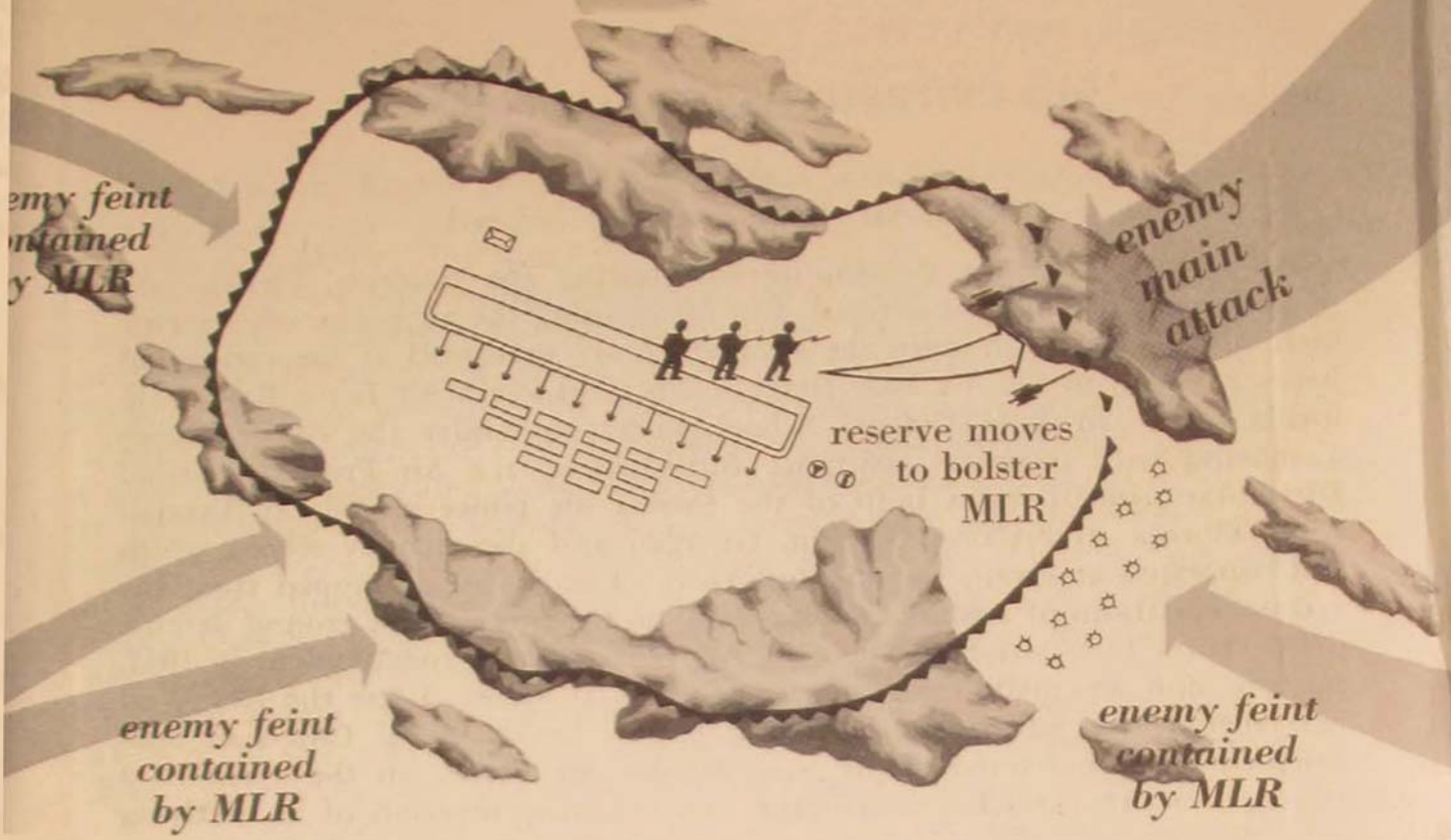
- **Air installations are usually tactically isolated.**
- **Sites are chosen primarily to suit air operational requirements. Many such sites are unsuited to ground defense.**
- **Within the air base, siting of vulnerable components—such as POL and bomb dumps—is determined by the needs of the primary mission.**
- **The area to be defended is normally too large for ground defense by the manpower available.**
- **Other than the few troops permanently assigned to ground defense, the personnel on an air base must continue their work on the primary mission as long as possible.**

Advantages

- **Air base defense planners will usually have time to reconnoiter and become thoroughly familiar with local terrain and approaches.**
- **The defenders can usually prepare and practice their defense plans unhurriedly.**
- **Once the terrain has been studied and the over-all defense plan drawn up, the ranges of various defense weapons can be measured out on the terrain and fire plans can be tested.**
- **While the attacking enemy must carry his ammunition with him, the defender can stockpile his ammunition at various points and use it at a high rate to bring concentrated fire on critical sectors.**
- **Especially at night the defender will have the advantage of prepared positions and be better able to maintain the advantage of silence.**



These illustrations show the stages in ground defense of an air base. The first panel shows an overseas air base under normal readiness conditions. Positions have been prepared for a defense in depth. A command post has been set up to coordinate the defense activities. The main line of resistance has been laid out to make use of the terrain advantages offered by the two rows of hills to the north and south of the air base. These heights must also be denied to the enemy, since the field of fire from the hilltops would cover the whole base area and make it impossible to continue the primary mission of the base. Beyond the MLR a deep fringe of strongpoints and outposts has been established. These are manned continuously, usually by air policemen trained in techniques of scouting and reconnaissance, while



panel 3.

the MLR is manned only when the attack alert has been given. Beyond these outposts patrols fan out even farther afield, gathering information on enemy intentions and strength. An integrated communications network links the outposts with the command post, with each other, and with the MLR. If the enemy attacks (second panel), warning is flashed back by the patrols or outposts. The outpost troops fall back as slowly as possible toward the MLR, pass through it, assemble behind the MLR, and become part of the mobile reserve force. As soon as the attack warning is sounded, the base personnel least necessary to the air base mission (Category III) immediately run for their equipment and fall out to man the segment of the MLR previously assigned to their organization. With the MLR divided into segments, specifically assigned to certain units, and with frequent practice of the steps to be followed in an alert, the men can get into position in the short time that will be available. Since the MLR has been carefully designed and defensive positions already prepared, these partly-trained forces are expected to hold the line against light attacks. If the attack becomes stronger, base personnel more directly connected with the basic mission (Category II) will be brought in as reinforcements. If an all-out fight develops, the personnel directly involved in the basic mission (Category I) will also be called upon. If the enemy attack threatens to overwhelm a certain sector of the MLR (third panel), the ground defense commander can move his reserve force to that point. This force, trained not only to hold a defensive position but to launch limited counterattacks and armed with weapons of considerable firepower, will reinforce the weakened section of the MLR. If the MLR is too thinly manned to stop the enemy advance, the withdrawal to more compact defensive positions must still protect the primary mission of the air base rather than any particular piece of ground. If by abandoning the housing area to the enemy, the defense forces can save the POL dump, the bomb stores, and the runway, then housing is of secondary importance. Obviously an effective ground defense cannot be organized when the crisis is at hand. Time is as vital as it is in air defense. Prepared positions and frequent practice are essential. The effort might seem too large if the stakes involved were not tremendous.

The Air Base Defense School

THE responsibility for developing and testing the concepts, tactics, and equipment for air base defense, and for training the air police officers and men who in turn will train the supplementary personnel at the individual bases, is vested in the Air Base Defense School at Parks Air Force Base, California. The Air Base Defense School, operating under the Air Training Command with technical assistance furnished by the Air Provost Marshal Directorate, incorporates both of the former air police schools at Tyndall AFB, Florida, and Camp Gordon, Georgia, and the security school which SAC operated at Camp Carson, Colorado. The school developed from the recommendations of a study made in 1950 on the problems of ground defense of Air Force installations. When the Air Force became independent in 1947, no provision was made for ground defense of air bases. Later the Key West agreements and subsequent clarifying papers by the Joint Chiefs of Staff assigned tactical defense of air bases to the Air Force. In the event of a strategic or area attack—an airborne and seaborne invasion of an outlying area, for example—the Air Force will join with the Army and Navy in an over-all defense effort. The outbreak of the Korean War focused attention on the Air Force deficiency in tactical ground defense. The study saw in the air police and the existing security systems a nucleus which could be expanded (1) to train the additional personnel needed for tactical ground defense and (2) to provide the hard core of more highly trained troops which would be needed to make air base defense effective. The study recommended that air police training be immediately expanded, both in the number of students and in the subject matter in the curriculum. The Air Force Council approved the recommendation and ruled that the Air Base Defense School be established.

In August 1952 the 3625th Training Group (Air Base Defense) was activated and began operating the Air Base Defense School. The group staff and the school instructors were for the most part picked from the staffs of the two former air police schools, from the security school at Camp Carson, together with a group of very competent SCARWAF officers. At present the Air Base Defense School has a three-fold mission: (1) to teach Air Force personnel the principles and related subjects necessary for the ground defense of Air Force installations, including air police and security duties; (2) to train personnel to conduct their own training programs at their base of next assignment; (3) to develop, field test, and refine air base defense concepts, doctrine, tactics, techniques, and materiel. New developments and improvements will be disseminated throughout the Air Force. Manuals, bulletins, packaged courses, and on-the-job training kits will be published and made available for base training programs.

The Air Base Defense School is physically divided between two California air bases. Group headquarters and classroom facilities are on Parks AFB. The field maneuvers which apply classroom teaching to realistic defense situations in the field are held at Beale AFB, some 150 miles north of Parks. The school is comprised of four branches:

(1) The General Subjects Branch covers general subject matter relating to air police activities—military law, drills and ceremonies, leadership, unarmed defense, organization, ethics, etc.

(2) The Weapons Branch provides the student with a working knowledge of the operation and employment of small arms and crew-served weapons, ranging from the caliber .45 pistol to the 60-mm mortar.

(3) The Security Branch brings the student up to date on present Air Force security policies, indoctrinates him in the need for security and security planning, and instructs him in the methods of attaining security and law enforcement and of providing for both the internal and external defense of installations. Students receive instruction in security, intelligence, subversive activities, estimates and plans, law enforcement, and corrections.

(4) The Tactics Branch teaches students the methods and techniques of defending Air Force installations against overt attacks. The use of maps and compass, communications, combat skills, passive defense, tactical formations, and the techniques of ground defense are covered in lectures and in a series of field exercises and problems.

The total course lasts 13 weeks except for the advanced officers course, which is of 10 weeks duration. Each of the branches teaches its curriculum on four course levels with a new set of classes beginning every four weeks:

Courses	*Quotas*
Air Police Course 96150 (basic)	224 students
Air Police Course 96170 (NCO)	55 students
Air Police Officer Course 772100 (basic)	38 students
Provost Marshal Course 771100 (advanced)	10 students

Designed to produce the *operator,* the *supervisor,* the *manager,* and the *planner,* the four courses vary considerably in their emphasis and degree of intensity on different subjects. Thus in the basic course for airmen 35 per cent of the course is devoted to weapons and 18 per cent to security, while in the provost marshal course only 16 per cent of the time is spent on weapons and 38 per cent on security.

The field exercises at Beale AFB join the students of the four course levels to work out problems together under realistic conditions. Each level assumes its duty as it would on an air base under actual attack. The faculty monitors the exercise and allows the students to make mistakes. Then the exercise is analyzed and each mistake pointed out to the students. When everyone has seen the light, the exercise is tried again under slightly different conditions to see how well the students have absorbed their lessons.

Each time the Air Base Defense School runs through the class cycle, it is creating and refining concepts, tactics, and techniques for security systems and for ground defense. Every effort is made to stimulate both the faculty and the students to evaluate the course, its methods, and results, not only to effect constant improvement but to prepare the students to go back to their bases and educate all echelons of command in this pioneering program of air base defense. Knowing that the effectiveness of its graduates is the final verdict on any school, the Air Base Defense School plans to follow up its graduates and query commanders in the field about their performance.

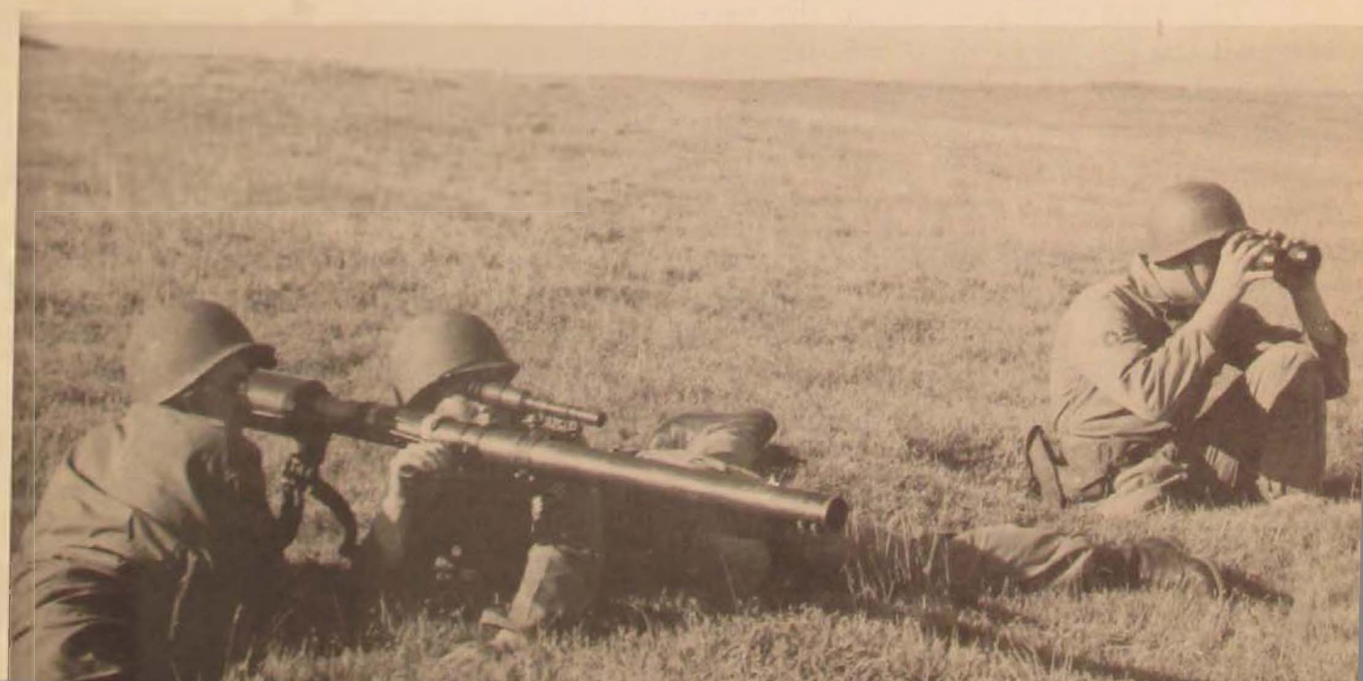
The Air Base Defense School is a big step in the right direction. It has pulled together the air police training and the ground defense training into one establishment with one faculty and one concept. Its mixed Air Force-Army faculty has pooled the peculiar problems and requirements of the Air Force with Army know-how in ground warfare. Because it is a well-rounded organization, the Air Base Defense School can develop doctrine as well as instruct, can test new equipment as well as teach the use of standard arms.

The Test of Defense Schooling

The courses in tactics, weapons, and maneuver have been completed. The Air Base Defense School now brings the students of its four class levels together for the field problem at Beale AFB. In a 72-hour exercise the students fight off a determined "enemy" attack. They plan strategy, send out patrols, man outposts and MLR, throw in reserve forces, shift firepower, all under the watchful eyes of their instructors. Naturally they make their share of mistakes. The instructors go over the battle with them, pointing out errors and suggesting remedies. Then the attack begins again. Tired, hungry, and grimy, the dogged defenders once more fight off the "enemy." This time they make few mistakes, and these not ones made in the first attack.

Comprehensive planning is essential in effective air base defense. Planning must provide for continuous operations concerned with covert attack and for emergency operations concerned with overt attack. These operations must be separate but integrated for complete coordination. All air base defense planning requires two basic steps: (1) an estimate of the situation; (2) an operations plan implementing the decision reached by the commander after study of the estimate of the situation. Having completed the estimate of the situation, these officers study a "mock-up" of the problem air base before planning its defense against ground attack.

Once the plan has been made, the junior officer must implement it, explain it to his men, and train them to carry out their duties. Above, the plan is being explained. In the other photos men are being trained in the use and application of ground defense weapons. At right, a team is instructed in the 60-mm mortar; below, a 57-mm recoilless-rifle crew is in hasty-firing position. Other weapons taught in the school are the caliber .45 automatic, the M-1 rifle, the carbine, the caliber .45 submachine gun, the caliber .30 Browning automatic rifle, the caliber .30 and .50 machine guns, hand grenades, rifle grenades, and mines.



What of the Future?

While the Air Base Defense School is a big improvement over previous air police and security schools, it does not consider that its present course or facilities completely solve the Air Force problem. The physical set-up is not the most efficient. Neither Parks AFB nor Beale AFB has real air base facilities—runways, aircraft, maintenance shops, bomb dumps, and POL storage. Obviously realism and transfer of experience is limited when field exercises must not only simulate conditions of attack but also what is to be defended. This deficiency, coupled with the separation of two parts of the school by 150 miles, indicates the desirability of consolidation on an operational air base with both proper facilities and room for maneuver. Operations would become realistic and closely knit, and the school could set up a model defense system. The school hopes eventually to devote more time to field problems. Relocation would be of most benefit to these exercises—the real pay-off of the course, both for the students and the faculty.

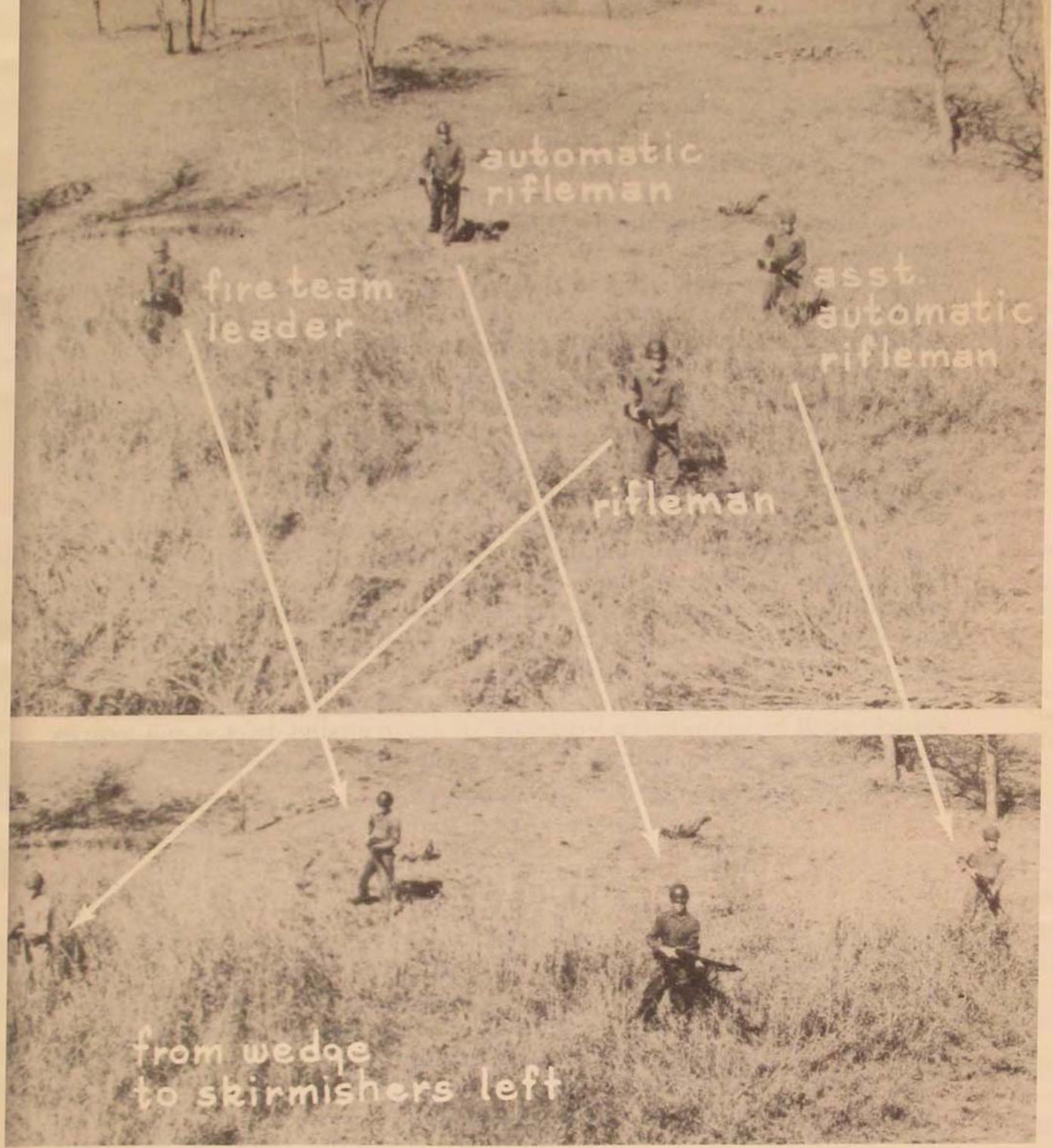
The practice of drawing the entire student body from the air police is not altogether satisfactory. The number of air police in the Air Force is not adequate to defend Air Force installations in addition to their other duties, especially since the recent cut in air police personnel. It is also desirable operationally that other categories of Air Force personnel be trained in the defense part of the course. Headquarters USAF is now at work on a career field for security officers. After its establishment the present courses can easily be reorganized into split-phase courses. Then a personnel officer, for example, could take the defense training without the purely air police part of the course.

Whether the course is opened to non-air police personnel or not, there is a need to maintain a steady flow of students to the four courses. At present no mandatory quota is leveled on Air Force commands. The school can only request that commands send students. As a result the number actually sent varies with the urgency of other operational requirements and the attitude of the commander toward the need for ground defense.

But however good the Air Base Defense School becomes, however valid are the concepts and techniques that it develops, the final development in Air Force capability for ground defense is outside the province of the school. The final task is to create the necessary strong motivation and alertness of all the people in the Air Force.

On Guard

Even after the bulk of the tremendous training job has been done, the problem of individual attitude will remain. Recently the provost marshal of one of the most security-minded air bases in the United States tried an experiment. He assigned a newly-arrived WAF officer to spend several days strolling around the air base, studying the defenses. Then she was to devise some plan for sabotaging an essential part of the base. On the third day of her assignment she and her wire-haired terrier strolled by the formidable wire fence encircling the POL dump. As she drew opposite the gate, the dog seemed to pull the leash from her hand and dash through the gate, disappear-



The four-man fire team, a new development in air base defense. Replacing the infantry squad as the basic element in the defense structure, the four-man unit is particularly adapted to the special problems of defending an air base. As shown on maneuvers, the four-man team is versatile. It can be quickly deployed from one formation to another. Here it moves from the wedge (top) to skirmishers (below). Composed of three riflemen and one automatic-weapon man, it can adapt itself to a variety of automatic weapons, depending on the circumstances—the Browning automatic rifle, the submachine gun, the caliber .30 machine gun, the 57-mm recoilless rifle, or, in some cases, the 60-mm mortar. Because of the small size of the team, the men quickly get to know each other and learn to work together after a minimum of practice. In defense of a small area, units can easily be detached and moved to other positions. Since the four-man unit is easily subdivided into two teams, it also fits into the Strategic Air Command practice of employing two-man reconnaissance and detection (R & D) teams to patrol restricted areas.

ing among the huge storage tanks. The guard on the gate, gentleman that he was, dropped his rifle and chased after the dog. When he could not catch him, the two guards patrolling the fence came inside and joined the chase. The WAF officer followed them inside the fence and casually placed several of her "thermite bombs" among the tanks. When the panting guards finally returned with her dog, the WAF was waiting patiently at the gate. She thanked the men profusely and walked away. Her simple stratagem of the damsel-in-distress had negated the whole elaborate security system. Security was defeated not only by human nature but by the attitude of the guards toward their job; they did not have the conviction (1) that theirs was an important assignment; and (2) that sabotage could actually occur here, now, in the United States. If they had they would have automatically suspected anyone who walked by that fence, regardless of the uniform the person wore. Such an attitude, however repugnant to the average American, is the price of an effective ground defense.

In our air bases abroad the air base commander must insist upon a sound defense plan for his base and that his personnel practice the plan until they can find their posts in the dark in minutes when an alert is sounded. Each man taking part in a practice alert must realize that he is not merely being inconvenienced by a whim of the commander but is learning to save his own life and possibly the future of his country. When we have achieved these aims we shall be winning the battle for Air Force ground defense and security for the missions of the United States Air Force.

Air University Quarterly Review

Air War In Korea: X

FLYING TRAINING IN FIFTH AIR FORCE

LIEUTENANT COLONEL L. G. TAYLOR, JR.

THE pilots and aircrews of Fifth Air Force like to think of themselves as "tigers." That they were "tigers" during the Korean War is attested by their record for destruction of enemy aircraft, supply lines, vehicles, troop emplacements, and the thousand other targets attacked by the U.N. air forces.

These men were not and are not the dashing youngsters who gained fame in the days of the "big war." While many of them are young, many others were heroes of World War II, now older, wiser, and considerably more settled in their ways. It is impossible to lump them under one descriptive term unless by the common denominator called heroism.

But one thing shared in common by all pilots and crews was the best training that money and human ability can produce. Much has been made, for example, of the lopsided ratio of MIG kills to Sabrejet losses. Almost always it has been pointed out at the same time that this amazing record is not due to any great superiority of aircraft or equipment but almost entirely to the superior training of USAF pilots. The same qualification applies to all categories of Fifth Air Force air activity. Fighter-bomber pilots, light-bomber crews, reconnaissance pilots and crews, all compiled outstanding records in their specialties. The reason behind this uniform high performance was the excellent training received by all air crews.

During Hostilities

FEW people not actually in Fifth Air Force know that even during the height of the air operations in Korea, pilots and crews were training intensively. It was frequently difficult to apportion a part of the available flying time to training purposes—especially when F-86 pilots were on MIG-killing sprees, when long enemy supply lines provided many lucrative targets for night intruder B-26's, or when the ground situation demanded close support from fighter-bombers. But always thought was given to tomorrow. It would never have done for flying operations to be conducted at the maximum pace, with no thought to training replacement flyers in the techniques and tactics which were peculiar to the Korean operation.

Flying-training operation in Fifth Air Force recognized that each pilot's need for training varies. Obviously a fighter-bomber pilot with World War II experience and a couple thousand hours of flying time does not need the same training as a newly graduated pilot with a total of 350 hours flying time. So flying training was geared to pilot proficiency. It was left to the unit commander to determine when each pilot was sufficiently proficient to be termed combat ready.

The Flying Training Branch of the Directorate of Operations, Hq Fifth Air Force, issued broad training directives. These directives listed the subjects which would be treated in ground school and the types of flying training for the newly arrived pilot. They set no minimum number of training hours

nor any standards other than those in USAF directives. One pilot might be declared combat ready after a very few training flights, while the next pilot might be put through twice as much training. Every pilot flying combat, whether a squadron commander or a wingman, had to be "certified" capable of flying combat missions. The program worked quite well, its organizational disadvantages being more apparent than real.

One early complaint was that the training programs in different units were not standardized. The standard program of one F-84 wing might have called for 35 hours of assorted flying training time for each new pilot, while another F-84 unit might call for only 25 hours. But in either case the pilot need not complete either number of hours, provided that he could qualify in a lesser number. By the same token some pilots were required to fly more hours than the unit program called for. The programs were flexible, and although they differed, each covered the same territory and accomplished the same objectives.

Another reputed disadvantage was the loss of central control in determining when a pilot or crew was combat ready. This "disadvantage" is refuted by the great differences in experience levels of replacement pilots. A standard, mandatory training program, a same-for-all program, would have worked unnecessary hardships on the individuals and on the units. In the final analysis, who is better qualified to state when a pilot is ready to fly combat than the combat-tested pilots who will be flying with him?

More real were the difficulties that the stern facts of operational necessity imposed on a flying training program in a combat theater. All flying and particularly training, since operational flights must of necessity receive priority, was limited by the fact that major inspections and maintenance of aircraft was accomplished at bases in Japan. The reason for this, of course, was to increase mobility of the units and permit them to move rapidly if necessary without leaving behind valuable equipment. But it did restrict flying operations, in that considerable time was lost to ferrying and weather. Another obstacle was that many pilots reported to Fifth Air Force for combat duty without having flown at all for the preceding sixty or ninety days. For such pilots, particularly those with low experience levels, a certain period of refresher flying was required before they could be injected into the normal training program.

There was also the problem of Korean weather, which for certain months of the year slowed down operations considerably. There was the necessity for maintaining certain levels of fuel and ordnance in readiness for all-out tactical operations. Also each unit had to maintain at least 75 per cent of its tactical aircraft in commission at all times—this against the event that the enemy take advantage of his numerical superiority both in the air and on the

"Flying training" usually implies duty far from a theater of operations. But Lieutenant Colonel L. G. Taylor, Jr., formerly Chief of Flying Training, Headquarters Fifth Air Force, outlines the vigorous flying training that Fifth Air Force carried on at the height of hostilities. The training paid off big. The sharp flying skill of Fifth Air Force pilots featured every phase of the air campaign. Since the armistice, unit training continues in realistic simulation of combat missions, and individual training sharpens the keen, battle-proved edge honed on the war-time air weapon. An alert, combat-ready air force patrols South Korea.

ground to launch a do-or-die attack. All these difficulties, together with some minor ones, lumped together as considerable restraint on a wartime flying-training program in Fifth Air Force.

In each unit a combat-experienced pilot of at least flight-leader caliber was placed in charge of a provisional training flight. To him and his staff of instructors, all of whom were combat pilots, fell the responsibility for rounding all newly arrived pilots into shape for combat. Even when trained and assigned to squadrons and flights, new pilots were not considered full-fledged combat pilots. Their first two or three missions were carefully scheduled to be short and less dangerous ones. The term "dollar rides" or "cherry rides" denoted these missions, which were in effect training flights under actual combat conditions.

An entirely separate training program came into being during the latter stages of the Korean War. Conducted exclusively by fighter-bomber units for their flight leaders, it was designed to prevent any "incidents" of aircraft dropping ordnance on friendly positions during close-support missions. Flight leaders were taught the latest techniques of locating and hitting targets, with emphasis on navigation by maps and target identification. When graduates of the one-week course returned to their units and displayed greater proficiency at target identification and destruction, the course pay-off was obvious. The school was considered so important that it has been continued after cessation of hostilities.

One other phase should be mentioned. A pilot did not bid goodbye to the training program once he was declared combat ready. At that point he merely switched to continuation training. Not nearly so extensive as pre-combat training, this schooling was primarily to improve his ability to deliver ordnance accurately and to fly on instruments.

Post-Armistice: Unit Training

With the end of hostilities in Korea the mission of Fifth Air Force has become essentially one of maintaining the highest possible state of combat readiness. Every take-off of a tactical airplane now is a planned and pre-briefed training mission, flown to simulate combat conditions as realistically as possible. A good share of these training flights are ordered by the Combat Operations Division of Fifth Air Force headquarters and therefore are a part of the over-all command plan for the day's flying operations.

The mission of maintaining combat readiness applies to all echelons of Fifth Air Force, including the headquarters. The Combat Operations Division has taken responsibility for what might be called the unit flying-training program. This consists of planning day-to-day training operations, in which the flying activities of each tactical unit are integrated into the over-all plan for the day. "Frag," or operations, orders are issued daily to all units exactly as they were during war time. The units immediately begin plans to implement the frags on the following day. This system keeps all the operational machinery well-oiled. The frags could just as well direct flights into North Korea, and the pilots and aircraft could just as easily fly them, should the necessity arise.

Some of the missions directed by Combat Operations, though actually training flights, are tactical in nature. For example, at least one alert flight at all times patrols the air lane south of the demarcation line. Others are

standing by on strip alert, ready to take off on short notice to defend against a surprise attack.

Other missions directed by Combat Operations during a normal day may include practice route reconnaissance, Shoran, or tactical air direction post ("tadpole") missions by B-26 night intruders; fighter-bomber strikes, using live ordnance against one of the gunnery and bombing ranges in Korea or simulating attacks against friendly positions or supply lines; fighter-interceptor sweeps, which may end in mock attacks and dogfights against an "enemy" or in firing at tow targets; weather, visual, or photo reconnaissance flights by tactical reconnaissance aircraft; practice leaflet drop missions; and control missions for the LT-6 "Mosquitoes."

Individual Training

As mentioned before, the Flying Training Division of Headquarters, Fifth Air Force, is responsible for "individual flying," as contrasted with the "unit flying" training supervised by the Combat Operations Division.

Just as during the hostilities period, new pilots and crews must be provided combat-ready training. A continuing program of training for the same crews is also necessary once they have been declared ready for combat. This training to maintain combat readiness is now of primary concern. During the war crews kept their teeth sharpened on actual combat missions. After the armistice a flying-training program had to be devised which would continue throughout the pilot's or crew's assignment to Fifth Air Force. Consideration had to be given to several limitations. Paramount was the number of available flying hours. The rear-echelon maintenance system has remained in effect, and aircraft still must be flown to Japanese bases for major inspection and maintenance. As during the war, turn-around time for this operation reduces the number of flying hours available. Other restrictions are the supply levels of parts, fuel, and ordnance which must be maintained against the ever-present possibility of the resumption of combat operations. For the same reason a maximum number of tactical aircraft must be kept in commission at all times and training must be suspended when the in-commission number falls below the requirement. Also tactical aircraft must be conserved to the extent that they will not be worn out if the fighting should resume.

These and other factors determine the total number of hours which each unit can fly. After a unit's total allocation of flying hours has been apportioned among assigned or authorized crews, the portions are further broken down into definite amounts for each category for each unit. Fifth Air Force allows roughly 240 hours per year in tactical aircraft for each F-84 and F-86 pilot, with a ceiling of 300 hours. For F-94 crews the ceiling is 252 hours per year. The B-26 light bombers are allowed 312 hours per crew, with a ceiling slightly higher. The jet units can supplement their allocation with further time in the T-33 aircraft assigned to each unit. The T-33's are used primarily for transition and instrument training.*

*[Col. Taylor's number of flying training hours for Fifth Air Force pilots mentioned in the paragraph above and in the table on the following page reflects only that time devoted to tactical training and does not include some 60 additional hours per pilot received in the following categories: time logged as an observer for another pilot flying instruments; time logged in test flights; in standardization checks; in target towing for aerial gunnery; and in ferrying aircraft for rear-echelon maintenance. This time raises the individual total to well over 300 hours—the minimum required by Hq USAF to maintain pilot proficiency and accomplish other missions.—*Ed.*]

Fifth Air Force Continuation Training

For F-86 fighter-interceptors

formation	20
tactics and maneuvers	36
instruments	24
weather penetration	8
navigation	32
gunnery: 48 sorties	75
interception	45
total	240 hours

For B-26 light bombers

route reconnaissance	84
TADP missions	72
bomber stream	36
low-level reconnaissance, Red-bird or Shoran	36
formation	48
Loran or Shoran	36
total	312 hours

For F-86 fighter-bombers

navigation	12
instruments	36
tactics and maneuvers	48
night	24
air-to-air gunnery: 48 sorties; and air-to-ground gunnery: 60 sorties	120
total	240 hours

For F-84 fighter-bombers

navigation	20
instruments	20
tactics and maneuvers	48
night	24
air-to-air gunnery 24 sorties; and air-to-ground gunnery: 64 sorties	128
total	240 hours

A definite yearly training program is now in force for the crews of each type aircraft, in each operational category in which it is employed. For example, Fifth Air Force has two F-86 fighter-interceptor wings and two F-86 fighter-bomber wings. Obviously the same training does not satisfy both types of operation. There are also two F-84 fighter-bomber wings in the command. Because F-84 and F-86 capabilities differ the training must differ—primarily in that the interceptor capability of the F-86's is emphasized.

Training programs were also established for F-94 all-weather interceptors, for tactical reconnaissance pilots and crews (both B-26 and jet), and for the LT-6 or Mosquito pilots. These made up only a relatively small portion of the total individual training program for Fifth Air Force.

Objectives

EACH Fifth Air Force training program proceeds from the views of tactical unit commanders and operations personnel as well as from the training section in the air force headquarters. At the time of writing, flying training is threatened by a reduction in the flying-hour allocation to Fifth Air Force.* The command programs are given here in their original form to indicate what is considered necessary to keep combat pilots at a high state of readiness.

To permit the commander of Fifth Air Force to evaluate the combat readiness of his command, a reporting system was instituted when the new programs were issued. Initially training accomplishment reports were rendered each ten days, later twice monthly. The report reflects the degree of accom-

*[Since this writing Hq USAF has authorized Fifth Air Force the additional flying hours requested for the full training program.—*Ed.*]

plishment by the average pilot. At Hq Fifth Air Force this information is posted on charts designed to present the information at a glance.

The training programs place considerable emphasis on gunnery and bombing training. Sitting on the powder keg that is Korea, Fifth Air Force is naturally determined that each pilot shall be able to deliver his fire power with the maximum effectiveness. Air-to-air and air-to-ground ranges have been established in Korea and off its coasts. Fifth Air Force has three scorable air-to-ground ranges that are used primarily by fighter-bomber units; three very small, uninhabited islands just off the Korean coast not scorable as ranges, used mostly by light bombers and tactical reconnaissance units; three over-water aerial gunnery ranges for interceptor practice; and a smoke-rocket range used by Mosquito pilots to practice marking targets. Compared with ZI standards, the command appears to be fat on ranges. But tempo of gunnery and bombing training keeps these ranges busy.

Throughout the Korean fighting, the bulk of the publicity went to the fighter-interceptor units as they sought out the enemy in the sky and destroyed him. The air battle was vital to the over-all conduct of the war, but probably of more immediate consequence to the ground situation were the highly successful interdiction and close-support operations of the fighter-bombers and light bombers. These operations required the utmost cooperation between Fifth Air Force and Eighth Army. When hostilities ceased, the machinery which had provided this cooperation became rusty. It was evident that unless the system and the understanding which had provided such good results during the war was revived, the communications network and the coordinated organization would fall apart from disuse.

In September 1953 a conference was held at Hq Fifth Air Force to find the best means of preserving the air-ground operations system. The conference was attended by representatives of all interested elements of Eighth Army, Fifth Air Force, and First Marine Air Wing. Agreed upon was a joint training program to exercise fully all parts of the air-ground system. Fifth Air Force has resumed the daily planning conference as one means of allocating a definite number of training sorties to air-ground exercises. The daily conferences are attended by Army liaison officers who propose targets and coordinate throughout the Army channels. The program calls for both simulated and live-ordnance missions, all pre-planned but capable of being diverted to other targets at Army request. Fighter-bomber training strikes are controlled by Mosquitoes and by tactical air control parties, just as during the war. Light bombers execute Shoran drops, MPQ drops controlled by tactical air direction posts, as are also visual bombing missions. The entire communications-request network is exercised daily. The best possible practical training results for both air and ground personnel, and the air-ground system remains capable of resuming combat operations immediately.

One project now under consideration is a proposal to institute a Fifth Air Force central jet instrument school. Of great concern to the Commander, Fifth Air Force, is the decreasing ability of tactical pilots to fly in adverse weather. This has been caused by the large influx of newly graduated, inexperienced tactical pilots. Certain measures have already been taken against this deficiency. For example, to ensure best utilization of aircraft and qualified instrument instructors, the groups now control all T-33 aircraft previously assigned to units, and formal instrument instruction is being given to all assigned pilots.

The command jet instrument school would place a certain number of T-33's and instructors at one base, where potential instructors would be trained to operate the group-level schools. Centralization would provide quality instrument instructors throughout Fifth Air Force and would standardize instruction of the best type.

The Fifth Air Force flying-training program has changed considerably since the cessation of hostilities, especially in its emphasis. While the training for combat has remained much as it was, continuation training has been stepped up to keep the edge on combat-ready pilots and crews. As long as both types of training remain at present intensity, Fifth Air Force will be in fighting trim.

Headquarters, Fifth Air Force

Books and Ideas...

Another Plea For An Air Strategy

COLONEL RICHARD C. WELLER

WHATEVER significance the reading public attaches to Brigadier General Bonner Fellers' book, *Wings for Peace,** it will find it hard to question his grasp of the fundamentals of the objectives of war, of the political ends of war, and of the preparedness dilemma which the free world faces. The opening sentence holds the key to his thinking: "The Red Air Force is the most fearsome and deadly threat the United States has ever faced." From this nucleus his solution grows. It seems impossible for General Fellers to avoid the conclusion that air power is not only peace power but also the decisive arm in the decisive theater of any future conflict. His arguments should be listened to all the more because he is a ground force officer whose ideas on air power are objective—at least to the degree suggested by his many years of service in the U.S. Army.

General Fellers' central theme is simple: democratic nations cannot maintain huge surface forces supported by air and sea forces as a means of deterring war. But he does not rest his case there. He goes on to point out that surface war in the traditions of the infantryman has developed into a test of blood which could only result in fantastic losses if launched on a global scale. This fact, coupled with new developments, convinces General Fellers that an alternative military strategy is desperately needed. But, he demonstrates again and again, military tradition stubbornly balks at any attempt to explore the possibilities of air power as a means of substituting technology for sheer manpower, even against a potential adversary who has all the advantage in manpower. General Fellers contends that bias, prejudice, and sentimentality have combined to prevent a really searching "new look" at strategy. His own new look at strategy leads him to one solution—an air strategy in an air age—and he effectively sets forth the role air power should play in war as well as its relation to other arms and to the national objectives which may some day require its use.

The chapter on the "Red Threat" deals briefly with the growing menace of the Red Air Force, somewhat subtly with the implication of nuclear and thermo-nuclear weapons,** with the Communist ideology which admits of no principle of co-existence, and with the fact that after some six or seven years NATO is still woefully weak. In short General Fellers leads his reader quickly to the conclusion that in spite of enormous outlays of men, money and materiel, "On no front, can we meet a major threat."

Proceeding on a rather high level of generalization, General Fellers treats with the policy of containment, carrying it briefly through economic aid, the

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***Wings for Peace, by Bonner Fellers, Brigadier General, U.S. Army, Ret. (Chicago: Henry Regnery Company, 1953, $3.50), 248 pp.**

**Until more detailed information on nuclear and thermo-nuclear weapons is made available, General Fellers' remarks must have been necessarily restrained. They should not be taken casually, however.

North Atlantic Treaty Alliance, and the Mutual Defense Assistance Pact. He points up inconsistencies surrounding the development of these implementing features of our postwar foreign policy. One gathers that General Fellers regards them as a series of stop-gap measures designed to meet the power probings of Red policy. These separate and distinct acts—ECA, NATO, and MDAP—he considers distantly related to each other but separated conceptually by many months. General Fellers deduces that vision and over-all planning were not comprehensive enough to integrate these measures in their approach to the larger problem of post-war foreign policy.

His concern does not lie in the aid which has been rendered, though he does point out that billions of dollars have failed to produce a serious military posture. Rather his concern lies in the fact that the aid which has been rendered is assuming the overriding quality of a basic strategic plan for waging global war, should global war be thrust upon us. General Fellers fears that our own national security in general and our own national objectives in particular have not played a profound part in shaping the character of our military forces. In other words the means with which Communism could be defeated in a hot war have been subordinated to the more immediate problem of regional defense pacts and defense of key areas. He sees the relationship between the two as a subtle, unstated move on the part of ground generals to ensure that in the event of war the American Army will have a battlefield. without which there would be little use for mass land armies.

From general consideration of the containment policy General Fellers moves to containment in the East—the Korean War, Indo-China, and Red China. He reminds the reader of the testimony of Army General Bolte, who believed that the ROK forces were better equipped than the North Koreans and could defend South Korea, and of the Pentagon defense perimeter doctrine, which did not include Korea. These facts, coupled with emphasis on the defense of Western Europe, suggests to him an invitation for Communist aggression in Korea.

In commenting on the air war in Korea General Fellers points out that after Chinese intervention the interdiction role of the Air Force merely enabled a smaller ground force to hold a defensive line against a greater force. To capitalize upon air interdiction, a full-scale ground offensive was necessary. But the author emphasized that even in this limited war the attrition on the Reds was terrific and that it was the Red Chinese commander's appeal to Peiping that he couldn't go on "fighting airplanes, tanks and artillery with human bodies" that led General MacArthur to initiate his cease-fire proposal.

General Fellers' apprehension over the Korean War and truce negotiations stems from his thesis expressed throughout his book. Victory on the ground in Korea would require a massive ground assault which could halt successfully at the Yalu only if air power succeeded in persuading Mao that his Korean venture was proving not to be worth an air war over the Chinese mainland. Mao could appeal to the U.S.S.R. for an expanded war, but he could not defend China against air forces. To General Fellers at least it is clear that air war would be the only logical weapon, for "Western nations with limited manpower would do well to avoid land combat on the Asiatic Mainland."

General Fellers' treatment of the containment policy as it embraces the northern and southern geographic reaches of a bi-polar world is a simple lesson in geography. Militarily his views make liberal use of the compulsion which motivated air zealots of years gone by to look at the globe instead of Mercator charts. The lesson lies in the fact that the enemy in terms of ground war is still thousands of miles away, while in terms of air war, technology is bringing him dangerously close. Because neither of the two great world powers, the Soviet Union and the United States, could successfully invade the other with ground forces in sufficient strength to gain a decision, or could make control of the sea a decisive factor, General Fellers again concludes that the decision will be gained in the air. And in the air "the enemy route to the heart of America is inadequately defended."

Of military containment in the West, General Fellers speaks of Europe and NATO. But he does not speak of it solely in terms of defense. The obvious—that in terms of ground combat divisions there is no genuine defense as yet—any one can understand; what is not so obvious, and what he wishes the reader to follow closely, is that even a successful defense of Europe will not protect us from the striking power of the Red Air Force. If the Red Air Force is to strike directly against America, the route does not lie over Western Europe and the Atlantic meridian; it lies over the North Pole.

That a successful defense of Western Europe would be a tremendous aid to the U.S. in a war with the Soviet Union, General Fellers does not deny. But he points out that it is fundamentally a European problem, one which Europeans appear to have repudiated by failing to reach the defense goals established at the Lisbon Conference. General Fellers attributes this to the lack of European unity. Europe united is a power at least the equal of Soviet Russia, but old traditions, old jealousies, and conflicting objectives have proved stronger than a union held tenuously together by generalized concepts of freedom, fears, and hatreds.

Because of the lack of economic and political unity it appears to General Fellers that the Western European nations have thus far failed to erect a formidable defense. This lack of defense in Europe serves as a lever which pries the Allies apart. Continued failure to materialize a defense generates lack of faith in the entire concept. The more the U.S. does to push NATO and the less the Allies do, the more rational becomes Soviet propaganda (in Soviet eyes at least) that the U.S. is the real menace in European affairs.

Of all the evidence given to support General Fellers' thesis, the most depressing must surely be his report of his conversation with a trustworthy government official of one of the principal European allies:

> His government approves of NATO because it needs help. But already more is being spent upon armament than this European power can afford; its military budget must be reduced—not raised as the U.S. is urging. His country will support NATO as a war deterrent and in the hope American aid will continue. But should this war deterrent fail and the Red Force strike, the official frankly said his government does not propose to fight. It prefers neutrality. If Russia will not grant neutrality, this government will accept occupation rather than endure two destructive sweeps of the Red Army across his country. 'We have the lesson of South Korea,' he said.

General Fellers supports his argument that defense simply does not exist by the words of numerous responsible military officials. He quotes General Gruenther and General Ridgway to this end. General Bradley supplied his own support of the fact in his article in *The Saturday Evening Post* of 22 August 1953, on the occasion of his retirement:

> Today, we and our Allies have substantial and increasingly efficient defensive forces in Western Europe, though I agree with General Ridgway, our new Chief of Staff of the Army, that they are as yet, by no means as strong as prudence requires. In Asia we have at least stopped the Korean aggression dead in its tracks, with enormous losses inflicted on the aggressors. We are also giving military aid to other nations in Asia, but the situation there remains delicate, uncertain and dangerous.

Although couched in optimistic terms, General Bradley's words are clear enough, and General Fellers sums up the case—"On no front, can we meet a major threat." General Vandenberg, on occasion of his retirement, testified to the inadequacies of an Air Force reduced below the 143-wing goal.

THERE is a deeper significance to General Fellers' warnings which is not clearly brought out. He establishes that military planners contemplate a ground war as the primary means of defeating the enemy, but only indirectly does he comment on the enormous casualties which this strategy would involve. But passages in the chapter "Red Spectre Over Europe" are filled with statistical casualty appraisals of the ground war in World War II. It is only necessary to recall Winston Churchill's Volume I, *The World Crisis,* of his series of books on the First World War and his chapter entitled the "Blood Test" to understand the full implication of surface war in the future.

General Fellers' chapter on "Stubborn Military Tradition" is intended to leave no doubt in the reader's mind that U.S. Army doctrine firmly accepts a concept of war which requires a mass of infantry soldiers to defeat the enemy army and to occupy his country before terms can be imposed on the enemy. But more profoundly disturbing than this reiteration of military tradition is the fact that a U.S. strategy of this kind has not been ratified by the Congress or the people, outside the controversial scope of NATO and the defense of Western Europe. The actual link between the defense of Europe and the defeat of the Red Army in war has yet to be clarified. Bonner Fellers warns us that a policy of deferring the establishment of a sound strategic concept for victory can only mean that the defense of Europe *must* move in the direction of a frightful slaughter of American youth in pursuit of the surface-war concept. The weapons, tanks, machine guns, infantry divisions, artillery, are being forged now. They will be used, according to Bonner Fellers, whether we wish it or not, for the simple reason that we will have nothing else with which to fight. Since the military forces the democracies can assemble in peacetime do not approach the numbers necessary to give realism to the surface war concept, General Fellers believes the whole strategic concept is doomed to fail—and to fail without the strategy ever having been objectively established and fully agreed to by the Congress and the people.

The chapter, "Genius for Production,' is a disturbing analysis of the U.S.S.R.'s industrial progress. Its purpose is to convince the reader that the Soviet Union is fast catching up in the air. Just how true this is is not likely to be appraised accurately as long as the Iron Curtain is effective. General Fellers points up the gradual increase in Soviet awareness of the impact of air power on war and argues from this evidence that any "calculated risk" reduction in American air forces would be disastrous. It is possible that General Fellers is placing too much emphasis upon relative numbers of air-

craft, but even if he is, it would seem essential that our criteria of air strength at least ought to derive from the recommendations of our own air generals. General Fellers once again notes with pessimism the de-emphasis of American long-range striking air power at the expense of "balanced" forces.

In discussing the concept of deep penetration General Fellers remarks on the similarity in principles of both ground and air strategic conceptions. The differences in reality lie in the means, not the ends. The ground forces propose to march on the heart of the enemy's source of power, but to get there they must first defeat the enemy army and then through occupation force the people to bend to the victor's will. Air power poses this same end but goes about it in what might be called reverse order. It strikes directly at the source of power and then exploits aerial victory to bend the people's will. It can do this because at that stage there is no longer anything to defend the people, their army and navy being helpless to protect them from victorious air forces. General Fellers sees an analogy to the air concept in the Civil War with Sherman's march through Georgia. This generally acknowledged masterpiece of strategy exemplifies striking at the heart of a nation's strength without permanent occupation. Air power is far more ideally suited to this concept than land forces. One is inclined to examine occupation as an outgrowth of war. Has there ever really been a successful occupation? If there has not been, one can seriously question the relation which surface war bears to the need to occupy a nation for the purpose of bending its will.

General Fellers contends that strategy invariably emphasizes a single weapon system supported by all others and that since air power is the only means of striking the land-locked Soviet target system, the "Navy which is already in being could retard its own further expansion and safely limit its activities to anti-submarine techniques." It is a point that will plague the reader who is conscious of the need for economy in defense spending. In considering the Army General Fellers recognizes the need for a highly mobile force whose initial and principal purpose outside of continental defense is the protection of a system of air bases. Its size would be restricted by a strategic concept which simply does not envisage any attempt to pit 100 American divisions against the Communist hordes. If the Army was reconstructed with such a role in view, the vast armament program designed to support a gigantic land-mass war could be greatly reoriented. General Fellers' preoccupation with air power may make it appear that he belittles the roles of the surface forces, but nothing could be further from the truth, as General Fellers' long experience in the Army testifies.

To General Fellers the proper base structure to support an air concept is vital. His examination of the existing base structure will not be well received in Naval circles. Bluntly he accuses the Navy of reluctance to indorse Air Force bases overseas in the hope that greater emphasis will be placed upon carriers. He recounts the success of carrier task forces in the Pacific against Japan, but reminds the reader that in the closing days of the war when the carriers were most in evidence close in to shores, Japanese land-based air power was depleted and second-rate. He documents his claims by personal interrogation of Kamikazi pilots. General Fellers claims that

the carrier and its aircraft will not be an adequate substitute for that of land-based aircraft and therefore should be subjected to a thorough-going analysis, similar to the post-war bombing surveys. Coincidentally this is a matter which was recently brought to the attention of the British government. On 22 October 1953 Viscount Trenchard set before the House of Lords a motion to unify the Fleet Air Arm and the Royal Air Force in the name of economy and increased efficiency of Britain's over-all air power. The motion, it appears, was denied. And yet if Bonner Fellers and Viscount Trenchard are correct, the division of air power in U.S. and British armed forces may have far-reaching effects in any war of the future.

The author's discussion of a strategic air base structure calls for the establishment of bases from which sustained and violent air attacks could be launched. Bases located close in to the enemy are doomed, even as inadequate surface forces are doomed, when faced by superior forces which can be more quickly concentrated and supported. He would draw a strategic line that would give our own air forces the advantage of concentration and secure logistic support and, by its geographic position, would impose the severe strain of over-extension upon Red air forces. This principle of governing the establishment of air bases might be called logistic ranging. U.S. air bases should be far enough away from the U.S.S.R. to put a strain on Red air attacks and the logistic support of those attacks, while at the same time easing our own burdens in launching and supporting a sustained air assault. Obviously such a base structure would depend upon bombers suitable to exploit it. The two factors, bases and bombers, cannot, as General Fellers points out, be brought together and harmonized unless the role of air power is clarified now in terms of an air strategy. The new strategy which General Fellers would urge upon the U.S. is one of substituting American technological genius and industrial capacity for numbers of men. Machines, modern machines in the right balance, machines featuring the most modern weapons the air age can produce, backed up by technically-trained experts, should be substituted for the sheer manpower required in the traditional infantry concept. He would not abandon our Allies, but he would make it clear that the defense of Paris lies not in the battlefields of Flanders but in the potential power of the nuclear age, backed up by the incontrovertible evidence of air forces both in being and large enough to maintain sustained assaults until the decision is gained. Such air power should be supported by ground and sea forces. A balance of this kind, General Fellers believes, is economically feasible and would be consistent with U.S. objectives of peace, backed by the persuasion of force. This would be a strategic framework which the nation's economy could support. Once we possess such a force—and it will take several years to develop—General Fellers sees a new and more aggressive foreign policy with a greater potential than mere containment.

Gen. Fellers' *Wings for Peace* is but another warning in a long series of warnings that America is slipping rapidly behind in modern concepts of defense. The reading public is bound to regard it as controversial and therefore distasteful. The arguments will be regarded as specious. The author will be called an isolationist of the "go-it-alone" category. But the incisive mind will not fail to grasp the aggressive character of Bonner Fellers' strategy. No man can be called isolationist who would forge in air power a striking force that dwarfs the built-in fire power of armies of infantry

divisions. No man's writings should be regarded as merely controversial when he offers a military solution to a nation that has been uncomfortably poised upon the horns of a dilemma while searching for some promise of realistic defense by the armed might it is building.

Perhaps the real value in General Fellers' book lies in the possibility that it may inspire the public to inquire seriously into strategy and to ask themselves—What serious study of this question has ever been made? By what authority? Where is the result?

Air War College

BRIEFER COMMENT

The Armed Forces Officer, Department of Defense, pp. 263.

Recently the Air Command and Staff School selected as a textbook something new and different in books on leadership, *The Armed Forces Officer.* This strongly written and rewarding book, an official Department of Defense publication intended for officers of all the services, is a compact and readable volume of practical value. The author's purpose is to examine "the fundamental responsibilities of officership." With the intent to define the ethical system by which our best officers live and to show how a good leader develops, the author sets forth the "strong, uniting inner doctrine" of good officers and leaders, describes its application in the details of military life, and shows how a man can continue to develop as a leader and officer. The book opens with a moving discussion of the meaning of the commission; then in separate chapters gives the advice of a senior officer on military ideals, on responsibilities and privileges, on career development, leadership, discipline, and on relationships with enlisted men. There is an especially effective chapter on the importance of skill at writing and speaking in the development of a good leader.

Even the casual reader is struck by the very readable, often inspiring, style. The skillful writing, the authority, and the richness of this unsigned book are explained by the fact that its main author is the military historian and battle-analyst, Brig. Gen. S. L. A. Marshall. The idea for a volume on new thinking about leadership and its development was originated by General Eisenhower. From 1946 on, various committees worked at it. Then in 1950 Brigadier General Marshall was asked to prepare the draft to be published. For most of his life an officer and professional writer, General Marshall was Historian for the E.T.O. in World War II. He recently published a best-selling battle report of the defeat of the Eighth Army in the battle of the Yalu, *The River and the Gauntlet;* and his battlefield research is believed to have resulted in an increase of the firepower of our infantry in Korea.—*J.L.J.*

U.S. Government Printing Office, $1.50

How Russia is Ruled, by Merle Fainsod, pp. 575.

The purpose of this book is stated as "to analyze the physiology, as well as the anatomy, of Soviet totalitarianism and to communicate a sense of the living political processes in which Soviet rulers and subjects are emeshed." Academically detailed, the work is divided into four parts:

a historical analysis of the Bolshevik Revolution; a study of the Party and its changing roles; an examination of other instruments of rule, such as the bureaucracy, the police, and the armed forces; and the impact of Soviet controls. This thoroughly studied picture of totalitarianism at work is the latest of eleven studies produced to date by the Russian Research Center, established in 1948 and supported by the Carnegie Corporation on a grant extending to 1958. The major objective of the Center is "the study of Russian institutions and behavior in an effort to make for better understanding of international actions and policy of the Soviet Union."

Harvard University Press, $7.50

From Lenin to Malenkov, by Hugh Seton-Watson, pp. 377.

This is a worthwhile book for a student of Russian history. While it is not an orthodox treatment, it does give contemporary color and produces much matter for thought. A critical student involved in extensive study of the subject would find it a valuable contribution.

Praeger, $6.00

Nuclear Physics, by W. Heisenberg, pp. 225.

A good little introduction, by the famous director of the Max Planck Institute of Physics, that treats its subject simply and without complex mathematics. Principally concerned with radioactivity, the binding energy of nuclei, nuclear structure, and the methods of producing nuclear transmutations, there is also ample background for understanding and some account of the practical applications of nuclear physics.

Philosophical Library, $4.75

Geography from the Air, by F. Walker, pp. 111.

Explains and illustrates the technique of interpreting and analyzing landscape as shown on vertical aerial photographs: the geographical, geological, and human elements of the earth's surface. Nearly 100 clearly reproduced aerial photos. The author is Senior Lecturer in Geography in the University of Bristol.

Dutton, $7.50

Principles of Insurance and Related Government Benefits for Service Personnel, by Associates in the Social Sciences, Department of Social Sciences, USMA, pp. 198.

Information relating to all types of Government monetary benefits which accrue to survivors of active duty or retired officers or airmen, including benefits from Veterans Administration, Social Security, and Federal Employees Compensation Act. The book also provides the reader with detailed information on all types of Government and commercial life insurance, furnishing as well recommended life insurance programs. Prepared primarily for the guidance of cadets at the Military Academy, it is a good guide to all regular or reserve personnel who are planning for the security of their families.—*L.J.K.*

Military Service Publ. Co., $1.50

Military history — recent titles of interest to the professional

Royal Air Force, 1939-1945, Volume I: The Fight at Odds, by Denis Richards, pp. 430, H. M. Stationery Office, London, 13s., 6d.—The Fight at Odds is the first volume of an officially commissioned three-volume history of the Royal Air Force during the Second World War. The remaining volumes are expected this year. Author Richards, having behind him wartime experience as head of a group of historians and technical experts writing confidential studies of the Air Ministry, has had full access to official documents and records, ranging from those related to the conduct of the war down to sortie

and combat reports of individuals. Enemy records were also consulted. *Fight at Odds* starts the story with the beginnings of rearmament in 1934 and carries it on to the close of 1941, including the desperate struggles of the Battle of Britain and the campaigns in 1940 and 1941 for control of the Mediterranean and the Middle East. The entire three volumes are proposed as "a history of operations and the policy that governed them" that, though officially commissioned, is an interim account but no part of the final official history being prepared under the direction of Professor J. R. M. Butler.

The Rommel Papers, edited by B. H. Liddel Hart, with the assistance of Lucie-Maria Rommel, Manfred Rommel, and General Fritz Bayerlein, translated by Paul Findlay, pp. 545, Harcourt, Brace, $6.—It was Field Marshal Rommel's custom to dictate each evening a narrative of the day's events and to set down after each battle its course and the military lessons to be derived from it. From this rich material and his detailed, outspoken letters written almost daily to Frau Rommel, Liddell Hart has assembled a comprehensive, first-hand account of Rommel's campaigns. Not only the record of tremendous events by their chief actor but a powerful reflection of dynamic leadership.

New Guinea and the Marianas, March 1944-August 1944, Volume VIII of History of United States Naval Operations in World War II, by Samuel Eliot Morison, pp. 435, Atlantic-Little, Brown, $6.—Continues the projected 14-volume series with the story of Hollandia, Wake, Biak, Vogelkop, and the Battle of the Philippine Sea. This series has been disclaimed as "in no sense an official history," although the Navy Department has contributed extensively to advancing the author's work. We have commented before on the movement and interest of Professor Morison's writing and also upon his somewhat subjective approach in this series. [*A.U.Q.R.* III, 4 (Spring 1950), 75-6].

The History of the First French Army, by Marshal de Lattre de Tassigny, translated by Malcolm Barnes, with a preface by General Eisenhower and An Appreciation by Capt. B. H. Liddell Hart, pp. 532, Allen and Unwin, 42s.—The French in the campaign that began with the landings in the South of France.

Political science for study or reference

The United States and India and Pakistan, by W. Norman Brown, pp. 308, Harvard University Press, $4.50 —The United States and Italy, by H. Stuart Hughes, pp. 256, Harvard University Press, $4.—The two latest issues in the American Foreign Policy Library, now numbering thirteen, a series of extremely useful handbooks. University of Pennsylvania's Professor of Sanskrit Brown and Stanford University's Associate Professor of History Hughes provide competent, extremely workable introductions of the nations that are their subjects.

Russia, A History and an Interpretation, by Michael T. Florinsky, two volumes, pp. 1151, Macmillan, $15.— Covers a thousand years of Russian history in precise, scholarly fashion, but ends with 1918. For the serious student.

Foreign Policies of the United States, by Hollis W. Barber, pp. 614, Dryden Press, $5.25—Designed for textbook use of the student taking his first course in American foreign policy. Its principal sections are devoted to the conduct of American foreign policy; the U.S. and the Cold War; the U.S. and the Western Hemisphere; the U.S. and the Far East; and the U.S. and the United Nations. Very good for the serious beginner in its field.

In-Flight Refueling

AMID the sporadic dribble of daily news releases it is easy to overlook the general lines of progress in various Air Force techniques and equipment. Particularly is it easy to overlook their cumulative meaning. One such technique is inflight refueling. Like many other technological developments, inflight refueling had its beginning early in air history. In 1923—only 20 years after the birth of powered flight—two U.S. Army pilots transferred 25 gallons of fuel from one airplane to another through a 50-foot hose. In January 1929 Captain Ira Eaker and Major Carl Spaatz kept a tri-motored Fokker monoplane aloft for 6 days and 7 hours by inflight transfer of 5060 gallons of gas and 245 gallons of oil. But adaptation of the technique to standard operations remained to the future. The need for longer range became acute during World War II, but the immediacy of manufacturing aircraft and the priorities of their employment did not permit the "experimental gadgeteering" that such a development frequently requires. The mass formations of the TNT age also rendered aerial refueling impractical.

Following the Second World War, as the veil was partially lifted from Soviet international ambitions, the Air Force became seriously concerned

Above a U.S. Air Force F-84 Thunderjet fighter-bomber makes contact with the refueling hose of a KB-29 tanker over the Philippines on a non-stop flight from Southern Japan to Bangkok. The tip tank on the fighter's wing is sliding into the funnel-like nozzle on the tanker's hose for the in-flight refueling operation, which requires 2½ minutes. Non-stop flight of 4 December 1953 was made in 6½ hours.

over the long round-trip to targets deep in the Eurasian continent. Development of inflight refueling equipment and techniques was given high priority and deeply shrouded in secrecy. The goal—to extend the range of the USAF's existing strategic bombardment forces. In February 1949 the public had a glimpse of progress. A USAF B-50 medium bomber gently lifted its wheels from a runway in Texas to begin the first non-stop flight around the world. Later—ninety-four hours and one minute later—it landed on the same runway. Its 23,452 mile non-stop trip had tallied another advance in modern warfare—the global extension of the USAF's atomic capability—by inflight refueling. Air commanders were one step nearer to resolving the obdurate opposition of range and endurance to speed and payload.

The non-stop, globe-girdling B-50 was refueled four times by the early British system. The B-50 trailed a 300-foot line ending in a grapnel. The KB-29M tanker trailed a shorter, weighted line. When the aircraft maneuvered the two lines together, the grapnel snared the tanker's line and the hose was hauled aboard the B-50. Though workable, the disadvantages were obvious. The odds on hit-or-miss were too great. Far too much time was consumed in maneuvering the lines together, pulling the hose aboard, and transferring the fuel by gravity flow. It was an interim system to be used while research and development continued.

In 1951 B-29 tankers were refueling B-50's with a "flying boom"—a telescoping, rigid pipe that could be extended from the tail section of the tanker aircraft to the refueling door in the nose of the aircraft to be refueled.

First of a series of USAF air tankers, the "flying boom" KC-29 refuels F-84 Thunderjets high over the Pacific Ocean half-way between California and Hawaii. When the first pilot has filled the tanks on his fighter, his wing man will move up for a welcome drink. With the extension in range afforded by aerial refueling, two fighter wings have flown from the United States to Japan. Many more have crossed the Atlantic. Spanning the world's large oceans is now commonplace for USAF jet fighters and bombers. Substantial air forces can be deployed overseas in a matter of a few hours or at most a few days, vastly increasing the mobility of air forces over the months required to prepare for and move the same forces by surface vessel.

A small V-shaped "ruddevator" half-way down the boom enabled the operator in the tanker to "fly" the boom into position. Fuel was pumped under pressure at a high rate of flow. But the limited extension of the boom compelled the two aircraft to fly at close quarters, and the rigidity of the boom called for a high flight stability to avoid breaking contact.

The introduction of jet propulsion spurred the need for inflight refueling. Thirsty jets consume fuel at enormous rates. The fuel load alone of the B-47 outweighs a fully-loaded B-17 of World War II. Over 300 gallons of fuel are used to taxi from warm-up ramps to the end of the runway. Take-off and climb to cruising altitude drink deeply from the tanks. Consequently ranges are even shorter than with many World War II aircraft, although bomb loads remain relatively the same. A method had to be found of refueling in flight if the B-47 was to have long-range strategic capability. Refueling even 10 to 20 minutes after take-off would stretch range remuneratively by restoring the large amount of fuel consumed in taxiing, take-off, and climb. With the atom bomb giving the B-47 the punch of 2000 B-17's, mass-formation bombing tactics were obsolete. One, two, or three B-47's could accomplish the destruction that required thousands of TNT-carrying World War II bombers. Small formations could be easily refueled in flight.

Jet aircraft were first refueled by the piston-engined B-29 tankers. The difficulties of the rigid boom were compounded by need for constant adjustment and trim as tanker lightened and refueled jet took on weight.

When the faster C-97's rolled out from production lines, they began to replace the B-29's. Known as KC-97's, they now form the bulk of the USAF's fleet of air tankers. But the speed differential between high-performance jets and the piston-engined tanker still remains. At high altitudes the KC-97, to maintain a speed at which the B-47 will not stall, must conduct the refueling operation at a slight dive angle. As the transferred fuel increases the weight of the B-47, the jet aircraft will stall at higher and higher speeds. If the jet is refueled at a lower altitude, the climb back up to cruising altitude will drink up much of the replenished fuel.

A possible answer is to convert jet B-47's to tankers and adopt the RAF-developed "probe and drogue" method of fuel transfer. In this system the tanker trails a high-pressure flexible hose from its bomb-bay. The hose ends in a funnel-shaped connector—the "drogue." When the aircraft to be refueled opens its nose refueling door, a slim, needle-like arm—the "probe" —thrusts forward. The technique is now reversed from that of the "flying boom." Instead of an operator in the tail of the tanker attempting a connection, the pilot of the combat aircraft, much closer to the point of contact, flies his probe into the drogue.

This has been the direction of improvement in aerial refueling—towards better performance tankers for refueling higher-performance combat aircraft and towards a speedy, flexible, and reliable system for making the refueling connection and fuel transfer under all conditions of flight. At the same time the tension of flying during the period of fuel transfer has been eased. The B-47 jet air tanker project has progressed to the point that Stratojets can be converted under field operating conditions from bomber to tanker and back to bomber as combat requirements dictate.

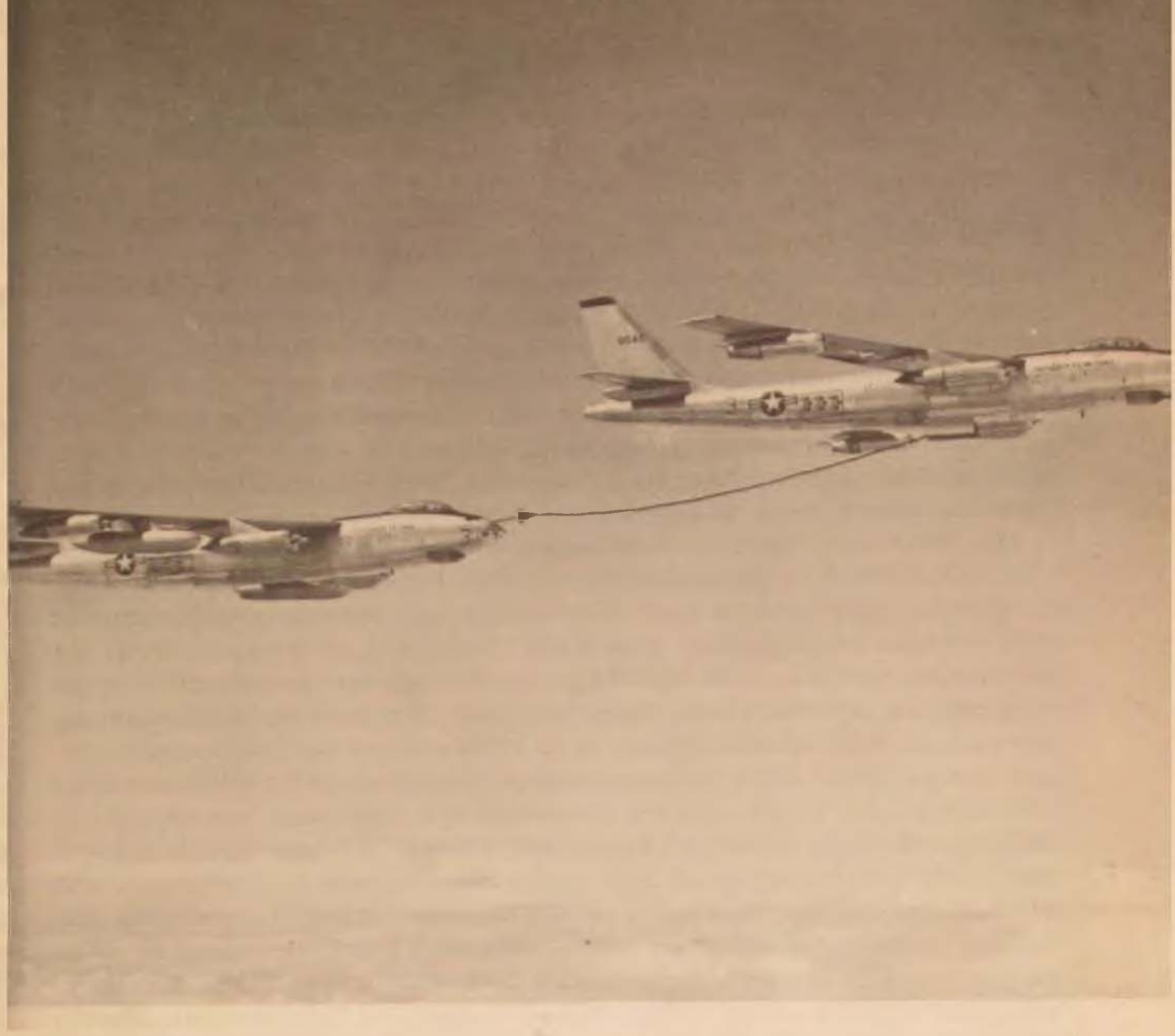
While the mechanics of inflight refueling change rapidly, the USAF is piling up operational experience. Every five minutes, 24 hours a day, every day, somewhere in the world a USAF aircraft refuels in flight.

The Meaning

With bombardment aircraft that have large capacities for both fuel and bombs, inflight refueling eliminates the compromise of reducing either fuel or payload to remain within the maximum take-off weight limit. If fuel can be replenished once the aircraft is airborne and en route to target, a fuel-bomb load can be carried that is considerably in excess of maximum take-off weight. Bombardment aircraft with smaller wings for higher speeds can be given the endurance built into their big brothers. With either type aircraft, refueling allows greater flexibility in mission flight-plan, thus increasing the possibility of diverse tactics and surprise. Fuel is available to avoid the logical flight approaches to a target, along which the enemy builds his heaviest defense.

For the fighter, range-extension is a boon. The combat radius of the air defense fighter now stretches hundreds of miles farther out from the targets it defends, without any sacrifice of its powerful armament. The long-range escort fighter can retain its high-performance characteristics and carry more aerial ordnance. The tactical fighter-bomber picks up greater flexibility for

The KC-97 tanker refuels B-47 bombers with a flying boom. The team of B-47 and KC-97 aerial tanker is the backbone of the present USAF long-range jet bombardment force. In early 1953 this team accomplished a 24-hour, non-stop simulated combat mission. Covering well over 12,000 miles on three aerial refuelings, the sleek Stratojet dropped a dummy 10,000-pound bomb dead on target at mid-point in the flight. The operation broke all distance and endurance records for jet aircraft.



The newest in the progressive advancement of aerial refueling. Jet refuels jet by the "probe" and "drogue" method used by the Royal Air Force. The B-47 tanker trails a long hose ending in a funnel-like "drogue." The receiving B-47 juts its spear-like "probe" from its nose and guides it into the coupling mechanism. Fuel is then pumped under pressure. Designed for high-altitude, high-speed refueling, jet-to-jet refueling greatly increases the jet bombardment capability of the USAF.

evasion tactics, more time over target, and capability to operate from bases less vulnerable to enemy attack.

For the transport refueling helps compromise the problem of range versus payload. It can eliminate the need for the short-stage hauls not possible under some war-time conditions or the drastic reduction of payload for long stages. If rapid movement of troops or materiel is urgent, delivery of maximum payload in long-stage flights may well avert local disaster.

For the long-distance reconnaissance and anti-submarine patrol, refueling means less-cumbersome and less-expensive aircraft, at the same time greater intensity and range of operations.

For the Air Force now, and until unknown power plants and fuels are developed, refueling means the highest degree of global operational flexibility and a mobility to deploy rapidly anywhere in the world.

For the enemy the USAF refueling technique means increased vulnerability to air attack.

Editor's Notes...

The Big Look

DURING the year 1953 the public was treated to a fanfare over the fiftieth anniversary of powered flight. The great public information media glanced at the event and duly reminded their subscribers that the Wright brothers' crate had developed into aircraft of amazing speed and range. Striking newsfilms were displayed of streaking jets, and here and there the quiz masters interviewed an airman or a legislator. There was also during the year a spate of news that Air Force objectives were being trimmed, and late in the year, that they were to be expanded.

The anniversary publicity culminated in an appropriate birthday observance at Kittyhawk, a considerable effort, with large-time press in attendance. In the local paper that we read, these doings were noted in a half column of wire dispatch on page four. Principally description of the spectacle at the celebration, the piece did not forget to bid readers marvel at the great technological advance of the flying machine. We were again disappointed not to find, either in this account or in others of our Air Force anniversary, any thoughtful or inspired interpretation of the military symbolism of the event, especially of the striking revolution that fifty years has wrought in the larger elements of military tactics and strategy. We have not often found noteworthy understanding of that revolution, except by implication at best, in other news stories, broadcasts, or non-professional articles concerned with military aviation or national defense. Fast-flying aircraft . . . yes. New gadgets . . . yes. Spectacular jet warfare in Korea . . . yes. Cuts or increases in defense appropriations . . . yes. Atomic weapons and the immense difficulty they impose on defense . . . all have interested the press in 1953. The sweeping revision of the ways of conducting a war . . . the conception of entire new strategies . . . the devising of tactics that break abruptly with the traditional objectives and employment of forces? No. If we read our newspapers and public journals correctly and understand our broadcasts, a mutation of far-reaching impact upon the planning and conduct of war has come upon us with little recognition by the public.

We in the Air Force have been greatly concerned over the obvious apathy of the public to our ups and downs in the national defense complex. We note that even the well-informed citizen appears uninformed and consequently careless of the great new possibilities for offensive and defensive military action, with their intense bearing on national decisions urgent to his welfare. Yet the reporter who covered the Kittyhawk story for his wire service is known to us as a competent reporter. For the most part the nation's news stories come from the typewriters of competent, thinking men. Why have they failed to write the big Air Force story around the spot news pegs they find in new devices, or defense deliberations?

Perhaps we in the Air Force have failed to inform the men who inform the public. Have we always told them about the woods when we enthusiastically urged them to consider the trees? Have we tied in our spot releases and our public statements with the big story? Have we ourselves neglected

the big look of our Air Force? When we talk about our Air Force, what do we talk about? The trees, or the woods? Trees do not make a woods. The mind does. A forest is a concept—not fifty thousand trees.

To report constantly, accurately, and completely to one's superior officer is a well-founded military duty. Mr. John Q. Public is our ranking superior. Ultimately he must make the big command decisions. He must understand our values, our role in his best defense, and the adequate composition of our forces. Like any other commander, he must be informed. We cannot relinquish our duty in favor of others—reporters, special analysts, committees, or spokesmen for other interests. They are only channels to reach Mr. Public. Most of all we ought to give him a clear understanding of the foundations of our professional judgments. We, the professionals, must inform him.

The Vice Chief of Staff is convinced that the Air Force has failed to keep the public properly informed. He has urged commanders to emphasize the education of all personnel in the basic missions of the Air Force, the extent the missions can be accomplished, what remains to be done, and why it is not being done. Every man in the Air Force must be a knowledgeable source of reliable information about his Air Force. General White also urges that all personnel communicate their professional understanding to the public by all possible media upon every appropriate occasion. In particular he expects all officers to undertake more writing and public speaking.

The *Quarterly Review* considers that it holds a charter in this accelerated program to create well-rounded public understanding of air power. First, as the Air Force professional journal, it offers opportunity for the publication of advanced information and authoritative opinions on air strategy, tactics, and techniques. Secondly its published issues compose a ready file of detailed, accurate, authentic, and professionally viewed information about a wide variety of Air Force matters. Here is a made-to-order source book of ideas for articles or speeches, supporting evidence for opinions and judgments, and general background knowledge of USAF operations. With General White's exhortation in mind, take a look at the table of contents of this issue. And the following sample of informative and idea-making pieces from back issues:

on air doctrine:

"Air Power Indivisible," by Major General John DeF. Barker and Brigadier General Dale O. Smith

"Tactical Air Doctrine—Tunisia and Korea," by the Air Force Historian Dr. Albert Simpson

on the employment of air forces:

"The Air Campaign in Korea," by General O. P. Weyland, Commander, Far East Air Forces

"Current Practice in Air Defense," by Major General Frederic H. Smith, Vice Commander, Air Defense Command

"Defeat of the Luftwaffe: Fundamental Causes," by Generalleutnant Adolf Galland of the Luftwaffe

on leadership:

"A Leader is Made by Man," by Major General R. C. Wilson, Commandant, Air War College

"Morale in a Prison Camp," by Oliver Philpot, "Wooden Horse" escaper from Stalag Luft III

on training:

"USAF Pilot Training," by Major General Warren R. Carter, former Commander, Flying Training Air Force

"Squadron Officer Course," by the *Quarterly Review* staff and Air Command and Staff School

on research and development:

"Geophysical Research," by Dr. Helmut E. Landsberg, Director of Geophysics Research, USAF Cambridge Research Center

on operations:

"The Attack on Electric Power in North Korea," a *Quarterly Review* staff study of the analysis and destruction of a target system

"Air-to-Air Combat in Korea," by Colonel Harrison R. Thyng, USAF jet ace.

on logistics:

"Air Force Logistics in the Theater of Operations," by Major General Paul E. Ruestow, Commander, Far East Air Logistics Force

Aircraft and their crews and the air bases, the aircraft factories and the related industries, do not make air power. The mind does. Air power is a concept—not fifty thousand airplanes—and the victorious employment of air forces is born of understanding of the weapon in hand. Likewise the public support of air power. Anyone who reads only the articles listed above begins to understand the big look of the USAF. These articles and the numerous others that fill the 24 issues of the *Quarterly* are inspired by the concepts of air power and the employment of air forces. Therein or elsewhere we urge all officers and airmen to take a good look at the Big Look. Then give out the word.

Long Time No See

Appropos the Kittyhawk celebration the Associated Press has reported that Soviet newspapers have been annoyed about the whole golden anniversary business as an obvious attempt by "American propaganda to prove the priority of the Wright Brothers in the invention of the airplane." According to the AP item: "Red Star, Soviet Army newspaper, quoted an article from the Soviet Air Force Journal saying the Wrights were 20 years behind Russians in successfully using a heavier-than-air flying machine. Red Star said the journal correctly reported: 'Careful study of our archive documents show that more than 20 years before the Wrights the Russian inventor R. F. Mozhaisky built an airplane in Russia.' "

This reminds us of the story about Cato, the old Roman. Cato started studying Greek when he was around eighty. Somebody asked him why he was beginning so large a task at such an advanced age. Cato said dryly that it was the youngest age he had left. There is a similar logic about this business of discoveries of early inventions. Now is the earliest time left.

The Quarterly Review Contributors

Gill Robb Wilson (B.S., D.Sc., Washington and Jefferson College; B.D., Western Theological Seminary) is editor and publisher of *Flying* magazine. In World War I Mr. Wilson was a pilot in the French Escadrille 66 and, after the United States entered the war, flew with the U.S. Second Army Bombardment Group. After the war he was a Presbyterian minister for ten years. Turning to aviation again, he was Director of Aviation for the State of New Jersey from 1930 to 1945. During this period he was consultant to the U.S. Government on lighter-than-air development and was four times president of the National Aeronautics Association. Before and during World War II he was a member of the committee which developed the Civilian Pilot Training Program. He also figured prominently in creating the plan for the Civil Air Patrol, organizing it nationally, and establishing its first antisubmaline patrol units. As correspondent and aviation columnist for the New York *Herald Tribune*, Mr. Wilson covered the war in both Europe and the Pacific. At present he is a member of the Congressional Aviation Policy Board and is vice-president of the Air Force Historical Foundation.

Brig. Gen. Bonner Fellers, U.S.A., Ret (U.S.M.A.) is at present Chief, Public Relations Consulting, Veterans of Foreign Wars of U.S. He retired from active duty in the U.S. Army on 30 November 1946. During his Army career he served as Secretary, General Allied Council for Japan, in Tokyo from January to August 1946. He was a member of the staff of General Douglas MacArthur, 1943-46; Military Observer with British Forces in Africa, 1940-42; and a member of General Douglas MacArthur's staff in the Philippines, 1936-38. He graduated from the Coast Artillery School in 1920, Command and General Staff School in 1935, and Army War College in 1939. His recent volume on the significance of air power for national defense, *Wings for Peace*, is reviewed in this issue.

Brig. Gen. Dale O. Smith (U.S.M.A.; M.A. and Ed.D., Stanford University) is Director of Education, Air University, Maxwell Air Force Base, Alabama. During his attendance of the Air War College, Class of 1947, several of his papers on strategy were published and received national attention. Following this assignment, he was sent to Stanford University for additional study in education and received his doctorate in 1951. Next assigned to the faculty of the Air War College, in November 1951 he was transferred to Hearquarters Air University as Deputy Director of Education, becoming Director of Education in May 1952. During World War II General Smith commanded a B-17 Group in England.

Commander Carl H. Amme, Jr. (U.S.N.A.) is currently Air Plans Officer on the staff of the Commander-in-Chief, U.S. Naval Forces, Eastern Atlantic and Mediterranean. Prior to this assignment he attended the Armed Forces Staff College. In 1948, when Military Air Transport Service came into being, he served as Director, Plans and Operations, of the Pacific Division for eighteen months. His war service was in the Aleutians as commanding officer of a naval patrol squadron. Later he was executive officer on the escort carrier *Corregidor* in the Pacific. He has had two articles published in the *Naval Institute Proceedings*, on the strategic importance of military air transport and on ground-controlled approach.

Dr. Robert F. Futrell (Ph.D., Vanderbilt) is at present Historian, Pacific Theater, Historical Division, Research Studies Institute, Air University. He held wartime positions as historical officer at the AAF Tactical Center and assistant historical officer at Far East Air Forces headquarters. He was separated from the Air Force in 1946, at which time he assumed his duties as Historian, Pacific Theater.

Dr. O. G. Haywood, Jr. (U.S.M.A.; M.S., Harvard; D.Sc., MIT) is now Manager of Engineering Planning for Sylvania Electric Products, Inc., New York City. He organized the USAF Office of Scientific Research in October 1951 and served as chief of the office until he resigned his commission as a colonel in the USAF in September 1953. He has had extended experience in science and research administration in the U.S. Army Corps of Engineers, the Atomic Energy Commission, and the U.S. Air Force. He is a graduate of the Air War College, Maxwell AFB, Ala.

Lt. Colonel George E. Tormoen is currently a student in the Field Officer Course, Air University. He has just returned from a 30-month tour of duty in the Far East, where his last assignment was Chief, Current Operations Branch, Deputy for Operations, Hq FEAF. In World War II he flew 30 missions as a lead-crew pilot in B-24's in the Eighth Air Force, followed by six months as a wing operations staff officer.

Lt. Colonel L. G. Taylor, Jr. (U.S.M.A.) formerly Chief of Flying Training, Hq Fifth Air Force, supervised the flying training program of Fifth Air Force since 1 January 1953, during both war and peacetime. Prior to that assignment he was for two years the editor of *Flying Safety* magazine at Norton AFB, California. He flew fighters in the Eighth Air Force in England during World War II.

Colonel Richard C. Weller (B.S., Fordham) is Director of the Extension Course Division, Air War College, Maxwell AFB, Ala. He commanded Losey Field, Puerto Rico, and served as Air Officer, Caribbean Defense Command,

and Chief of Staff of the Sixth Air Force during World War II. Later as air member of Bilateral Staff Conversations with Chile he aided in establishing Air Force requirements of that nation in the Hemispheric Defense Pact. He is a graduate of the Armed Forces Industrial College.

BRIEFER COMMENTS: Major James H. Jackson, AC&SS; Major Orr Y. Potebyna, AC&SS; Major Lewis J. Knabel, Hq AU; the Editors, AUQR.