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Morality and War: A British View

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THE recent series of 'H' bomb tests in the Pacific has produced a considerable reaction in Britain. The bomb has been condemned on moral grounds in a flood of speeches, articles and letters to the Press. Many of these are intended to shame or frighten the public into demanding the abolition of the bomb, or at least the cessation of its development. Though possessing a superficial resemblance in their appeal to moral and humanitarian principles, most of these attempts to influence public opinion against the 'H' bomb are inspired by varied motives.

The Communists and their fellow-travellers want to abolish the 'H' bomb, and the 'A' bomb too, because these weapons are the biggest, and perhaps the only, deterrent to Russian and Chinese aggression. And many well-intentioned people, who are by no means Communists, add their voices to this appeal because they are moved by a vague but powerful humanitarian impulse. They are people who feel rather than think.

Then there are the pacifists, who are opposed to all measures for the defence of the Free World, and who cling to the belief that if we refuse to arm ourselves and resolutely close our eyes to the dangers of aggression, war will never happen. The ostrich, when confronted by a dangerous situation, is said to bury its head in the sand, believing that it is as effectively hidden from its enemies as they are from it. The pacifists are human ostriches; people who think that if they shut their eyes to danger, they have succeeded in averting it. Such people are impervious to argument, and ignore the lessons of history. Each new development in modern weapons evokes in them only a demand for the unilateral disarmament of their own country. Nothing can be done about them, but they do not gain many converts, as a rather special type of mental unbalance is necessary for the holding of such convictions. I suspect that genuine pacifists are born, not made.

Next there are the defeatists, who believe that we have not a hope anyhow if war should come, and that we must therefore be prepared to put up with anything and everything rather than

face up to aggression. An extreme example of this way of thinking can be found in the recent action of the Coventry City Council. This misguided body has voted to disband the city's Civil Defence organization, on the grounds that everything is hopeless, and that nothing can be done to mitigate the effects of the 'H' bomb. Many of the defeatists have an extraordinary faith in the effectiveness of talking and manage to believe, in spite of the overwhelming evidence to the contrary provided by the last seven years, that if only we go on talking long enough, we can make satisfactory agreements, which will be honored, with those who are our bitterest enemies. And finally there are those who are trying to make political capital out of the 'H' bomb, on the grounds that any stick is good enough to beat the Government.

These various sects—except possibly the last—though extremely vocal, are not numerous, and represent only a very small percentage of our population.

THIS reaction to the 'H' bomb will come as no surprise to a student of history. The invention of new weapons of war has always brought about an outcry against them on moral or humanitarian grounds, and attempts have been made, again and again, to prohibit their use. Nowhere can this be more clearly seen than in the invention of gunpowder. It is said to have been discovered by an ancient Chinese philosopher. On hearing about it, the ruler of the province sent for him and required him to give a demonstration. Having satisfied himself that the thing worked, the enlightened ruler saved humanity from this particular

In the years since the first atomic bombs were dropped on Japan, there has been widespread, sincere, and earnest discussion of the inhumanity and special horror of this new weapon. Many plans have been advanced for the abolition or control of nuclear weapons. Surely there does seem to be a special revulsion against a weapon which can bring such terrific and random destruction to the homes and families of a nation. But many of the plans which have stemmed from this humanitarianism have not been distinguished by logic, and so far none of them have combined their noble aims with prudent safeguards in a mixture acceptable to both sides. Air Marshal Sir Robert Saundby (Ret.), wartime second in command of the RAF Bomber Command and distinguished commentator on the air age, reviews some of the faulty logic which has become evident in some attempts to wish away the existence of nuclear weapons. He points out that almost all new weapons throughout history have been greeted with repugnance at their inhumanity. A resolute and far-sighted development of nuclear weapons and the vehicles to deliver them, Sir Robert suggests, may offer the Western world the most humanitarian goal—the end of war.

horror for many centuries by having the inventor humanely executed and every trace of his invention destroyed. Whether this is fact or legend I do not know, but it is certainly in line with the attitude of civilized peoples towards new weapons of war.

When gunpowder re-appeared in the Middle Ages, providing the foot-soldier with a weapon capable of penetrating personal armour, it was vehemently opposed by the knights, who saw that their predominance on the battlefield was seriously threatened. The use of gunpowder in war, except against infidels, was forbidden by an ordinance drawn up by an Oecumenical Council, which, it is hardly necessary to add, was never effective. It is closely paralleled by the proposal, tabled at the Disarmament Conference at Geneva in 1932, more than 500 years later, to abolish aerial bombardment except in undeveloped countries. Indeed, while it is usual to find attempts made to ban or limit new weapons, it is rare to find such attempts meeting with any success.

One example, that of chemical warfare, is frequently quoted as a successful attempt to ban a weapon of war. It is true that gas was used by both sides in the First World War, and not used at all in the Second one. It is also true that a convention prohibiting its use was signed by a large number of nations soon after the end of World War I. But although the United States did not sign it, and the Soviet Union did not ratify it, neither of them used gas in World War II.

If we look more closely into the matter, it seems probable that the reason why it was not used is to be found in an appraisal of its military value to the Axis Powers, rather than in the deterrent effect of the convention. The truth is that chemical warfare makes life unbearable for the belligerent nations. Everyone— men, women and children, service or civilian—has to wear, or be ready at a moment's notice to wear, uncomfortable respirators and heavy protective clothing. The penalty for a moment's unreadiness, night or day, may be death. The insidiousness of the attack, the fear that a gas, invisible and odourless, may have already fatally damaged lungs or nerves, has a powerful morale effect, especially on untrained civilians.

The disadvantages, therefore, are very real, and no doubt in the German view they outweighed the possible advantages. The Axis Powers thought that they could win the war quickly without resorting to chemical weapons and thereby exposing their civilian population to its miseries. Later, when they might have con-

sidered using these weapons to avert defeat, it was too late. They had lost command of the air, and could not face the awful retribution which the use of gas would have brought down upon them.

It is therefore important not to allow ourselves to think that the existence of the convention is an absolute safeguard against the use of chemical weapons in any future war. It is nothing of the sort, and it is still necessary to study the subject, and be prepared to defend ourselves against a surprise attack of this nature.

THERE is another factor which, in Britain, tends to encourage attempts to ban or limit new weapons, though it has more to do with our national psychology than with morality. Our deep sense of military tradition, combined with a natural conservatism in these matters, makes us reluctant to adopt new methods and weapons and turn our backs on the old familiar things that have served us so well in the past. The most obvious example of this is our unwillingness to give up our reliance on sea power as our first, and almost our only, line of defence. For centuries we have relied upon our fleets, not only to guard our shores, but to keep war as far away from us as possible. We have been brought up on Bacon's famous dictum that "he that commands the sea is at great liberty, and may take as much or as little of the war as he will." This was true enough when Bacon wrote it, and indeed it remained valid until the coming of air power. The success of our sea power in dealing with France during the Revolutionary and Napoleonic wars, brilliantly expounded by Admiral Mahan, profoundly affected our national way of thinking.

But nowadays our Navy cannot protect us from invasion, nor can it keep war away from our shores. Even as long ago as the middle of the 18th century, a First Lord of the Admiralty unwittingly defined the limitations of the Navy when he declared to a Parliament apprehensive about the possibilities of an invasion by France: "I do not say they will not came. I only say they will not come by water." In those days they could come in no other way, and his assurance calmed the nation's anxieties. But nowadays they do not need to come by water, with the mainland of Europe only a few minutes flying time from our coasts.

The Navy still has a great job to do in time of war in protecting our ocean convoys, conducting anti-submarine warfare at sea,

and anti-mining operations. None of these tasks are easy, and they are capable of fully absorbing the efforts of the Navy for a long time to come.

Our island situation and our successful reliance on sea power for so many centuries have encouraged in our people an almost unconscious belief that war is properly a remote thing in which the civilian population ought not to be involved. Apart from civil wars, all our fighting since 1066 has been done on the high seas or in other people's countries. We were deeply and genuinely shocked in 1914 when the Kaiser's U-boats began to sink our merchant ships at sight. We had previously relied on the "rules" of warfare at sea, under which a merchant vessel could not be sunk unless its civilian crew had first been put in a place of safety.

One of the main reasons for the unwillingness of our people to admit that air power has replaced sea power as our first line of defence—and as our principal means of keeping war away from our shores—is that air power is still regarded with a good deal of repugnance, partly moral and partly psychological, because it is held to involve civilian populations in war. We forget that blockade, one of the main instruments of our sea power in the past, relied for its effect mainly on its power to starve the enemy populations of food, clothing and the raw materials needed for their very means of livelihood.

The result of all this interplay of warlike experience, shared by the civilized nations of the world, is a body of doctrine about the morality of various methods of warfare. This doctrine is certainly not founded upon logic and, indeed, if any underlying principle can be discovered, it appears to be merely that of use and custom. Every development is opposed at first, then accepted with reluctance, and later with resignation. Finally it acquires, with age, a kind of respectability which bears no relation to its fundamental decency or humanity.

For a very long time, until the coming of air power, the "classical doctrine" ruled the conduct of war. This doctrine laid down that the object in war must always be to bring the enemy's armed forces to battle and destroy them. Such destruction, in the old days of simpler weapons, had to be achieved mainly by killing men. Thus, to the man in the street, the idea of killing enemy soldiers and sailors was quite proper and indeed praiseworthy, while the idea of killing enemy civilian factory workers engaged in making weapons of war, or the crews of merchant vessels engaged in transporting them and other vital strategic goods, was immoral and unjustifiable.

But although people, through long usage, have become accustomed to the idea of killing soldiers and sailors, it must be noted that it is permissible to kill them only in certain ways. They may be blown up, drowned or burned, shot or bayonetted, sliced with sabres, or impaled by lances. Boiling oil or molten lead could be poured upon them. But they may not be painlessly killed by gas or even anaesthetized. They may not be infected by disease, not even by a disabling but non-lethal disease. And yet it is not easy to prove that to gas a man or incapacitate him by disease is more immoral or even less humane than to burn him alive, impale him, or tear off his arms and legs with high explosives. The fact is, of course, that in time we get accustomed to things that in themselves are very horrible, and thus reconcile ourselves to their use. We shrink with horror from new methods and new weapons, even though they are demonstrably more humane, simply because they are new.

IF then there is no logic in our moral attitude towards new developments in warfare, and if anything, however terrible, will be accepted and become respectable in time, can we not adopt a more intelligent approach to this subject? What is needed is a re-appraisal of the vast range of weapons which scientific progress and human ingenuity have put at our disposal, in terms not of age and consequent respectability, but on their merits. We should assess them in terms of their effectiveness and, as far as is possible in war, their humanity.

It needs more than a little moral courage to take such a course. It is so easy to gain the plaudits of the multitudes and, in a democracy, their votes, by appealing to humanitarian feelings, on the one hand, and fear of these terrible weapons on the other. Those who keep their eyes open and, avoiding false sentiment, advocate rational measures which will—as far as that is possible nowadays—provide security, are apt to be stigmatized as warmongers.

Let us, however, make an effort to separate the sense from the nonsense, and evaluate the present situation in the light of reason and experience.

The basic assumption with which I would start is that every sane person in the Free World, without any surrender to the forces of evil, wishes to avoid a third World War. Shall we achieve that end by bringing pressure to bear on the United

States to stop the development of the 'H' bomb, leaving all progress along those lines to the U.S.S.R.? I can imagine no course of action more likely to bring about a global war, ending in the defeat of the Free World. Can we afford to trust any totalitarian state, especially one whose avowed object is to communize the whole world, if the rulers of that state know that they are the sole possessors of the master weapon of the age?

There are those who advocate that, whatever anyone else may do, the civilized nations of the Western World have a moral duty to bind themselves by a solemn declaration never to use the 'A' or 'H' bombs in war. I believe that, next to stopping the development of these weapons and leaving the field to Russia, this would be the most dangerous course that we could take. Even to let our potential enemies believe that we should hesitate to use them if attacked, would be to bring the danger of a third World War appreciably closer.

Then there is the proposed abolition by all nations of these weapons of mass destruction, under a proper system of international control. There is, of course, much to be said in favour of this, provided that two conditions are fulfilled. First, the system of inspection and control must be really effective; it must be not only fool-proof but knave-proof. It cannot, for example, be left to the Security Council of the United Nations, in which Russia has the power of veto and does not hesitate to use it. And I wonder how many people realize just how great an invasion of national sovereignty such a system of inspection and control must involve. Secondly, the abolition of these weapons must be linked to, and conditional upon, a satisfactory reduction of conventional armaments. If this were not done, the Communist Empires, with the manpower of half Europe and Asia at their disposal, could and would possess land forces that the Free World could never hope to match. With our air power robbed of its decisive weapon, and our sea power helpless against their huge continental land masses, the Communist armies would be invincible.

We cannot therefore separate the 'A' and 'H' bombs from the whole question of the limiting and control of all armaments. This is an immense task and given the greatest good-will—of which there is not much evidence in some quarters—it would take years to accomplish.

W HAT, then, should be our policy in the meantime? I suggest that, while never losing sight of the importance

of achieving general disarmament with effective safeguards, we must rely upon a balance of power.

The Free World must balance the vast manpower of the Communist Empires, channelled into great land forces, by superior air power equipped with the most powerful weapons that science can provide. For some time to come—perhaps for a long time—we can rely on being ahead of the Communists in our "know-how" of the use of air power, in our radar, and in other modern techniques. As Major de Seversky has pointed out, the very fact that both Russia and China are compelled by their circumstances to maintain huge armies will limit the effort that they can put into the development of their air power and all the ancillary industries on which it must depend.

But there will come a time, sooner or later, when the Communists will have enough 'H' bombs to devastate the principal cities and centres of administration in the Free World. What will happen then? Will the balance hold, or will the deterrent power of these weapons of mass destruction fail us? It can be argued that a sudden surprise attack could, at one blow, cripple the organization and industry of the United States and the British Commonwealth. This may be true, but it is equally true that the North Atlantic Treaty Powers will possess a large number of air bases, well dispersed throughout the world, and unless these were all simultaneously destroyed—an almost impossible proposition—the next few hours would see the destruction of the Kremlin and all the larger industrial and administrative centres of Russia and China.

It seems to me, therefore, that not only will the balance hold but that, as Marshal of the Royal Air Force Sir John Slessor said in a recent broadcast, the coming of these new weapons will put an end to global war. No sensible nation would begin a large-scale war unless it could see a good prospect of improving its position; there must be reasonable hope that the war can be quickly won, and give some advantages to the victor. What chance is there of that nowadays? And surely no one, not even the most power-mad dictator, would resort to war if he knew, beyond all doubt, that within a few hours his capital city and all the vital centres in his country would be destroyed beyond hope of repair.

We ought, I suggest, to use the next few years, before the Communists have a sufficient stock-pile of 'H' bombs, to regain the diplomatic initiative. We cannot be satisfied with a status quo which leaves whole nations at the mercy of the Red army and the Secret Police. We must find means, short of war, of compelling

the Communists to relinquish their hold on the countries that they now occupy, and force them to withdraw behind their own frontiers.

I do not think that this is so impossible a task as is commonly believed. The essence of the problem is to take one step at a time—perhaps a very small one at first—and gradually, carefully, to gain one point after another. And in the background, unseen but all-powerful, would be the threat of overwhelming N.A.T.O. air power. Time will be needed and great diplomatic skill and, of course, it is undeniable that risks must be run. But we must be prepared to face them, and we must have a policy so flexible and resourceful that at no time will any situation threaten to get out of hand. This will be a supreme test of statesmanship, but I believe that once a policy such as this has been decided upon, the men who can carry it out will always be found.

And so, under the shadow of air power wielding weapons of terrible potency which, by God's grace, we shall never have to use, we may hope to free the enslaved peoples of the world, and keep the peace until the canker of Communism, as some day it surely will, has passed away. We should therefore, I suggest, reject the spurious morality that shrinks from the acceptance of the master weapons that science has given us, and embrace the higher morality that bids us take advantage of their existence to abolish the new slavery, and exorcise from the world the evil ideology that threatens twentieth-century humanity.

Burghclere, England

Enemy Airfields

in North Korea

Powerful Communist Air Forces Are Poised
on the 38th Parallel
Ready To Challenge U. N. Control of the Air

Oɴ 29 June 1950—four days after the North Korean Communists plunged into South Korea—the USAF was given the green light to operate north of the 38th parallel to the Yalu River. Within a month the North Korean Air Force had been wiped out by air battles and concentrated attacks on its North Korean airfields. Only about 18 obsolete aircraft out of the original 150 NKAF combat aircraft survived to conduct sporadic "Bed-Check Charlie" nuisance forays over Seoul. Control of the air had been gained with a minimum of air effort and cost and was held over all Korea throughout the war.

After the NKAF had disappeared in July 1950 the Communists could ill afford to commit new air forces to the battle from their "protected" Manchurian bases. The U.S. had made it known that such action might lift the air restriction at the Yalu and perhaps trigger the USAF Strategic Air Command into action over China. Not desiring to extend the war, the enemy began a tremendous airfield rebuilding program in North Korea to provide bases from which air forces could "safely" operate without inviting destruction of the vital support area north of the Yalu. Forced labor gangs of thousands of Korean and Chinese military and civilian personnel began a rapid transformation of selected sites into well-designed airfields capable of handling both jets and conventional aircraft.

These repair efforts were kept under constant surveillance and systematically nullified by UNC follow-up strikes. The pattern of the "battle of the airfields" took shape and was pursued with relentless vigor and determination on both sides. Airfield after airfield was periodically bombed, the progress of enemy repair watched, and then bombed again. As the enemy

North Korean Airfields

In its last two years the Korean War was essentially an air war. Despite this fact the armistice negotiations passed over the implications of air control in Korea and considered in detail only the ground force situation. The unfortunate result is that after United Nations Command negotiators had argued for months over whose side would retain certain hills on the front, they accepted a truce allowing the enemy to construct airfields in North Korea, and they failed to insist on proper policing of the enemy post-armistice air build-up in North Korea. Thus the hard-won air victory was swept away. This default has two uneasy implications: (1) at the present stage of armed truce and continuing negotiations, the presence of hostile air forces in strength in North Korea deprives the UNC of its trump ace against the enemy—the threat of a resumption of the devastating air campaign against their ground forces and logistics; (2) the initiative has now passed to the enemy. If the war is resumed, the first move might well be a powerful, sneak attack to immobilize the U.N. air forces in South Korea. From North Korean air fields—many less than five minutes jet flight from UNC bases—the enemy could strike almost without warning. Even if friendly aircraft managed to get aloft, the desperate air battle would pit UNC air forces against massed enemy air 3 to 10 times greater in strength. The entire UNC ground structure would then come under determined air attack for the first time in the war. Immediately the whole position could become less tenable than in the bleakest days of Pusan.

Though victory was compromised in the armistice terms, the Battle of the Airfields stands as monument to the airmen who kept the enemy out of Korean skies for three years. The Editors of the *Quarterly Review* examine this interesting phase of the air war, the determined enemy efforts to repair their bases, the determined UNC air strikes against them, and the air posture in Korea today.

threw increased ground defenses around his airfield repair work, making daytime fighter-bomber attacks costly, USAF B-29's were given more and more of the responsibility to keep the airfields out of commission. The night flying B-29's ran through intense searchlight and antiaircraft barrages to keep the major airfields unserviceable. In the last year of the war Communist night jet fighters rose out of Manchuria to challenge the mediums, but the attacks continued. Striking in every kind of weather, using radar-bombing tactics through heavy overcasts, the B-29's compiled a record for accuracy and achievement that must have given the enemy much to think about. He did not come up with an effective defense—even the use of jet night fighters failed.

The airfield phase of the war tied up a considerable amount of U.N. total air effort but kept enemy air off the necks of the UNC ground forces, allowing the vital military advantages afforded by protective air cover.

The enemy's persistence in throwing great effort and resources into airfield repair in the face of continued follow-up strikes, which battered and re-battered the fields as quickly as they were repaired, was a riddle to our intelligence experts. If the intent was to wear down U.N. patience and war resources by the oriental technique of resiliency, it failed. Another, more logical, explanation previously analyzed in these pages* considered that the Communists were attempting to maintain the airfields in a degree of repair that would require minimum effort and time to make them serviceable bases for their Manchurian-based air force, if it could be moved to North Korea. This reasoning is substantiated by a long-term study of the level of repair maintained at various airfields. Those immediately south of the Yalu were so diligently repaired that intelligence estimated 24 hours' repair work would render them completely serviceable. Those in an arc across the middle section of North Korea would require 5 to 7 days. Those in southern North Korea would require at least two weeks. Thus, should the enemy decide to move his air into Korea from Manchuria, he could throw air cover over the bases just south of the Yalu, repair them in 24 hours, move into them, extend his air cover out over the middle arc, repair those in another 5 to 7 days, move into them, and repeat the process on the airfields right behind the front lines. Such action would have to be preceded by the elimination of the F-86's in a series of bold air strikes on USAF bases south of the 38th parallel.

Another explanation suggested that the enemy kept his airfields in an advanced state of repair so that with minimum effort he could quickly transfer his air forces from Manchuria should a sudden break in military or political events—such as even a brief cease-fire or temporary truce—make possible the maneuver. USAF aerial reconnaissance watched the pattern of enemy airfield construction unfold. Eight major fields designed for jets began to appear along the western coast between the Antung-Sinuiju complex and Pyongyang. Twenty-six additional airfields throughout North Korea were undergoing rehabilitation or new construction. The eight jet airfields represented a tremendous construction project. Each was located to give protection to its neighbor. Each had access to rail lines and to primary all-weather roads. Each consisted of a single, long runway, with taxi-ways

*"North Korean Airfields," *Air University Quarterly Review*, VI, 1 (Spring 1953), 14-17.

leading to widely dispersed and isolated parking and revetment areas. Revetments were often a mile or two distant, in nearby valleys or tucked into hillsides. Great care was taken to utilize the natural terrain features for protection from air attack. None of the eight was located in open country. Several —such as Pyongyang and Haeju—were built in the middle of populated urban areas where buildings were razed on both sides of a downtown avenue to make room for a long, wide concrete runway. Repair shops, POL dumps, and dispersal areas were scattered among civilian residences in an ingenious but cold-blooded plan to ward off air attack.

Air reconnaissance carefully watched and charted construction progress of the 34 sites, and Sabrejets patrolling the Yalu River looked down on the massing of enemy jets in Manchuria.

When the deployment of the combined CCAF-NKAF onto North Korean bases appeared near, the UNC air forces struck the North Korean airfield system with devastating force. One by one the bases were pounded into rubble and debris. Sabrejets threw up a curtain of defense against MIG intrusions from Manchuria. The combined strategy of denying the enemy the use of Korean bases and erecting an aerial curtain just south of the Yalu foiled the Communist plans to relocate air forces in North Korea. It established the pattern and tempo of the two-year-long "Battle of the Airfields."

Thirty-four North Korean airfields were repeatedly attacked during the battle for the airfields. Saamcham, typical of the jet fields constructed by the Communists, had a 6600-foot-long, 195-foot-wide concrete runway, plus taxi strips and ample dispersal areas. Well designed and well constructed, such fields could handle large numbers of jet fighters or jet light bombers. Each posed a big threat to the UNC forces if allowed to become operational. Twice-weekly aerial reconnaissance enabled UNC air forces to schedule strikes when repairs neared completion.

The Final Campaign

During the last two months of the war FEAF and Fifth Air Force increased the tempo of airfield campaign, lest the enemy's capability for rapid repair of airfields enable him to slip combat aircraft onto partially serviceable runways during the closing days of hostilities. A week before the armistice was signed, aerial reconnaissance noted unusually intense repair activity on a number of the major fields. Like frenzied ants thousands of laborers filled craters. Additional hundreds streamed down the roads leading to the airfields, carrying A-frames loaded with rock, earth fill, and other repair materials. This repair effort, one of the greatest of the war, along with unusually heavy truck activity in air base areas, indicated that the enemy was desperately trying to get runways on a number of his airfields in minimum shape prior to the armistice. Since only a handful of enemy aircraft were then in North Korea, this frantic activity also indicated the first priority of enemy military business when a "cease-fire" gave them freedom from air attack: movement of the Manchurian-based jet air force into North Korea.
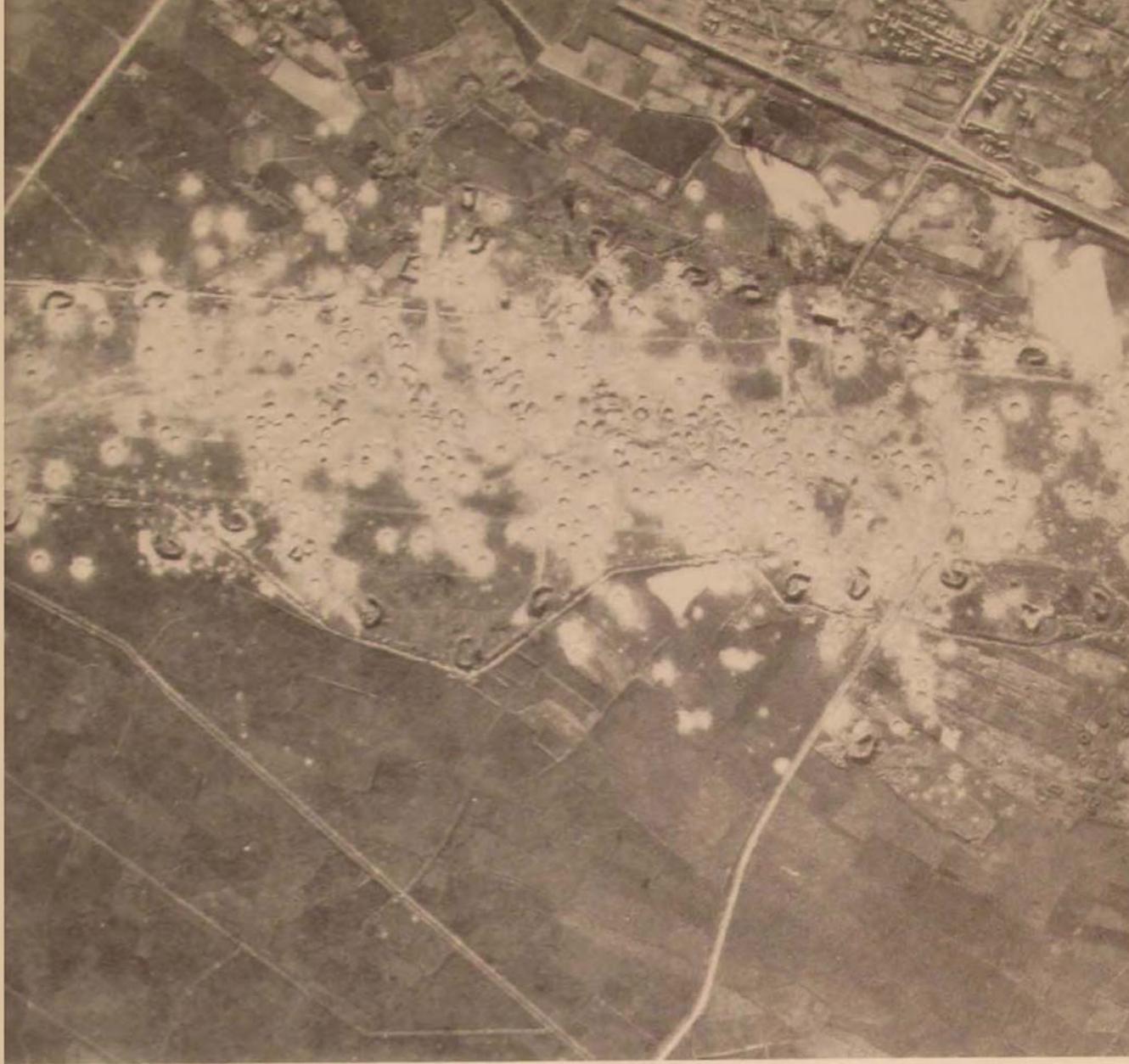
*Photo (left) of Sinuiju's 6000-by-230-foot earth runway, taken on 15 July—12 days
before the cease-fire—shows intense repair activity underway since the last bomb-
ing of the field on 20 June. The road (a) leading to the airfield is lined with
trucks. Twenty trucks can be seen on another road (b) with 6 more on the
field itself. Stacks of earth and rock fill (c) have been piled around the craters
which must be drained before filling. By repairing only four or five more craters
which directly straddle the main landing strip (d), Sinuiju's runway would be serv-
iceable for jet landings. Photo above, taken on 27 July—a few hours before the cease-
fire—shows results of the last series of strikes on Sinuiju. At 0100 hours 21
July, 15 Okinawa-based B-29's radar-bombed the airfield through a heavy overcast
with 150 tons of high explosives. Early the following morning, 22 July, 9 B-29's
dropped 40 more tons on the battered installation. Both attacks met very heavy
flak, intense searchlight activity, and numerous night-fighter aircraft. On the
morning of 24 July Sinuiju was hit again by Fifth Air Force F-84 and F-86 fighter-
bombers and again that night by B-29's. By 2200 hours, 27 July (deadline for the
cease-fire), the USAF had once more converted Sinuiju into a well-ploughed field.
Yet UNC prisoners of war returning less than one month later reported this same
field was now a first-class jet operations base equipped with a concrete runway.*
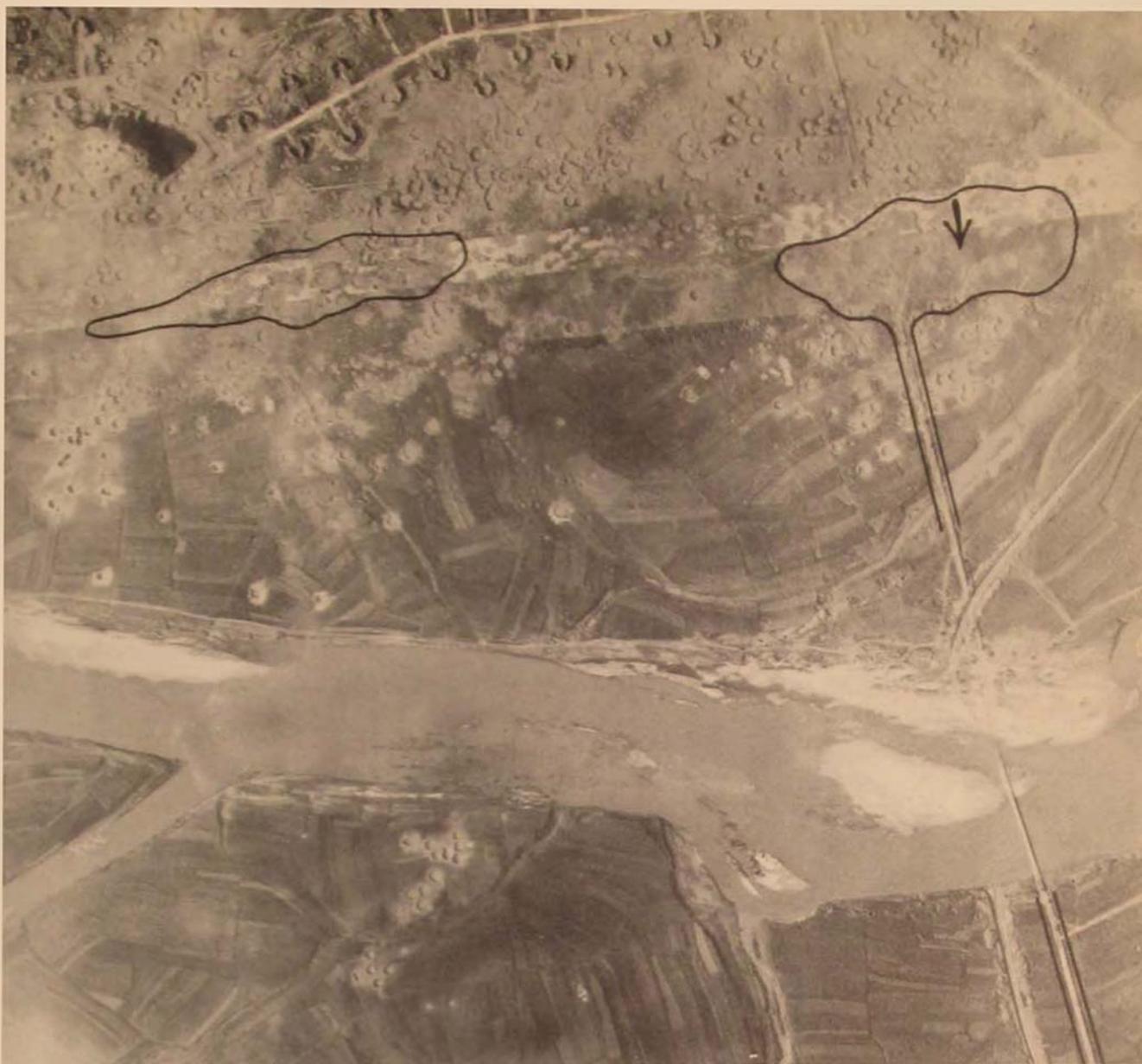
The history of Taechon airfield at the end of the war closely parallels that of Sinuiju. Built in October 1951, Taechon's 6500-by-200-foot concrete runway was kept unserviceable by air attack until the cease-fire. FEAF "cat and mouse" tactics during the battle of the airfields frequently permitted Taechon's repair crews to complete their handiwork before blistering aerial bombardment tore it apart again. Taechon's proximity to the Yalu and its long concrete runway made it especially suitable for enemy jets and placed it high on FEAF's target list. In the closing days of the war it was attacked by B-29's and F-84's, after aerial reconnaissance noted it was serviceable again. On the night of 23 July eleven B-29's, running through heavy opposition from flak and enemy night fighters, plastered the runway with 110 tons of 500-pound bombs. Photo cover (left) taken on 25 July —two days before the armistice—shows intense repair activity that followed. Thousands of laborers stream out of the hills toward the airfield with the A-frames of fill material. Other hundreds dot the road from the river's edge, probably carrying sand and gravel. Almost every crater is surrounded by a swarm of workmen. On the night of 26 July four B-29's again hit Taechon with 40 tons through a solid overcast in the last scheduled medium bomber effort of the war. Photo above, taken the following day, 27 July, a few hours before the cease-fire, shows the condition of Taechon at the end of the war. Reasonably sure of no further attacks, the Communists have committed thousands of laborers to feverishly repairing the concrete landing strip. Roads leading into the airfield are jammed with workers and vehicles.

That the enemy had succeeded in placing a small part of his Manchurian air force in North Korea before the cease-fire is a matter of record. The 6200-by-180-foot Uiju airfield, across the Yalu from Manchuria, remained serviceable during large parts of the war. Enemy jets were periodically observed landing and taking off and at times were parked along the runway or dispersed as far as a mile and a half from the field. The runways and adjacent area were well camouflaged with dummy bomb craters and simulated damage. A limited number of aircraft could well have been hidden there at the time of the armistice. The proximity of Uiju to Manchuria and the Antung airfield complex made it a dangerous and costly target to strike. Nevertheless it was targeted and bombed whenever reconnaissance observed MIG operations. For example, on 17 July—ten days before the armistice—pilots and reconnaissance reported 43 of the sleek jets on the airfield. B-29's promptly struck the airfield, destroying an estimated 23-25 parked MIGs. Following this strike no more MIGs were seen at Uiju. But to make sure the runway remained unserviceable until the armistice, 12 Japan-based B-29's hit the airfield with 120 tons of bombs shortly after midnight on 21 July. The next night 19 Okinawa-based medium bombers again struck Uiju with 180 tons of high explosives. On 23 July 18 F-86 fighter-bombers dive-bombed the runway and revetment areas. Photo cover (above) taken several days before the armistice, reveals the field unserviceable and the revetment area barren of MIGs. But a low vertical picture (below) of one small section of the outer fringes of Uiju taken on 27 July 1953 reveals four MIGs hidden under camouflage. The road leading to the water's edge comes directly from the airstrip. Across the river lies Manchuria. The situation strongly suggests that the Communists intended to stock Uiju with jet aircraft by covertly ferrying them across the Yalu into Korea at places like this, other than specified ports of entry. Such practice would of course be in violation of the armistice and emphasizes the need for air patrol to make a modern armistice realistic.
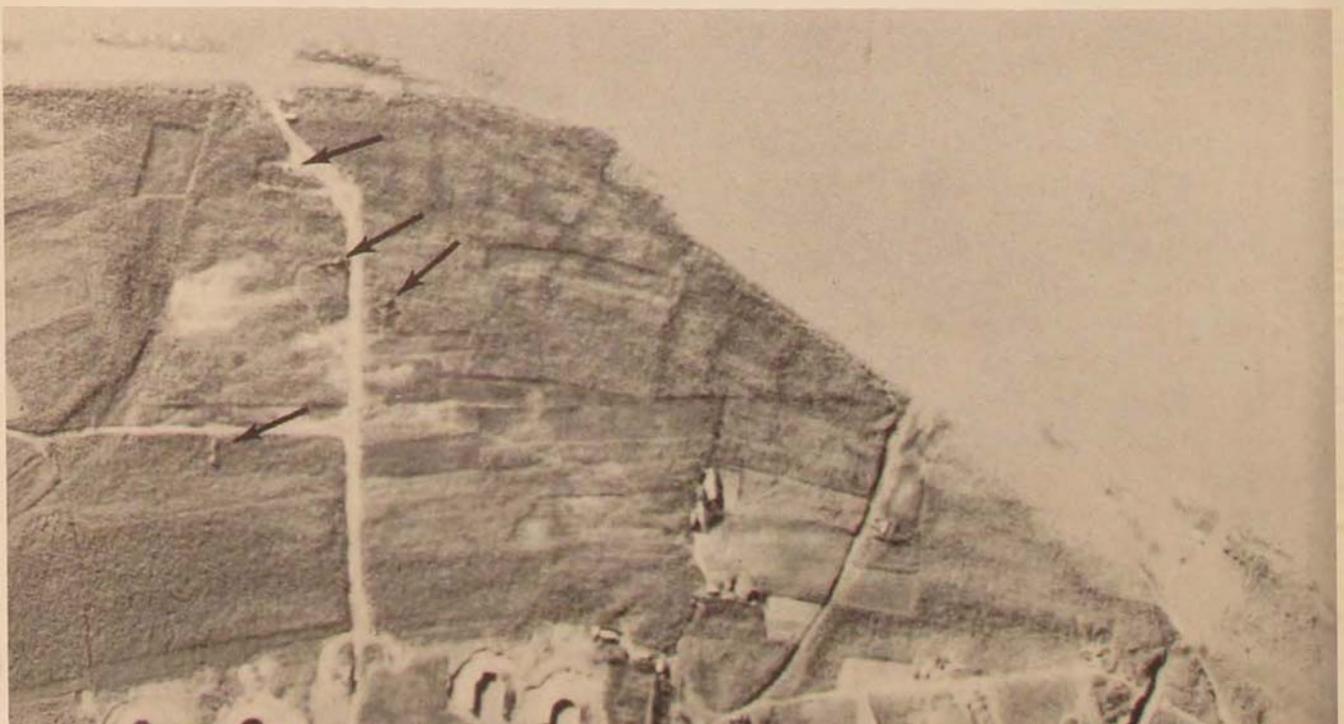
Now reportedly rebuilt and housing a number of first-line combat aircraft, 3400-by-500-foot Pyonggang dirt airfield, a short distance north of the neutral zone, was used by the enemy during the war to decoy unwary or new combat pilots into crossfire from antiaircraft guns. Known to pilots as the "Pyonggang flak trap," the airfield was dotted with 12 to 18 damaged Russian aircraft (the remnants of the original NKAF caught on the ground early in the war) dispersed around the edges of the field. From the air these planes presented a luscious firing-pass target to pilots returning from missions farther north. The enemy constantly moved his well-camouflaged batteries. The ditches across the strip were probably built to prevent the UNC from air-landing troops in a possible vertical envelopment. Serviceable frontline bases such as Pyonggang could well be used by the enemy much as the UNC used its forward bases. Such fields provided the air eyes, or "mosquito" controllers for ground forces for aerial close support, and air logistical support to frontline troops. Enemy observation aircraft from now-serviceable Pyonggang can make continual daylight surveillance of UNC front lines during the armistice.

Returning UNC prisoners of war, travelling through Pyongyang from their prison camps to Panmunjom for exchange in "Operation Big Switch," reported seeing large numbers of twin-engine jet and conventional bombers, along with MIGs and other unidentified single-engine fighters, flying around the capital city and taking off and landing at the Pyongyang airfield complex. This complex of three airfields was photographed on 27 July, a few hours before the cease-fire. At that time three fields were unserviceable and devoid of enemy aircraft. Yet less than two months later a North Korean pilot flew a MIG-15 out of the complex and landed on a UNC base in South Korea. The pilot reported the complex serviceable and housing Communist air forces in strength. Pre-armistice photography on 27 July 1953 gives the UNC evidence of truce violations. Upper left shows Pyongyang Downtown airfield. This 6450-by-150-foot concrete runway was constructed by widening a downtown street. Hangars, workshops, and support activities were spread out in the residential parts of the city surrounding the runway. Lower left shows Pyongyang Main's 3900-by-330-foot concrete runway and taxi strips, parking ramps, and hangar facilities. Reputed to be the home of "Bed-Check Charlie," this airfield was frequently the target of our medium bombers and fighter-bombers. Photo above shows the well-bombed Pyongyang East airfield, much used by the enemy in the very early days of the war. In addition to its 6200-by-85-foot concrete runway, this airfield had well-planned dispersal and support facilities. It was hit hard in the first big raid on the city of Pyongyang in mid-1952 and remained unserviceable until the armistice. This complex alone, if repaired and stocked with enemy combat aircraft, as is reported, poses a major threat to UNC forces in South Korea.

Intelligence reports from the U.S. Navy, whose area of action during the war in-
cluded the port of Wonsan and the surrounding North Korean east coast, indicated
intense airfield rebuilding there since the armistice. Unusually heavy construc-
tion has taken place at three principal sites, Wonsan, Sondok, and Hoemun. Photo
below shows a pre-armistice view of the spacious Wonsan airfield. The airfield has
two runways, each 250 feet wide and 3120 and 4160 feet long respectively, surround-
ed by a sod landing area 4250 by 3600 feet. Good support facilities, hangars, and
large revetment areas (a) add to its importance. Upper right shows Sondok, a huge
landing area 7020 by 6840 feet with plentiful support facilities, including concrete
repair ramps and hangars. Lower right shows Hoemun with its 4100-by-350-foot
earth runway (b) and the 4940-by-1030-foot leveled sod landing area around it.
Hoemun has numerous revetments (c) and dispersal areas but no hangar facilities.
Enemy jets operating out of these three airfields would pose a serious threat to
UNC control of the sea off the northeast coast of Korea—waters connecting Wonsan
with Soviet Siberian ports. Carriers might well have to retire beyond the range
of such jets, thus minimizing their support of the U.N. position in Korea.
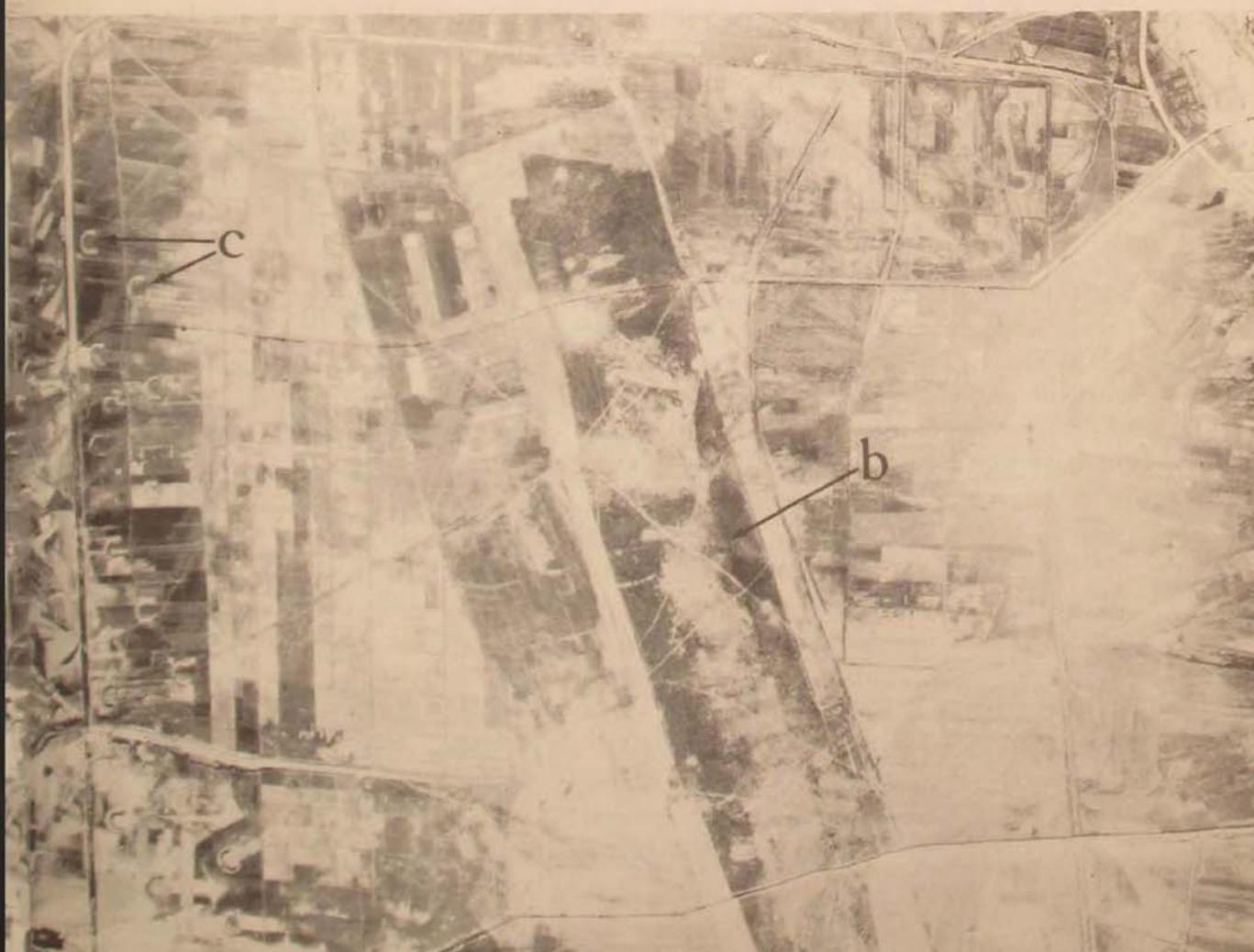
The Grim Prospect

The summer of 1954 finds Communists looking down the United Nations' throat in Korea with a 3-to-1 margin in combat aircraft and a 2-to-1 margin in men. This order of battle reverses the negligible-air-forces-strong-ground-forces team that poured across the 38th parallel on 25 June 1950, only to be decimated by UNC air forces and driven back to the Yalu. The Communists paid a price to learn that control of the air means control of the surface below, ground strength notwithstanding. They paid the price, but more significant, they learned the lesson.

Today the combined NKPA and CCAF have more than 3000 combat aircraft of all types. Their Soviet comrades can back them up with more than twice that number on hand in the Far East—adding up to an impressive force of Communist air persuasion poised like a razor-sharp scythe ready to slice down the Korean peninsula into the heart of industrial Japan.

Over 100 Communist airfields, nesting hundreds of conventional and jet fighters and bombers, lie within 200 miles of UNC ground forces—the distance between New York and Washington, D. C. Over 240 additional airfields are within the Communist jet light bomber's combat radius from U.N. ground force positions. Over 80 of these airfields, well-stocked with combat-ready aircraft, are located in North Korea—within 30 to 150 miles from the 38th parallel—and can accommodate either jets or conventional aircraft.

At the time of armistice there were only 34 airfields in North Korea. Only seven of these could accommodate jets, and all except Uiju were unserviceable at the time of the cease-fire. Only a handful of aircraft, at most two dozen, were based in North Korea. With the truce freezing force levels, the Communists should have no more than that today. But UNC intelligence figures betray the gross Communist violation of the armistice. The Communists have a reinstituted air force in North Korea. What this means to our present forces in Korea is the prospect of resumption of war at any time—a war which would match them against overwhelming land forces backed by heavy odds in the air. The status quo of the armistice has disappeared, and the ominous prospect for tomorrow is rooted in the very paper agreement that brought about the truce.

United Nations Command air forces maintained a three-year surveillance of 34 enemy airfields in North Korea, and scheduled strikes when repairs neared completion, or when the presence of enemy aircraft was observed. This continuing effort was a task of considerable proportions, one which required a sizable chunk of available air forces. That the UNC air forces won the battle of the airfields and kept an air force more than twice their size out of the war and away from the UNC ground forces in Korea is a matter of record. When this task is considered in the light of the daily aircraft requirements for close support, interdiction, and special combat missions, and the constant flow of priority requests for air attacks on hundreds of targets of all kinds, the achievement assumes significant proportions.

Had the same numerical air strength had double the number of airfields to keep inoperative, while concurrently battling an active jet air force over enemy territory and supporting friendly ground forces, UNC airpower in Korea would have been spread dangerously thin.

Yet who can say it will not be required to do just that? All information

indicates the enemy has already rebuilt most of his old airfields to accommodate jet air forces. Intelligence on new airfield construction is equally sobering. Unconfirmed reports tell of some 30 or more new airfields under construction. If this figure is correct, the Communists would have a total of over 75 airfields in North Korea upon which to place the bulk of the Manchurian-based air force.

When the enemy signed the armistice, he wrung from the UNC a concession that permitted airfield construction. It was argued that this was unimportant, since the enemy was forbidden to bring air reinforcements into North Korea. But air forces can be moved into first-class, fully operational

One sound bit of evidence backing the reports of new airfield construction in North Korea is this oblique photo of Oksan-ni airfield, which the enemy has built since the armistice. Constructed across rice paddies, Oksan-ni lies only a short distance behind the enemy lines and about 35 air miles northeast of Seoul. This aerial photo, taken from the U.N. side of the neutral zone on 28 August 1953—one month and a day after the armistice—shows Oksan-ni under construction. The runway area already measures 5100 feet by 350 feet. Subsequent reconnaissance has revealed two more airfields under construction near Oksan-ni, giving the Communists a strong airfield complex under the very noses of the UNC. From these bases they could mount a devastating air attack on Seoul within the matter of a few minutes and almost before air defense warnings could sound the alert. If a surprise attack were launched from Manchurian bases, enemy jets, low on fuel, could safely slip into airfields such as these, refuel quickly, and return to new targets in South Korea.

bases in a few hours by air or in a few weeks if smuggled in by devious land routes. Inspection and control of air facilities is the key to armistice policing —especially when dealing with an enemy whose word has so often belied his deed in the past. The only effective way to monitor an instrument as mobile as air power is regular aerial reconnaissance over the enemy air bases. A clause permitting UNC air patrols to operate to the Yalu was part of the earlier draft, but it fell a concession to the Communists. Not only does the final agreement forbid aerial reconnaissance over North Korea as a measure of enforcement, but the UNC agreed to evacuate vital radar stations on islands north of the bomb line and off the coast of North Korea—stations which would have provided a close watch on Communist air activity. Inspection and control was delegated to U.N. neutral inspection teams located only at specified ports of aerial entry. The result is that the clause forbidding air reinforcements is only as binding as the honor of the signatories.

At the time of the armistice, the combined strength of the Chinese Communist Air Force, the NKAF, and units of the Soviet Air Force located behind the Yalu, was estimated at around 2500 combat aircraft. The majority of these were jet bombers and fighters. It made up the third largest air force in the world, surpassed only by those of the Soviet Union and the United States.

If the time comes when the enemy should reopen the fighting in Korea, the true significance of the present UNC air situation will be immediately felt. Even if the bulk of the enemy air force is still north of the Yalu, its movement into prepared Korean airfields could be easily accomplished at the enemy's discretion. One bold "Pearl Harbor" strike against fighter bases in South Korea would give the enemy the vital air control that belonged to the United Nations forces throughout the war. From air bases in North Korea even the most lucrative targets on the Japanese islands would be within range of jet bombers. UNC naval aircraft carriers, pitted against determined formations of enemy jets, might well find the waters around Korea untenable. There is considerable doubt that South Korea could be held in the face of the enemy's wholesale commitment of air power, timed with a ground offensive.

So long as the UNC forces controlled the air, enemy military forces remained relatively paralyzed. By conceding to the enemy the right to build airfields in North Korea after the armistice and by failing to write into the armistice an effective system for monitoring the enemy air build-up, the U.N. signed away the only element of military power capable of both protecting U.N. forces and controlling enemy forces—an advantage we had spent such great effort and resources to achieve and maintain—one which meant so much to the repelling of Communist aggression.

The absence of a specific airfield clause in the truce may well have flipped the coin to place UNC forces in Korea today in a position more precarious than the darkest hours at Pusan.

The Role
of Tactical Air Forces

BRIGADIER GENERAL JAMES FERGUSON

RECENT headlines in our newspapers have again and again spotlighted further developments in the "New Look" and have impressed us with the enormity of the test explosions of hydrogen bombs on the Eniwetok Islands in the Pacific. These events bring to the mind of every thinking military man the question, "How will this 'New Look' affect the composition and strength of our armed forces?" And many airmen have further inquired, "With so mind-staggering an offensive weapon as this hydrogen bomb, where and how will tactical air forces fit into the new type of war that has come of age?"

In order of sequence I would like to approach this problem of the present position and future role of tactical air forces in five steps: first, a review of the lessons learned in the use of tactical air power in our military operations in World War II and in Korea; second, a test of the validity of these lessons against established procedures to determine their adequacy to meet the present world situation; third, a glimpse into tactical air force inventory of aircraft and allied equipment; fourth, application of new equipment and weapons in solving the situation as we see it now, at least to my way of thinking; and last of all, viewing our present new weapons, equipment, and aircraft, I would like to draw a picture of things to come. This step takes the familiar doctrine and tactics and our present procedures as a point of departure for projection into the future.

The remarkable increase in the sizes and types of atomic weapons has added a new dimension to the power and versatility of tactical air forces. Pausing at the threshold of the atomic age and of the "New Look," Brigadier General James Ferguson, Deputy Commander of the Ninth Air Force, reviews the lessons learned about tactical air forces in the Second World War and in Korea, and speculates on the role, the employment, and the composition of tactical air forces in the near future.

W̲ʜᴀᴛ were some of the lessons that we did learn from World War II and from Korea concerning the use of tactical air? It hardly needs to be mentioned that the first and most important lesson was that control of the air is a prerequisite for any large-scale military operation. Europe, the Pacific campaign, and Korea all taught us this. In Europe, from early 1944 onward, the Luftwaffe became the principal target for our tactical air, as well as strategic air. In time the targeting of this complex came to include not only the German aircraft and their airfields but also the equipment and the industrial plants that nurtured their air arm. The most notable example, of course, was the destruction of the complex of synthetic oil plants producing aviation fuel.

In the Pacific the long trek northward hopping from island to island brought forth an operational pattern: the immediate gaining of control of the air over each island defense by eliminating the local Japanese air forces and neutralizing their air bases.

In Korea the pattern remained essentially the same. Although the North Korean Air Force was small we set about driving it from the skies and then cratering its airfields into useless rubble. It was well we did, for the subsequent entry of the Communist Chinese with their Russian-made MIGs featured the first jet air battles. Without the constant attention that we had paid to the airfields in North Korea, we might have taken off one morning long after the disappearance of a North Korean Air Force to find a superior air force operating within a few miles of our front lines. Fortunately this never came to pass. And despite frustrating diplomatic limitations we did manage to maintain control of the air over the Reds by patrol and engagement of their MIGs over the Yalu. Though we were denied access to their lairs in Manchuria, we still were whittling down their air strength at armistice time. That our tactics were sound is demonstrated by the fact that at no time did combat-minded MIGs ever manage to penetrate within 75 miles of the battle line.

The second lesson was that the most profitable attacks were those made deep in enemy territory where supplies, materiel, and personnel are fairly well concentrated. As supplies and men are moved closer to the line of contact, dispersal greatly reduces the effectiveness of air attacks. Consequently, where it is operationally feasible, tactical air should place the major emphasis for its interdiction program against those lucrative and concentrated targets which necessarily lie deeper in enemy territory.

With respect to close air support we have all drawn certain conclusions as to how effective it might be under various battle

conditions. In my opinion close air support is of little use unless the associated army is moving ahead—unless it is on the offensive. When the army is holding along a riverline, or waiting for a supply build-up, or for strategic or political decisions to be taken, close air support does little more than keep the state of the art alive. It keeps the training up or it is used, as we did so often in Korea, in support of limited objective attacks. It should and must be used under such conditions as we faced in April and May 1951 when great hordes of Communist Chinese poured in against soft points in our lines. But, given relatively static conditions along a line of resistance, the most effective employment of tactical air is to range forward and seal off the projected battle zone, while maintaining control of the air and conducting long-range interdiction. This is the only way to deny the enemy the build-up of his supplies and his forces, both ground and air, that would effectively oppose the resumption of the offensive on the part of our own ground forces. When the day does come for the all-out attack by our troops, every airplane of every category would participate in breaking the initial line of resistance and getting the offensive under way. From then on close support, close-in interdiction, and airfield sweeps all combine to keep the enemy off balance and to make the offensive an ultimate success.

This was the general pattern for the Normandy break-out in World War II. Most of these so-called lessons were confirmed in Korea. At the outset the air battle was a brief and relatively small effort against the North Korean Air Force, yet it was the first consideration. The main concern on the ground was to stop or slow down the rapidly advancing columns of North Korean forces against the withdrawing South Koreans, until such time as ground reinforcements could arrive to take a stand along the Naktong River. A point of interest here concerns close air support of a withdrawal action. It should be noted carefully that the communications required for requesting close air support strikes are the first things to break down in a rapid withdrawal action. Also the irregularity of the withdrawal makes determination of the point of contact between our own rear guard and the advanced elements of the enemy next to impossible. To avoid attacking isolated friendly units air forces must extend the bomb line to the point that air attacks become general support rather than close support. This extension will amount to several thousand yards if not several miles from the actual line of contact.

There were other phases of air action in Korea from which we can confirm lessons. With respect to interdiction, that carefully

worked-out plan often referred to as "Operation Strangle" certainly complicated the enemy's supply problem. It systematically choked off most rail movement from the Yalu south. Except for small sections of track of three to ten miles in length, the enemy was denied sustained use of rail all through North Korea. He had to resort to driving trucks from the Yalu River down to the line of contact. In many places he was reduced to "A"-frame supply transport employing the local populace as manpower, principally at night, and through mountainous terrain. Some critics have condemned this operation as a failure because the enemy was still firing lots of ammunition and troop strengths were reportedly on the increase. Intelligence reports now tell us that the North Korean and Communist Chinese could store no more than seven or eight days of ammunition. Any real offensive, had we been permitted to launch one, certainly would have exposed this weakness.

I believe the lesson to be learned, or to be repeated, is this: an air interdiction program is only one part of a one-two punch. The other part, the simultaneous attack on the ground, was not there other than for limited-objective attacks and patrols. We all recognize the political implications involved in Korea. But it should be remembered, when we are discussing the proper use of air in conjunction with ground action, that an interdiction program is effective only when a ground offensive places high demands on the enemy communications and supply systems.

As to the air battle that came with entry of the Communist Chinese forces, it again was hobbled by political barriers. The overriding task placed before the daily target selection conferences at Fifth Air Force Headquarters was to keep unserviceable all the eighty-odd landing fields we knew of in North Korea. This was first accomplished rather early in the campaign and was maintained throughout the war. All North Korean airfields were kept unserviceable throughout by continuous photo and visual reconnaissance followed by B-29 attacks as airfields came into repair. The situation became more tantalizing as the war progressed. Our aircraft could fly up to the Yalu and look down on hundreds of MIGs just across the river but our pilots were not allowed to strike. They had to wait and engage them one by one, at a time and place of the enemy's choosing.

Many so-called lessons have been learned. The danger lies in accepting lessons automatically as principles which apply in every case. This could be disastrous. In any future war each lesson must be carefully analyzed in terms of the strengths and the

present deployment of the various troops involved, the distances across which our forces would have to move to participate effectively, and the power of new weapons.

I HARDLY need review the major problems facing us in the event of military action against us by an enemy such as Soviet Russia. But it may be useful to do so as a basis for testing the validity of our present doctrine or identifying areas where change is needed. First of all, the power of the initiative is not ours, either in time or place. Second, though we have forces deployed in many parts of the world, they are outnumbered, at least on the ground. Third, it seems obvious that a stockpile of atomic weapons is available for use by the only likely aggressor. Fourth, a tremendous submarine fleet is being built, which, if World War I and II experience is any indication, will make surface convoys a most unattractive means of transportation, at least at the outset of any future action. These are a few of the specific problems that will face us should we find ourselves in a large-scale war in an era of atomic and thermonuclear weapons.

Now there are three fundamental differences between World War II and any war we might get into in the future. They relate to time, to space, and to striking power. In the last war, time was measured in months and years. It took the United States two years to come up to full mobilization. Not until almost three years after the German invasion of Poland were the Allies ready for a major counteroffensive. It was some three years after Pearl Harbor before we really got within striking range of Japan. In any future conflict, time for mobilization will be virtually nonexistent. In my view, we must think in terms of hours and days, not months or years. M-Day and D-Day will coincide.

With regard to space, we have thought in the past in terms of a few hundred miles. Our tactical aircraft normally could operate out to three hundred miles, and the average penetration into enemy territory was on the order of two hundred miles. Because of this unit of measurement we have become accustomed to the practice of moving tactical air force units to overseas theaters by sea transport. Strategic aircraft began the last war with some seven hundred miles combat radius; by the end of World War II they had reached as much as fifteen hundred miles combat radius. New techniques now have extended this range to thousands of miles even for fighters. A few months ago a squadron of Thunderjets flew non-stop from an air base in Georgia to England, a distance of over four thousand miles. Another squadron from

the same base flew non-stop to North Africa in something over ten hours. On several occasions other squadrons of Thunderjets have traversed the Pacific to Japan with only two stops. Our jet bombers now span both oceans as a matter of routine. All new aircraft, either those of the Strategic Air Command or of the tactical air forces, are for all practical purposes without limit in range over friendly territory and are fast becoming longer-legged over enemy territory by the introduction of another new technique.

In the past longer range was achieved in an aircraft by adding fuel. This meant more expensive, larger, slower aircraft, which in turn made them more vulnerable to enemy action. Today we are building aircraft to carry and deliver the new family of weapons a reasonable distance. Any extension of range needed to reach a given combat area is provided by the use of tanker aircraft. They may be positioned in a pre-planned scheme all along the route, such as at Bermuda and the Azores, or at Hawaii and Iwo Jima. The combat aircraft simply rendezvous on these air refueling stations, fill up, and continue their trip. Much more than time is saved by this method. Aircraft encounter most of their difficulties in landings, ground operations, and take-offs. Aerial refueling minimizes this source of trouble between point of departure and final destination.

As we consider modern striking power, we most certainly break with past measurements. Remember how many hundreds of bombers we sent out loaded with half a dozen five hundred pound bombs time after time against a target complex? Remember the hundreds of aircraft put on station over beaches awaiting to be called down to fire a few rockets against a strong point, a pillbox, or the like? It is no secret we are now going all-out today to exploit the increased potential of new weapons. A fighter that could deliver two five-hundred-pound bombs in the last war usually required a direct hit to knock out the target. Today, using this new field of weapons, the *striking power of the fighter aircraft has risen to the equivalent of one hundred thousand World War II B-17's.* To put it another way, if all these outmoded bombers passed overhead in single file, they would need a week to drop the equivalent explosive force of one modern tactical fighter using one of the new weapons.

Think of the physical results of such firepower. Imagine, for example, one fighter aircraft clearing a whole beachhead of opposition. Or, even more serious, imagine a concentration like ours on the Normandy beachhead, being caught by just one hostile bomber loaded with an H-Bomb.

What then does this mean? What does the American "New Look" or the British White Paper on defense propose as a solution? How might this affect our tactics? Our balance of force? Present strategy must meet:

A. A long period of tension, during which small-scale peripheral wars are initiated in an attempt to cause our economic collapse.

B. A world-wide threat of large- or small-scale action that might break out at any time on short notice.

C. The possibility of nuclear weapon attack, launched without provocation or warning, against the North American continent, as well as against all of our installations in Europe or Asia.

D. The continuing inferiority in numbers of ground troops and the technical deficiencies of some of our allies.

The U.S. Joint Chiefs of Staff were not the first to reexamine their military posture in search of a solution. Prime Minister Churchill called in the British Chiefs in 1952 and told them that finances could not stand an indefinite policy of piling up guns and tanks. "There must be a cheaper way," he said, "and you must find it." This economic reality forced the abandonment of the fallacy that balanced forces mean forces getting roughly equal amounts of money in each annual budget. It continued the principle of emphasis on the most potent source of power, but with a difference. Where this force had been sea power in the past, now it is air power.

Economy struck the United States a year later. It took a slightly different form but the result was the same. A searching analysis of new weapons systems in relation to our far-flung military commitments, coupled with the overriding priority to defend ourselves here at home, produced essentially the same solution as that of the British Imperial General Staff. We could no longer afford to bow to tradition and leave large surface forces spread all over the world with relatively small increments of tactical air in their support, both waiting indefinitely to engage a numerically superior opponent, who would have the advantage of striking the first blow.

The JCS proposal has been tagged the "New Look." In a recent interview Admiral Radford, Chairman of the Joint Chiefs of Staff, summed up this "New Look" as—

A program for obtaining, and maintaining indefinitely thereafter, in an improved state of readiness, selected U.S. armed forces which are adequate for the security of the United States and which constitute the most effective contribution to the balanced collective strength of the free world . . . the program for our armed forces is more a matter of emphasis

. . . We are putting emphasis on our advantages, our long suits, in other words, on air power, on new weapons, and on a high state of combat operational readiness. We are placing emphasis on a ready reserve, mobility, and flexibility, not for any one date, but for the indefinite future.

Rephrasing the statement, we could say that the "New Look"—

A. Emphasizes the use of new weapons.

B. Exploits fully the new technical developments.

C. Reshapes our military forces so that they best contribute to the mutual defense of NATO countries while providing for maximum protection of our country.

In this "New Look" modern air power, coupled with nuclear weapons, has become the dominant weapon in modern war. The nuclear weapons have virtually achieved conventional status in our armed forces. Aircraft able to carry such weapons to the source of an aggressor's military might are rehearsing daily to meet the call, should it come. While the threat of devastating retaliatory blows is the prime hope for deterring a would-be aggressor, we must recognize that history records many miscalculations by those who thought to press their demands on others to a point just short of war.

A force in being, ready to repay an aggressive act a hundredfold, is the general shape of our military posture. This will be protected from surprise attack by an air defense proficient to the limit of technical capability. And as Admiral Radford said, "We will continue to have over a million men in our army and we shall continue to have a navy that is second to none."

OFFENSIVELY our air retaliatory force is divided in two. Part 1, the strategic air force, is poised to rain destruction on the principal sources of enemy military power and economic support of his military forces. For the most part these targets are massive in configuration. They are the source of military and economic strength. Their neutralization may cut out the heart of the octopus, but the tentacles can wriggle and work their way out to the Brest peninsula, through Southeast Asia, or deep into the Middle East before the life blood ebbs away. So Part 2, the tactical air force of today and the future, must be designed to cope with these tentacles.

The lessons learned in the past and the doctrine for employment of tactical air forces as we see it today are essentially valid, with particular emphasis on time, space, and striking power.

In *time*, we cannot afford one single day's delay in searching out

and destroying the air strength capable of supporting an enemy ground force or of attacking our strategic air forces. No two-year plan for reducing his air strength by attrition and daily air battles will fill the bill—not when the enemy can reach us with atomic weapons to destroy our source of military strength along with our force that would deliver the retaliatory blows. Instead a top priority must be given to developing the capability for an all-out blitz on the first day of action against the airfields and supporting facilities from which an enemy air force might rise.

In *space,* the techniques of in-flight refueling permit us to modify our deployment, thereby reducing the effects of the first blow against us. It will no longer be necessary to move tactical air units into the army area or, for that matter, even to move them far into the theater. In the past tactical air forces considered it necessary that they move right up to the line of contact, building or rebuilding airfields as they went. But even disregarding the atomic weapons in the hands of a potential enemy, the fuel and the airfield requirements for modern jet aircraft are so large as to require extensive construction and the storage of vast amounts of fuel in advanced areas. This is impractical. The tactical air force of the future, upon whose nuclear weapon punch so much depends, must be sheltered from unheralded attack.

With the outbreak of hostilities, the modern tactical air force will be able to move into the attack, regardless of distance, against such targets as communications centers, troops, supplies, and equipment. And it should be noted here that the more rapid the tactical air counterpunch, the greater will be the number of targets which will be in enemy rather than in occupied or overrun territory.

Always of vital concern to the infantrymen is the close air support. This new emphasis on air power and new weapons does not by any means rule out air support. Conventional as well as nuclear weapons will be used, where practicable, to further the strategy of the theater of operations. But we must not lose sight of the relative importance of various air actions as they bear on the final outcome of the war.

With regard to *firepower,* the new weapons will make many changes. While quantities of aircraft are still required to meet the needs of conventional attacks, an aircraft loaded with the punch of thousands of World War II aircraft is a potent weapon which must be exploited to the maximum. The formidable nature of this new source of firepower, in fact, reverses the orthodox relationships of air and ground forces. Specifically it is quite

reasonable to say that we should look for a modification in our tactics and in our concepts of war, a modification which would point toward the exploitation of tactical air atomic attacks by highly mobile ground forces. In turn these forces would be furnished close support by aircraft of high performance and unconventional configuration designed primarily for ground attack in the immediate battle zone. Recently SHAPE Headquarters has invited European manufacturers to bid on a light-weight battlefield fighter for use in support of NATO ground forces. This may well be a forecast of things to come. I envisage highly mobile, hard-hitting, air-transportable regimental combat teams backing-up the static defenses, with an air support force committed to attack targets in the immediate zone of contact, taking full advantage of the shock and disruption attendant to the new massive aerial blows.

Now let me summarize a few points.

A. From the time its offensive ability was recognized, employment of air power has been generally in support of ground battle. It was considered a supporting arm until recently when new weapons were introduced which in themselves produce decisive results.

B. The development of air power doctrine has culminated in a few basic principles which are even more sound for future employment than ever before.

C. We face a potential enemy vastly superior in numbers on the ground and with his ultimate aggressive intentions already announced.

D. Adherence to what has been called balanced forces no longer is commensurate with the military problem at hand. Though forces operating in all three mediums are still required, emphasis is now being placed on the arm that can get there first with the most decisive weapons.

From these broad statements of military realism we must move into the search for a solution employing the new weapons and techniques.

The outcome of the air battle will decide the outcome of the war. That decision cannot wait for mobilization and movement of great quantities of supplies and equipment to overseas bases. A force in being must be ready today. It must be based on airfields generally protected by dispersal and their range from the source of destruction. It must be trained to respond instantly to the call for action. The Strategic Air Command has this force

in being. It is currently being modernized by the introduction of new jet bombers and improved in its operational capability by the attachment of tanker squadrons to extend the range of its aircraft.

Only within the last few months has our tactical air portion of the United States Air Force come into this new field. It has been recognized in the past that Tactical Air Command has a principal role of supporting ground forces. But it is becoming more clear as time goes on that to assure the support of ground forces in the exploitation phases of any future war, tactical air forces must join with the strategic forces in the initial blows against the sources of enemy military strength. To do this Tactical Air Command is now receiving aircraft of considerably greater potential than ever before. Though most of the tactical fighter wings are presently equipped with the Sabrejet fighter-bomber, we are receiving shortly the new F-84F Thunderstreak which has exceptional lifting ability and long range at high speeds. Also the American version of the British Canberra, the B-57, is being delivered to our reconnaissance and light bomber wings. A high-performance light bomber with tremendous carrying capability, the B-66, is also scheduled to join the tactical air forces. These aircraft assigned to highly mobile wings will enable TAC to participate immediately in the early phase of any future action.

Incidentally, the Ninth Air Force just this April conducted an exercise in furtherance of this very principle of high mobility. Our wings are being trained to move on short notice with minimum equipment needed to operate at full speed for thirty days. This exercise required that a wing from California move on 24-hour notice to a flight strip in South Carolina some 2300 miles away to conduct tactical air operations in conjunction with an army exercise in progress in the area. When the results of this test are evaluated, we will have valuable information on the needs of modern jet wings deployed to an advance base and supported solely by airlift.

Now let me try to paint a word picture of the sequence of actions which might take place should war come in Europe, or for that matter, anywhere in the world. To set the stage, let us presume that forging of the NATO weapon has been fairly well accomplished—for indeed it has progressed well. Each one of the NATO countries has received a considerable amount of military assistance in the form of aircraft, aircraft control and

radar warning systems, guns, tanks, and other military gear. The many NATO working committees have striven hard to standardize procedures, systems, and tactics. And many of these standing operating procedures are already in effect throughout the NATO forces. The U.S. air forces have demonstrated their ability to reach advance bases on short notice and all tactical air squadrons will have participated in non-stop flights to various overseas bases.

With the sounding of the bell, the NATO air forces would concentrate on close air support of their own armies and air defense to the limit of their ability. Our tactical air forces, be they in North Africa, Spain, or the United States, would go promptly into their war deployment, carrying with them the support required for thirty days of all-out offensive action with both atomic and conventional bombs. The offensive would be against forces in the field and all the facilities that support them. This, of course, would complement the strategic counteroffensive. Resupply of these units would be paced to the progress of the air battle and would be by air, surface, or subsurface means as practicable.

Presuming the favorable outcome of this first and decisive phase, the ground offensive then could be initiated with those NATO ground forces on the continent. The standardizations of procedures and common-use items that have come with the close training of NATO units would permit the NATO ground forces to work closely with any combination of air forces. Korea was a good example of how standardization permits the close integration of forces from many nations and with different languages.

Certainly the opening of the sea lanes would have to preface the mounting and moving of convoys of American and Canadian ground forces to participate in the exploitation phase. At this stage either nuclear or conventional weapons might be used to assist in the mop-up.

This largely air view of a future war does not mean that I for a moment support a contention that only one member is needed on the military team of this day. On the contrary, now that a potential enemy has the capability of reaching across the North Pole into our own back yard there is plenty of work for all of us in all forces in all nations. This is all the more reason to scrutinize tradition and conventionalism and make changes where necessary so that we can best meet the common threat. Let each one of us contribute toward the common effort that in which he excels. Some of our NATO partners are better prepared than

others to furnish troops. Others have high technical skills, and industrial capability. Others by reason of location can contribute in form of bases and base support.

Today our globe-circling air force, capable of "instant retaliation," is our forte. Our defense is built around it. Our goal is to fit its employment to the support of Western freedom. Whether in a small peripheral action or an all-out global war, air power with intercontinental range and speed of sound will be depended upon as a principal means of punishing any would-be aggressor. The weapon drawn from the arsenal for use by this air power will be the one best fitted to destroy the target.

Headquarters, Ninth Air Force

The Philippine Anti-Communist Campaign

A Study of Democracy in Action

Lieutenant Colonel Tomás C. Tirona (PAF)

WITHOUT fanfare, the eight-year-old Republic of the Philippines is concluding major operations in a successful limited war against Communism. This article will briefly recount the typical pattern of Communist conquest, and the tactics of the eight-year, bitter campaign the young Republic conducted against it.

The Communist Party of the Philippines was overtly organized on 7 November 1930. As a political party it was insignificant and never did assume any major legitimate political stature. But within the first two years of its existence it made manifest its aims of subversion through violent strikes and seditious political campaigns. On 26 October 1932, the Supreme Court of the Philippines declared the party to be illegal under the Philippine Constitution. Subsequently its leaders were tried and found guilty of illegal association.

The Socialist Party of the Philippines was organized just as formally and overtly as the Communist Party. Founded a year after the Communist Party went underground, the Socialist Party's aims were highly indicative of heavy Communistic leanings. The Constitution of the Socialist Party of the Philippines described Philippine Socialism as differing from that of the United States and Europe and "condemned the counter-revolutionary role of Trotskyites and accepted the principles of scientific socialism enunciated by Marx, Engels, Lenin, and Stalin." In 1938 both parties were merged under the banner of the Communist Party of the Philippines. Its flag proudly announced the affiliation of the Party with the Communist International.

From 1938 to 1941 the Communist Party succeeded in organizing various social, political, cultural, and economic groups of the

Philippines under a variety of fronts. In December 1941, at the outbreak of World War II in the Pacific, the Party and its various fronts went underground. During the war thousands of Filipinos, impelled by a common desire to resist the Japanese, joined the armed faction of the Communist Party with no knowledge of the aims of the organization. This strong guerrilla organization became widely known as the *Hukbo Nang Bayan Laban Sa Hapon* (People's Anti-Japanese Army) or Hukbalahap. Its war-time record was one of numerous engagements against both the Japanese and other Filipino guerrilla units.

In 1945 the United States armed forces furnished arms to various guerrilla organizations in order to expedite the campaign in the Philippines and to hasten the attack against the Japanese mainland. Since the HUKs were fighting the Japanese as vigorously as the others were, they were also furnished arms. However, most of these arms were deposited in secret caches. All HUK units, with the exception of one regiment attached to the U.S. Eighth Army, showed no more than sporadic and token resistance to the Japanese after the receipt of these arms. When these facts became evident, the United States armed forces came to distrust the HUKs and confined their top leaders in a Philippine penal colony. The rank and file continued to terrorize the Philippine countryside. In 1946 the new Philippine Republic initiated a

In the simpler world before the Second World War, antagonism between nations found its expression in power politics and economic pressure. When relations deteriorated beyond a certain point, the result was open warfare. If the wars were not total in the modern sense, the maneuverings which preceded wars were even less so. The people of the countries involved were themselves virtually untouched by the struggle right up to the time that war came upon them. Communism, in its relentless drive for world domination, has introduced many shades of gray in the old black-and-white picture of international relationships. Particularly in Asia the tactics of cold war and limited war have been geared to the nationalism already present in those countries and have played up the social and economic dilemmas of ancient countries struggling to adjust to a modern world. The solution to the problems of Communism in Asia is thus a total problem in which a military solution can only be meaningful if it is accompanied by political, economic, and social readjustment. Of the various campaigns against Communism in Asia, the one conducted by the Republic of the Philippines has been the most successful, largely because it integrated political, economic, and social reform with military action. The *Quarterly Review* asked Lieutenant Colonel Thomás C. Tirona, of the Philippine Air Force, former Chief of the Air Staff and now a student at the Air Command and Staff School, to review the Philippine war on Communism and to point out the lessons which may apply in other local wars against Communism.

drive to return normalcy to the nation. The top HUK leaders were released from confinement to help in this campaign by contacting their dissident followers and encouraging them to surrender themselves and their firearms. While these leaders were ostensibly engaged in the pacification campaign, the *Hukbalahap* was redesignated *Hukbong Magpalaya Nang Bayan* or HMB (People's Liberation Army). All the various armed units were reorganized under a GHQ and prepared intensively for all forms of prescribed Communist struggle. The Republic subsequently declared the HMB and its affiliate organizations illegal.

Communist Strategy for Conquest

THE strategy for conquest adopted by the Communist Party of the Philippines and its armed force, the HMB, was laid out in a memorandum to the Central Committee by the Communist Party of the Philippines (CPP) Secretariat. This memorandum reads in part:

> Aim: To establish the New Democracy (People's Democratic Republic) by overthrowing American imperialism.
> Direction of the Main Blow: Isolation of the national bourgeoisie and other elements who compromise with imperialism and the winning over of the masses.
> Main Forces: The proletarians and landless peasants.
> Reserves: The middle class and rice peasants, the Soviet Union, and the New Democracies (other Communist States).
> Disposition of the Main Forces and Reserves: Alliance of the working class and peasantry.
> Revolution:
>   1. Period of preparation—Battle for reserves or strategic defense.
>   2. Seizure of National Power—Military offensive or strategic offense.

The absence of a valid objective to present to the masses may be noted in the announced aim of the CPP. The prescribed Communist Party line for Asia stressed the liberation of the masses from colonialism, but how could one liberate from colonialism an independent Republic of the Philippines? So the Communist Party of the Philippines substituted "American imperialism" in place of "colonialism."

From 1946 until 1951 the Communists prepared themselves for the drive to power. The years 1951 and 1952 were to be the period for the military offensive. This plan was carried out by the HMBs in the central and southern provinces of Luzon. The HMB Finance Department levied stiff cash and crop contributions

Situation Map: April 1950

L U Z O N

Manila

MINDORO

V I S A Y A S

SAMAR

PANAY

LEYTE
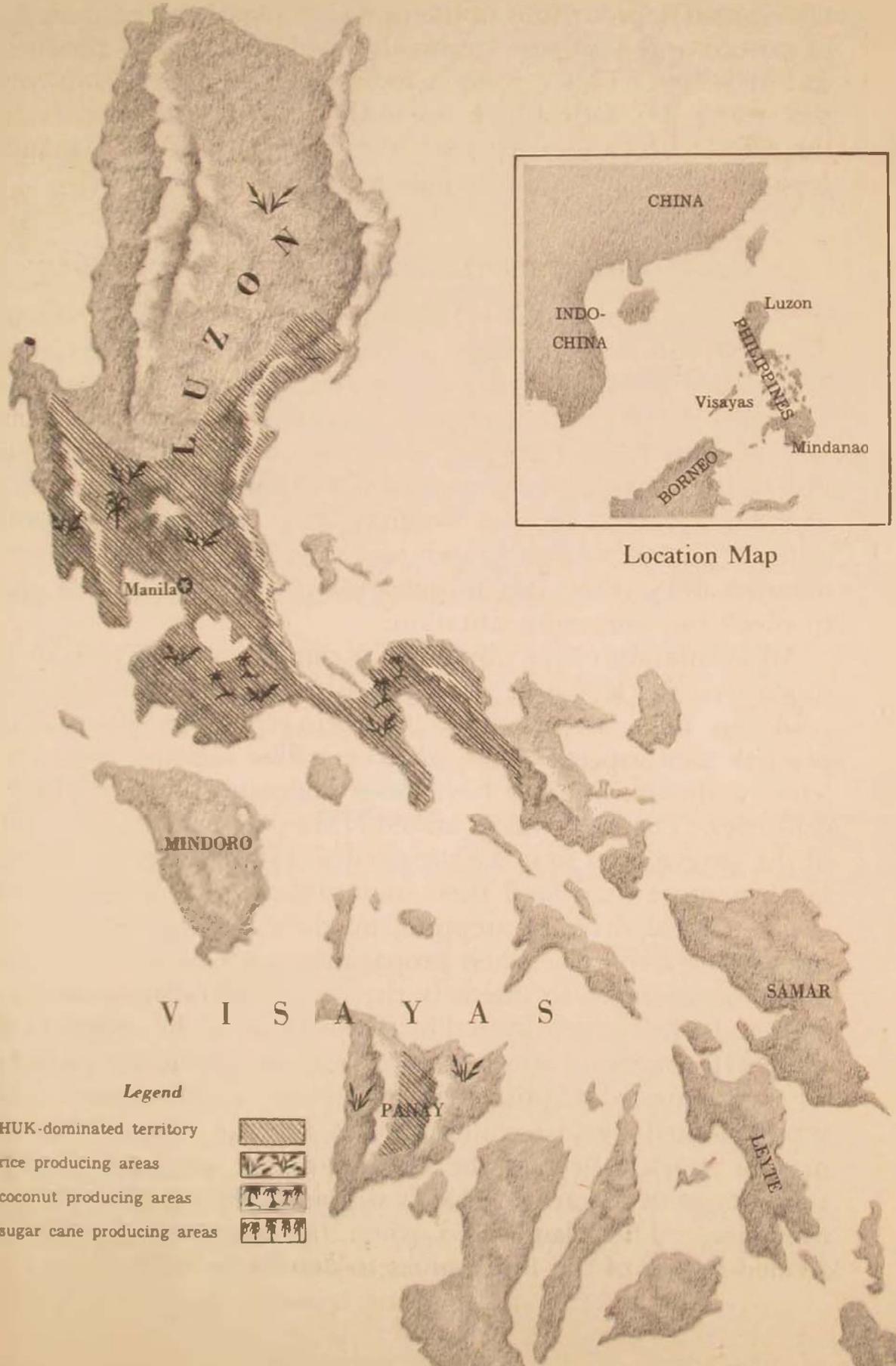
Legend

HUK-dominated territory	
rice producing areas	
coconut producing areas	
sugar cane producing areas	

on farmers to support the military drive. Crops of large estates owned by absentee landlords were harvested by HMB units. The loot from highway robberies was divided equally between the Communist Party Headquarters and the unit involved. Their widespread depredations in the rich rice, sugar, and coconut lands of central and southern Luzon dropped agricultural production to a new low. This worsened the serious economic problems of the young Republic which was only beginning to recover from the effects of two major campaigns of World War II and of Japanese occupation and exploitation.

Early Government Counter-HMB Operations

FROM 1946 to 1948 the HMBs were forced to lay more stress on their military activities as a result of punitive drives conducted by the national police force, the Philippine Constabulary. In spite of this diversion, the Organization and the Education Departments of the CPP actively carried out the political conversion of the masses. The government had considered the campaign and extension of its anti-banditry drive and employed quasimilitary police methods to stamp out the menace. But the undermanned and lightly armed Constabulary soon found itself unable to check the worsening situation.

An evaluation of the government campaign from 1946 to 1950 shows that the Republic overemphasized military operations and paid too little attention to the socio-economic, political, and psychological aspects of the problem. The socio-economic problems of the Philippines have been endemic to the country for centuries. The CPP and its armed HMB capitalized on the failure of the government to make the needed improvements. The Communists more than held their own militarily, and progressed in their political drive by stepping up their propaganda and other proselyting activities. Their propaganda made much of the failure of the government to intensify the amelioration program for the masses. In 1950, emboldened by the successes of the ragged HMBs, the HMB command attacked towns adjacent to the city of Manila. They threatened Manila with a force of 10,000 armed HMBs, supplemented by fifth-column forces in each city district. The plan of attack called for the burning of the city by fifth-column arsonists, with the armed HMBs slipping into the city during the confusion. The plan failed when the government called the Armed Forces of the Philippines to defend the city.

Typical HUK Installation

The HUKs constructed sizable temporary installations in the rugged mountain ranges of Luzon Island prior to the operations conducted by the armed forces of the Philippines in 1950. HUKs excelled in the use of terrain for maximum security. The dense tropical forests provided excellent camouflage. The training area contained school buildings, lecture and drill grounds, and the unit headquarters. Bivouac areas were always located close to water sources. The subsistence plots, or "production bases," were clearings planted with corn and root crops to supplement the normal food supplies obtained through levies on farmers in the plains. The terrain was so rugged that the trails were easily defended by small security posts.

In 1950, at the height of their successes, the HMB force stood at 15,000 armed and 80,000 active HMBs, with a mass-support base of 500,000. In the large areas where the people did not sympathize with the Communist movement, the CPP used intimidation and reprisals to keep them from cooperating with the government. They sought to alienate, divide, and conquer. The nation was in danger of falling into a tragic state of apathy and discord.
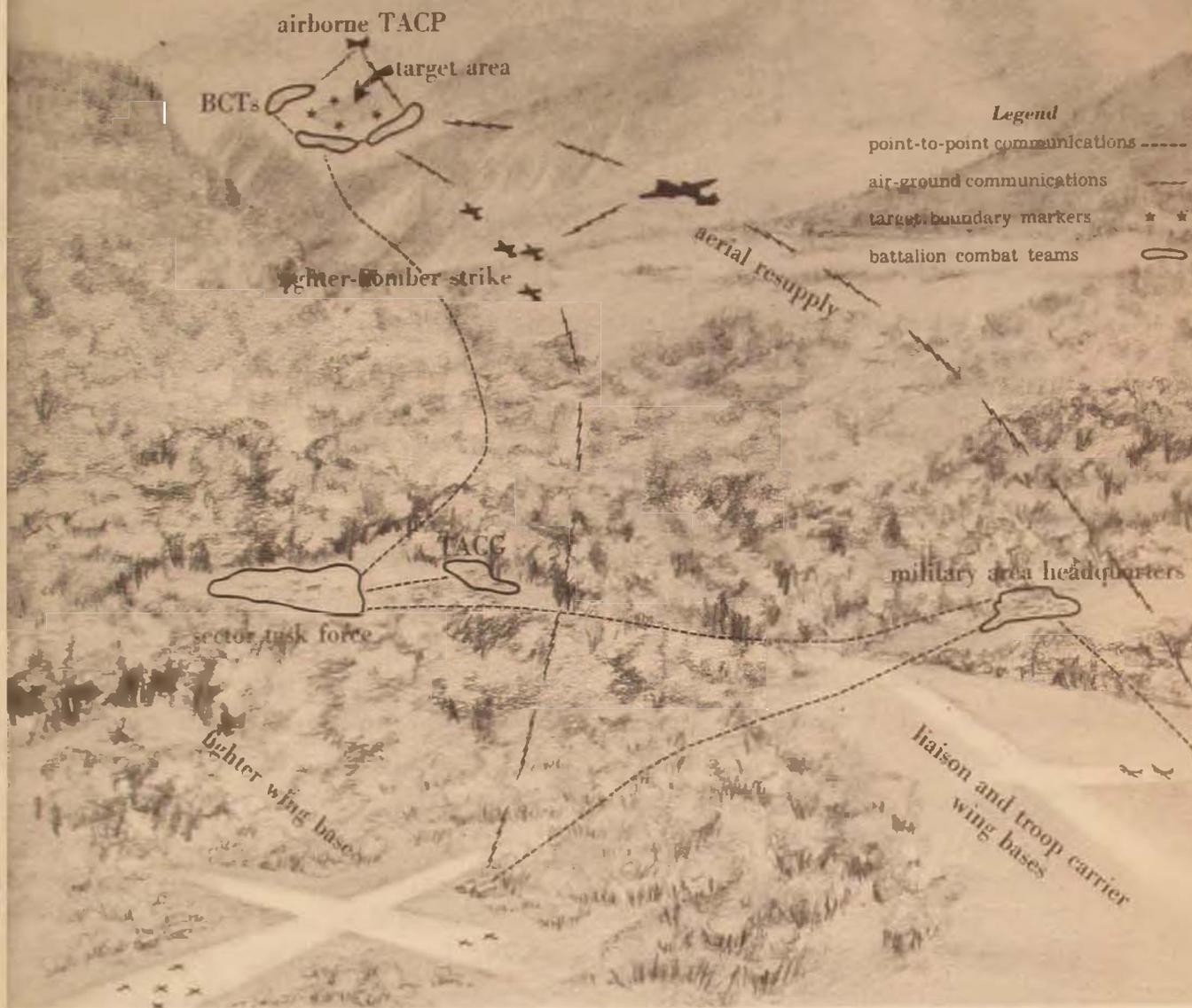
The New Counter-HMB Plan

A LARMED by the deteriorating state of peace and order, the government marshalled its forces and adopted a new campaign plan. The plan welded the socio-economic, political, and military aspects, supplemented by a vigorous psychological warfare program. To counter the CPP propaganda offer of "land for the landless," the government stepped up the drive to resettle farmers from the congested and marginal-producing farm areas of Luzon to the virgin public lands of Mindanao. A long-range industrial and economic program was financed by new issues of government bonds. Health and social welfare activities aided indigent families and victim's of nature's holocausts. Tenants were assured 70 per cent of the harvest. Small-crop loans and a vigorous anti-usury drive helped the tenants finance their farming. A new minimum wage law prescribing minimum wages for the various categories of skilled, semi-skilled, and unskilled labor nullified the effects of CPP propaganda on the labor front. As a guarantee of order and honesty in elections, the armed forces were employed at the polls to safeguard the ballot. Two clean and orderly national elections and the rigorous drive against graft and corruption, spurred by a militant press and aroused civic organizations, gradually restored the people's confidence in the ability of the government to counteract the physical menace posed by Communist insurrection and to offer a positive, legitimate social and economic program to offset Communism's grandiose promises.

The Revised Military Plan

A T the height of the Communist successes in April 1950, the Republic called the armed forces to join the Philippine Constabulary in the military campaign. When the armed forces considered the over-all government plan, they realized that socio-economic and political annexes to the main military plan would be required. Since the public normally looks askance at local military operations by the armed forces, a psychological warfare plan with wider coverage was also approved. Prior to the implementation of these plans, substantial improvements were made in the armed forces. Military areas were organized. A framework for the combined operations of the four major commands (Philippine Army, Philippine Air Force, Philippine Navy, and Philippine Constabulary) was laid out, subject to polishing as the campaign progressed.

Typical Air-Ground Operation against Guerrillas

Legend
point-to-point communications -----
air-ground communications ——
target boundary markers ★ ★
battalion combat teams ⬯

airborne TACP
target area
BCTs
aerial resupply
fighter-bomber strike
TACG
military area headquarters
sector task force
fighter wing bases
liaison and troop carrier wing bases

The organization of the Armed Forces of the Philippines for air-ground operations. Army military areas are divided into sectors, with three or more battalion combat teams (BCTs) in each. Air Force units support any number of military areas in the conduct of simultaneous operations. The tactical air control group (TACG), a mobile Air Force unit similar to the air section of a joint operations center, works with the sector task force headquarters during actual operations. Tactical air control parties (TACPs) work with BCTs and are normally airborne because the rugged terrain makes observation from the ground impossible. Important requirements for this system are simplicity, unit mobility, and excellent communications.

The Philippine Army reorganized its units into battalion combat teams, hard-hitting and well-trained units capable of sustained operations. An airborne battalion, a cavalry squadron, a dog team (K-9), and scout rangers were activated and fielded to supplement ground operations. The old plan of placing small garrisons in threatened areas was abandoned. Military areas were subdivided into sectors with two to three battalion combat teams (BCTs) each. These BCTs, together with Air Force and Navy units, formed task forces to conduct combined operations. Ground forces covered the sectors with fast mobile forces supported by strong reserves. While Air Force armed reconnaissance aircraft scoured the rugged mountains and the plains, the Philippine Navy patrolled the long Philippine shoreline. Dog teams and scout rangers worked together in ferretting out HMB hiding places and in reinforcing scout ranger units. These tactics brought the fighting to the enemy deep in the jungles. The cavalry squadron and airborne troops provided more mobile troops to seal off enemy escape routes or to pursue retreating enemy units. These were special operations supplementing the combined operations which were conducted whenever the enemy was located in sizable force. Military intelligence teams operated in the cities and towns, breaking up Communist cells and destroying the enemy's communications system. Six months after the armed forces took over the operations, the military intelligence service captured the entire CPP Politburo in Manila.

To complement the purely military aspect of the campaign, the armed forces initiated a policy of "attraction and fellowship." This policy embraced several levels of action against individual HUKs, depending on the degree of the individual's complicity. Against those who knew nothing but the language of naked force, a system of rewards was instituted for information leading to their apprehension or death. The rewards ranged from $50 to $75,000. In 1951 the top CPP leader, at the time actively organizing cells in the central Philippine Islands known as the Visayas, was killed by a civilian commando unit. The reward of $50,000 was distributed among the 21 members of this unit. As the system of rewards attracted more cooperation from civilians, including HMBs themselves, suspicion and dissension cropped up among the HMB rank and file. Top HMB leaders, on whose heads high rewards were placed, hardly dared move outside their mountain hide-outs. They surrounded themselves with none but the most loyal bodyguards.

For the HMBs and Communists who understood and accepted

the terms of the attraction drive, the armed forces provided for their return to peaceful society. Several Economic Development Corps (EDCOR) settlements were cleared in virgin public lands by the armed forces engineers. The ex-HMB was given 6 to 8 hectares of land (roughly 15 to 20 acres) initially cleared by the armed forces, a modest hut which he helped build, subsistence allowances and crop loans to tide him through the first harvest, a work animal, and farm implements. The engineers built community centers and cooperative marketing buildings. The community centers featured the traditional Philippine plaza flanked by a chapel. Armed forces medical personnel provided medical care. The plan today envisions the transfer of these settlements to civil agencies for administration when normalcy returns. Recently the armed forces, now able to relax the past intensive campaigns, have turned several hundred officers and men to the task of clearing several thousand acres of swamp land around San Luis, Pampanga, hotbed of Communism and home of Luis Taruc, the HMB leader. The proposed resettlement project in this area is expected to take the steam out of local Communist opposition.

The armed forces psychological warfare plan embraces the dissidents, the general public, and the armed forces itself. The plan provided programs for each of the following:

Primary Target—the dissident group.

1. The hard core—die-hards thoroughly indoctrinated in Communist ideology and irrevocably against democracy as a political society. These understood only the language of force.

2. The soft core—misguided peasants, workers, opportunists, fugitives from justice, and adventurers. These were won over by the policy of "attraction and fellowship." Persons who surrendered were given good treatment and opportunities for a new and better life. They were encouraged to surrender by shows of force and vigorous military action that demonstrated to them the futility of resistance and pitted their professed belief in Communism against the age-old instinct of self-preservation.

Secondary target—the mass base, consisting mostly of peasants, laborers, landlords, business men, students, professionals, and government officials. These elements were continually informed on government activities in the fight against Communism. A systematic propagation of information on established democratic ways and the Communist conspiracy was pushed in all types of media. Support of the mass base was enlisted.

Tertiary target—the armed forces of the Philippines. The program generally presented to the men the reasons for fighting

Communism, relations with the public, and an overview of the world situation. The intensive information and education program rapidly contributed to the rise in prestige of the armed forces.

As a result of the intensive implementation of the revised military plan, the HMB force was reduced to 1500 armed HMBs, about 2500 active followers, and a mass base of about 33,000. HMB Supreme Luis Taruc, relentlessly pursued by the armed forces and quarrelling with CPP brass, surrendered in May 1954. This surrender of the top leader of the HMB does not conclude the campaign against Communism in the Philippines. Various methods of struggle are still available to those who elect to defy the government. But the surrender of Luis Taruc will have far-reaching effects on Communist morale and possibly future tactics.

Lessons from the Philippine Campaign

THE lessons presented here are derived from the personal observations and opinion of the writer and do not necessarily reflect the official views of the armed forces of the Philippines or any other instrumentality of the Philippine Government. In many respects the problems of Communism elsewhere in Asia today bear the same aspects as those of the Philippines. These lessons are therefore presented here with the hope that these may prove worthy of consideration by others interested in similar operations.

In any country with a terrain similar to that of the Philippines, characterized by heavily-forested and rugged mountains, swamps, and jungles, the topography defines sharply the roles of each of the arms and services. A specific example is the role of the tactical air arm in this type of operations. Counter-air operations may not be necessary, but tactical air will be important from the military and psychological warfare aspects. Over areas declared free of friendly forces, armed reconnaissance limits enemy movement, prevents construction of large cantonments, and inflicts casualties on the careless. Interdiction of production bases, bivouacs, and trails important to enemy logistics forces the enemy to scatter his forces and to move frequently. Denied security, rest, food sources, and adequate shelter, the enemy becomes demoralized, succumbs to diseases, and defects or surrenders. In the various phases of the attack and pursuit, aircraft prove valuable in disorganizing the enemy and delaying his retreat so that friendly ground forces can pin them down. In mountainous areas troops air-landed by properly designed helicopters can cut off the enemy retreat. Helicopters are especially effective for air-landing special

troops operating deep into enemy territory and for resupplying these troops in pre-designated areas.

Countries unable to support a large and highly technical air force can support an economical and highly effective aerial campaign by employing lighter conventional fighter-bombers of good dive and climb performance. Where the enemy does not possess considerable antiaircraft firepower, some of the modern high-performance, conventional trainer aircraft designed to be armed with guns, bombs, rockets, and napalm may be more feasible and more suitable firepower platforms. Fire bombs are not very effective against targets in heavily-forested tropical areas because containers break at tree-top levels. The wide dispersion of the jelly and the rank, humid vegetation prevent effective fires. Butterfly bombs sown in a wide pattern are more effective against personnel in these areas. Five-hundred-pound general-purpose bombs uncover natural and artificial camouflage and are lethal within a radius of 200 yards against personnel entrenched in deep ravines and river beds. The blast effect, confined by the sheer walls of these ravines, causes more casualties than the fragments themselves. In rugged terrain, strafing is more effective as a psychological weapon than as a weapon of destruction. Fire bombs and rockets continue to be the most effective weapons against enemy positions in caves.

In combined operations in this type of terrain, the employment of forces must be well coordinated. Indoctrination in the capabilities and limitations of the various forces employed will instill confidence, especially among the supported forces. The enemy is skillful in the use of terrain and knows the area better than the attacking forces, so that operations require careful planning and coordination to maximize surprise, deception, and the principle of the offensive. Bomb lines have to be set as close to the advancing surface forces as possible to enable them to move in on the enemy immediately after air attack has ceased. This poses a difficult problem of identification, in which proper communications are essential. Surface forces maneuvering over difficult and heavily-forested terrain require lightweight, portable, waterproof transceiver sets capable of contacting both support aircraft and adjacent ground sets. Communications are probably the most important single factor bearing on close support problems in this type of operations.

Enemy tactics are elastic. Unless the friendly forces are trained in tactics similar to accepted Communist guerrilla tactics and are provided superior materiel with which to wage operations,

the forces employed against Communists will very likely be bewildered and outmaneuvered by the hodgepodge of tactics and techniques employed against them. The enemy excels at deception. Forces employed against these guerrillas must adapt their tactics to those of the enemy. The employment of garrisons in fixed bases in outlying areas merely fritters away any superiority enjoyed by friendly forces. In accordance with the "elastic disengagement" tactics, Communist guerrillas attack only when they enjoy local superiority, even if it be temporary in nature. Isolated, fixed garrisons will always be subject to attacks by a numerically superior enemy. A more effective employment divides these outlying areas into sectors and subsectors patrolled by hardhitting mobile forces backed by alert reserves and welded into cohesive action by an effective communications net.

More troops are generally needed to combat guerrillas than are normally required for other operations of comparable scope. If friendly areas and areas liberated from Communist control can be organized for their own defense, the battlefield will be localized to a more manageable size. A suitable plan for the organization of these areas must embrace the socio-economic, political, and military aspects of the problem. The psychological warfare program must be immediately applied to these areas. Success of such a unified plan depends on the sincerity of purpose, concreteness of ideas, and the acuity of the appraisal of the situation. It cannot operate in a vacuum, but must be based on actual, demonstrable facts. As trust and confidence are restored, the populace can be organized into para-military forces for the defense of their communities. A good intelligence screening and the effective application of psychological warfare programs can obviate the danger of these forces falling into Communist control. These forces may be under either civil or military control. They are intended as defensive or delaying-action forces and should not be used in strictly military operations. The well-organized community gains the courage to resist and is therefore less apt to cooperate with the enemy. This is the fatal blow to a guerrilla force, which by definition lives on and derives its support from the local populace. Without this support the enemy must withdraw from these areas because his security is compromised and his sources of information and supplies are no longer available.

In the conduct of an all-out campaign against internal defection, military intelligence teams play as important a role as combat forces. While combat forces scour the countryside for the armed enemy, military intelligence teams root out the covert enemy

forces in towns and cities. Special troops like rangers and commandos can go on intelligence forays deep into enemy territory. Both special and military intelligence teams need civilian guides and informers. The British in Malaya and the armed forces of the Philippines have had considerable success in using these civilians. Rewards and security attract a number of erstwhile non-cooperative civilians and lukewarm Communists to provide these services.

Conclusion

THE problems of Southeast Asia are basically socio-economic. World War II brought these problems into sharp focus and the leaders of Asia's voiceless millions believe that the existing political order must be changed if the solution of these problems is to be expedited. Communism, ever-ready to take advantage of nationalistic and political movements, does not offer a solution, but all too often leaders awake too late and find themselves irretrievably enmeshed in the Communist expansion program.

Communists have long recognized the need for the support of the mass of the population. Unfortunately the democracies have stressed the military aspects of the peace-and-order problem. They have tended to ignore the other facets of the dilemma, and by default have allowed the Communists to assimilate the masses into their ranks. The campaign against Communism requires the application of sound socio-economic, political, military, and psychological warfare plans. It requires the wisdom, sincerity, and determination of a well-informed nation. Unaided, no single nation in Asia today can withstand the burrowing campaign of Communism. If the free world abandons the complicated and sometimes strange play of power politics and resists cohesively, Communism can be defeated.

Air Command and Staff School

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Information Services Program

MAJOR GENERAL SORY SMITH

FUNDAMENTAL if little known changes have taken place during the past year in the Air Force's information programs. They involve much more than the appearance of hundreds of newly-painted signs reading "Information Services Officer" at Air Force installations around the globe and the disappearance of signs reading "Public Information Officer" and "Information and Education Officer."

While fundamental, these changes are not drastic. They comprise an adjustment to the current situation within and outside the Air Force that is as logical and necessary as adapting a new armament system to an improved aircraft. The most logical change—from the Office of the Secretary and of the Chief of Staff to the most isolated squadron—is the consolidation of the "I" portion of the I&E Program with the Public Information Program. This raises the internal information function to the proper level on the commander's staff. In the field, the reorganization also brings the historical officer into the new Office of Information Services.

Behind these changes lie many months of careful study by civilian experts and military personnel. The problem that the Secretary of the Air Force and the Chief of Staff asked the experts to help solve might seem relatively simple at first glance. It was essentially this: "How can we make the most effective, economical use of the Air Force's information resources to help Air Force members to be better informed and to meet our other obligations to the American people?"

The question was prompted by the realization that our human relations and communication efforts had not kept pace either with new demands that world events had pressed upon us or with new concepts and techniques that had been developed in the information field. Military air forces had become recognized by the Nation's highest civilian leaders and the Department of Defense as the keystone of our national security. The increased responsibilities placed on the Air Force called for an ever better

understanding of air power by members of the Air Force and the American people. Moreover President Eisenhower and other top Government officials were expressing concern about whether armed forces personnel were being adequately armed with the well-grounded convictions that free men must have to weather a "cold war" of any duration and with the necessary knowledge to withstand Communist ideological assaults.

These factors and others pointed to the need for a reevaluation of the effectiveness of our external and internal information programs. Communication-conscious men in the Air Force had been giving sober thought to the over-all problem even before the Air Force had finally been recognized by the Nation in 1947 as being rightfully a separate service. Key personnel had by this time begun to question the relatively major position that pure publicity had played in the Air Force. The other armed services, as well as private industry, were also beginning to take a hard look at short-range, press-agentry-type relations with the public, and were finding them inadequate. It became apparent to those of us responsible for Air Force information activities that we must recognize in more concrete terms our special responsibility to the Nation, to the community, and to each individual in our organization. The basic responsibility is one of supplying them with the information they need in order to understand our assigned missions, our relation to the other services, our leading role in national air power, our capabilities, our limitations, and our accomplishments.

To the Nation—being a government by the people—we owe this information because we are an instrument of defense which is responsible to the people. Furthermore, our members and employees and their families comprise a not insignificant portion of the American people. Subject to reasonable security limitations, we are as morally bound to supply the people with sound information about ourselves as they are bound to demand it and act upon it. We are responsible to the communities near our bases for promoting among Air Force personnel an understanding of the unique problems that our presence imposes on our "hosts." And we owe the communities the information they need to appreciate the fact that, until international communism puts aside its ambitions, large numbers of military personnel must be integral members of American society.

In short we are obliged for the sake of pulling together toward a common goal of defense to understand their problems and help them understand ours. We must ensure that our personnel under-

stand that they are a part of their nearby community—but marked by a uniform that reminds the community of those things, good or bad, which are associated with the wearer. This situation calls for ceaseless efforts to create and maintain mutual understanding. It calls for efforts to make the Air Force uniform itself a recognized symbol of service, dedicated in effect to defense of the Nation's *communities*. It should be evident that in this age of globe-spanning air capabilities, no American community near an air base can be considered isolated from national defense responsibilities. Not since our Revolutionary War has national defense been of more immediate concern to both the community and the military. It is a mutual problem that brings us together.

To each individual in our organization we owe an understanding of the need for his services to the Nation, and the importance and significance of his individual role in accomplishing the Air Force mission. To meet this responsibility he must be supplied not only with information of the same kind that is made available to citizens outside the service, but information about the heritage and aims of our Nation, the nature of its sworn enemies, and the contributions of the Air Force to National Defense.

Viewed in the light of these conclusions about Air Force information responsibilities, it seemed to us that our current organization needed improvement. We obviously needed an organization that consolidated under one head the external and internal information programs. It would consolidate in one place and in one career field special skills of information services experts. It would reduce duplication and permit the Air Force to inform its various audiences more economically.

Similar consolidations had already been effected in Strategic Air Command, Air Training Command, and Military Air Transport Service. The new organizations had proved remarkably successful in improving the command internal-external information programs.

All three command Information Services Officers had concentrated the greatest amount of their time and energy on developing a more effective information program for airmen and officers. They were well pleased with the results. As one of them put it— probably with over-simplification—"Take care of the internal program, and the rest of the information program will take care of itself."

What he meant was this: a clearer understanding by the general public and the people of nearby communities of the grave responsibility of the Air Force today is a welcome by-product of a successful internal information program. As a rule a well-informed member of the Air Force is not only a better officer or airman and a better citizen, but also a better interpreter of the Air Force to the public.

These three commands recognized the paramount importance of *persons* in the Air Force. They recognized the fact that even though American technology has worked to provide the best aircraft and equipment in the world, the machines are virtually useless without superbly skilled, experienced men to handle them effectively. They recognized the vital importance of high morale and sincerity of effort based on an understanding by each individual of the issues at stake and the great value of his role in the over-all Air Force mission. It is the combination of this kind of men and first-class materiel that can make a defense organization which the Nation can look upon with pride.

With the actual experience of SAC, ATRC, and MATS to draw upon, we began in the spring of 1953 to search for the best methods of implementing an effective information services program throughout the Air Force. We discussed concepts and techniques with civilian and military communication specialists. We sought the opinions of Air Force Information and Education officers, Public Information officers, personnel management professionals, and commanders whose continual concern is the morale of Air Force members.

Since the summer of 1953, staff members of the Office of Information Services, OSAF, have been drawing up detailed plans for putting into practice numerous proved concepts of human relations and communications. The Information Section of the Information and Education Branch, Personnel Services, Directorate of Military Personnel has been transferred to the Office of Information Services. Air Force Headquarters Information Services now includes an Internal Information Division, a Public Information Division, and a Community Relations Division.

Guidance has gone to Information Services Officers in the field through the Air Force Information Services Newsletter and various conferences. Directives to major commands have presented policy guidance and pointed the way to reorganization in the field. In his letter to major commands on 2 November 1953, the Vice Chief of Staff stated that every man and woman in the uniform of the United States Air Force must be thoroughly

familiar with the roles and missions of the Air Force. He stated that he expected each commander to pursue this objective as zealously as he pursues his operational mission. Regulations spelling out other aspects of the Information Services Program will be going out from Air Force Headquarters during the remainder of 1954.

ONE of the most significant changes in the information program is recognition of the commander's responsibility in this vital area. Internal information functions at every level of command are now to be handled by an officer on the personal staff of the commander. In this way the commander can better cope with the sometimes difficult problem of communicating effectively with members of his command on subjects outside the operational field.

More than ever before he will be aided in this by materials produced by the Air Force OIS staff in Washington. Films, Air Force news stories, interpretive and background feature stories for base newspapers, television film reprints, pamphlets, posters, special Commander's Hour materials, and technical assistance will be prepared for the commander's use. A magazine dealing with subjects of Air Force-wide interest and value is in the planning stage. Low-power television stations, like the experimental unit at Limestone Air Force Base, are being programmed for isolated Air Force bases overseas.

The commander now will be in a better position to help his personnel shoot down the Communist ideological sorties directed at the peoples of the free nations. With an effective information program he will be better equipped to cope with the problem of explaining the "reason why" of many potential causes of low morale: isolation, discomfort, inaction, and lack of understanding of the unit mission, the Air Force mission, and national objectives. Moreover, as he works to build an effective operational unit for the defense of the Nation, the commander has within his grasp the means for achieving job satisfaction, strong motivation, team spirit, and high morale.

The primary mission of us all is to help keep our Air Force a superior fighting force—superior in the quality of weapons, equipment, and trained men. The Air Force must continue to carry efficiently its tremendous responsibility of being the Service charged with maintaining general air supremacy. Such an or-

ganization will not engage in blatant publicity. Its activities are founded in strength and logic, both of which provide a source of information to be reported fully and accurately to the people of our democracy.

To provide the people inside and outside the Air Force ready access to information is the prime task of the Air Force Office of Information Services, and of the Information Officers at our installations throughout the world. Truth, like water, seeks its own level; and we mean to give it the chance.

Headquarters, United States Air Force

Human Engineering
or Human Error

Lieutenant Colonel George E. Long

L AST December four F-84's were making a standard instrument approach to Dobbins Air Force Base near Atlanta, Georgia. Suddenly, without any indication that anything was wrong, all four crashed into the ground, scattering wreckage and bodies for half a mile. Said *Time* magazine:

> The three planes had obviously followed their leader in. But there was no explanation of what led Hodge, a World War II and Korea veteran (104 missions, three Jap planes) with 1,000 hours' time in Thunderjets, to fly into the ground. The planes were on a gentle descent when they plowed across the scrub oak and piney woods. Instrument-approach procedure called for them at that point to be at 11,000 feet. Instead, they were at 1,100—which is ground level, 25 miles northeast of Atlanta.*

No indication at the time nor anything uncovered in the official investigation offered final proof of the cause of that accident.

Of course we can glibly say, "another case of pilot error," with the same feeling of release from responsibility that goes with saying "It was fate!" But is it true, as we imply by the finality with which we regard this classification of "pilot error," that humans, being fallible creatures, are going to make errors and nothing can be done about it?

An examination of human capabilities as opposed to the design of some of the equipment in those F-84's may lead to a somewhat different conclusion. Certain human engineering research studies conducted several years ago indicate that the conventional three-pointer altimeter installed in those F-84's is easily misread. In these studies even experienced pilots misread this instrument by 1000 or 10,000 feet (too high) 10 per cent of the time. Though they may provide explanations for accidents such as this, these facts by themselves tell only half of the story. Only when they are considered along with additional data obtained at the same time do they become truly significant. Another altimeter which

* *Time,* LXII, No. 24 (December 14, 1953), 27, 28.

presented altitude information to the pilot in a different manner was studied at the same time. The changes in the conventional altimeter consisted only of substituting a revolving counter for two pointers, but it reduced reading errors from 1 in 10 to less than 1 in 100.

Conventional Altimeter   Redesigned Altimeter
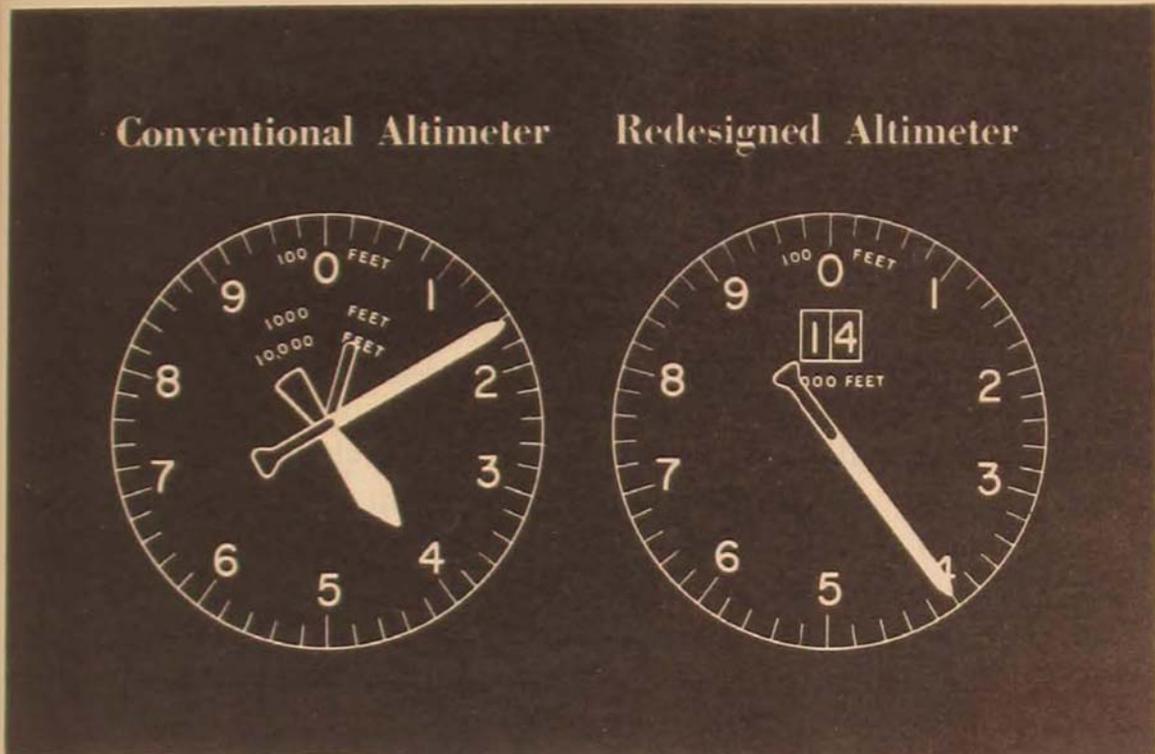
Why do I emphasize the significance of the relationship between these sets of finding? Because it illustrates my essential point. That is: the design of the equipment—how you present information to the pilot or the specific control action that you make him perform—determines the quality of the pilot's performance.

The human being, like the machine, has very definite capabilities and limitations—characteristics which are subject to investigation *and to specification.* Equipment can be designed in accordance with these operator characteristics, so that when an operator uses, maintains, or monitors that equipment he does it with a maximum of efficiency and a minimum of errors. There is little one can do to redesign the man to fit the machine.

An engineer would never undertake the design and development of some new component in an existing machine system without first determining the pertinent characteristics of the whole system in which that component was to work. At the outset he would study the nature of the inputs to be fed to that component and of the associated components which were to receive its output.

We have seldom given such consideration to the human elements in the system even though they often are more important than other elements. We often speak of man as the limiting element in our systems, but we design our equipment as if he had no limitations, as if nothing were impossible for him.

Why has not more attention been given to designing equipment to fit human capabilities? I think there are two main reasons. In the first place, we have not appreciated the significance of human behavior characteristics for equipment design and their effect on the manner in which the job is performed. We tend to think that an instrument is an instrument. A control is a control. But more important, most of us don't really believe that it is possible to pin down these human characteristics closely enough to design equipment that will take them into account. On the one hand we all think that since we are humans being human we instinctively understand humans, and hence our common sense will suffice. On the other hand we insist that human behavior is so complicated it is impossible to understand it, much less to measure it.

Both of these assumptions have been rather conclusively disproved by human engineering research studies made over the past several years by the military services, by universities, and by industry. Though evidence is still somewhat sparse because effort in this field has been limited, these investigations clearly indicate that there are characteristics of human behavior that are important in equipment design problems, that these can be specified, and that when they are taken into account the errors made by the operator decrease and the efficiency of the man-machine system increases significantly.

We are also becoming very much aware that modern weapons of war can no longer depend on common sense to provide the answers to these problems. We must have expert scientific information about human behavior and we must apply it to the design of these complex machines if men are to operate them.

But why should modern equipment require so much more attention to human operator requirements than was necessary in the past? Because it is more complicated? What is there about this so-called increased complexity that makes the man's job so much more difficult? Take the job of the pilot of one of our modern

jet interceptors. Essentially he still has the same controls and does the same things to them to control his aircraft. He must take off, get to his target, destroy it, and get home. And essentially he needs the same basic information. But the operating conditions imposed by modern aircraft developments—the high speeds, all-weather operations, and extreme altitudes—have reached a point where the pilot can no longer obtain with his own senses the information he needs. Some artificial means which extends his sensing capacity must obtain this information and transmit it to him. When the pilot of an F-51 looked through his canopy at an ME-109 he absorbed in a very short time a terrific amount of information—the position of the enemy aircraft, its direction of flight, its relative altitude, and a rather clear conception of its speed relative to his own. All this information came to him in an integrated picture of the situation. It immediately told him (within limits) what action he should take.

The pilot of the F-51 did not get an indication of the absolute speed of the ME-109, compare that with his own speed, and then compute the necessary maneuver. He did not need to. He could perceive directly the relationship between the speeds of the two aircraft. To put it another way, he saw directly how fast he was overtaking or losing the ME-109. This was the type of information he had to have to decide on his next move. Nor did he determine the rate of climb of the ME-109 and compare that with his own to decide whether he was outclimbing his enemy or not. His or his enemy's absolute rate of turn never entered into his understanding of the necessity to increase or decrease his bank. These aspects were perceived directly just as we perceive such relationships in our daily activities.

The pilot of a jet aircraft can no longer receive all this information directly from his senses. We have had to devise machines to help him. But in attempting to extract the essential information from the external situation and present it symbolically to the pilot, we have destroyed the integration of these various elements. Their relationship is no longer immediately apparent. The pilot must now take all these bits and pieces of information from a variety of instruments, the number of which increases as operational conditions impose new requirements for symbolically presented information. Then he must somehow determine the relationship between these bits and pieces and integrate them into a total picture. Only then can he decide on his course of action. Add to this the shortening in time caused by increased speeds, and you really have complicated his task.

If the human pilot is to continue to perform effectively, the designer must develop equipment that presents information to the pilot in a form that makes the relational aspects apparent or that even performs part of the integrating task for the pilot. This will require not only engineering knowledge but facts about human behavior. It also requires a close working relationship between the design engineer and the human engineer, since most decisions on design will compromise ideal design from the human operator's standpoint with engineering considerations that the performance requires of the system.

W HILE it would be impossible as well as meaningless for my purposes here to attempt a survey of human behavior characteristics or human engineering principles, it may be helpful to note examples of the type of considerations about human behavior which are pertinent to modern equipment design problems.

One of the trends in modern weapons system development is of special concern to human engineers at the moment. That trend is to make our systems as automatic as possible, but still retain the human as a monitor and as an alternate system in case of failure of the automatic components. One of the activities at which human beings are especially inept is monitoring automatic equipment. Moreover the man gets worse as the equipment he monitors gets better. When nothing goes wrong and he has nothing to do, he gets restless and bored; his attention wanders; he may even go to sleep. Efficiency requires attention. Attention requires activity. When the human is employed merely as an error-detecting device, he operates very efficiently as long as the errors occur at a rather frequent rate (of course it goes without saying that there is a maximum rate). Below an optimum rate, which varies according to the specific task, the probability of his detecting errors begins to decrease, until at very low rates he's quite likely not to detect them at all.

Research on the air defense system has studied the activities where the operator detects airborne targets on a radarscope. When targets appear at a rate of about 40 an hour his efficiency is at a maximum—about 90 per cent probability of detection. As the number of targets decreases there is a gradual decrease in performance until at about 10 per hour the probability of detection has dropped to only 50 per cent.
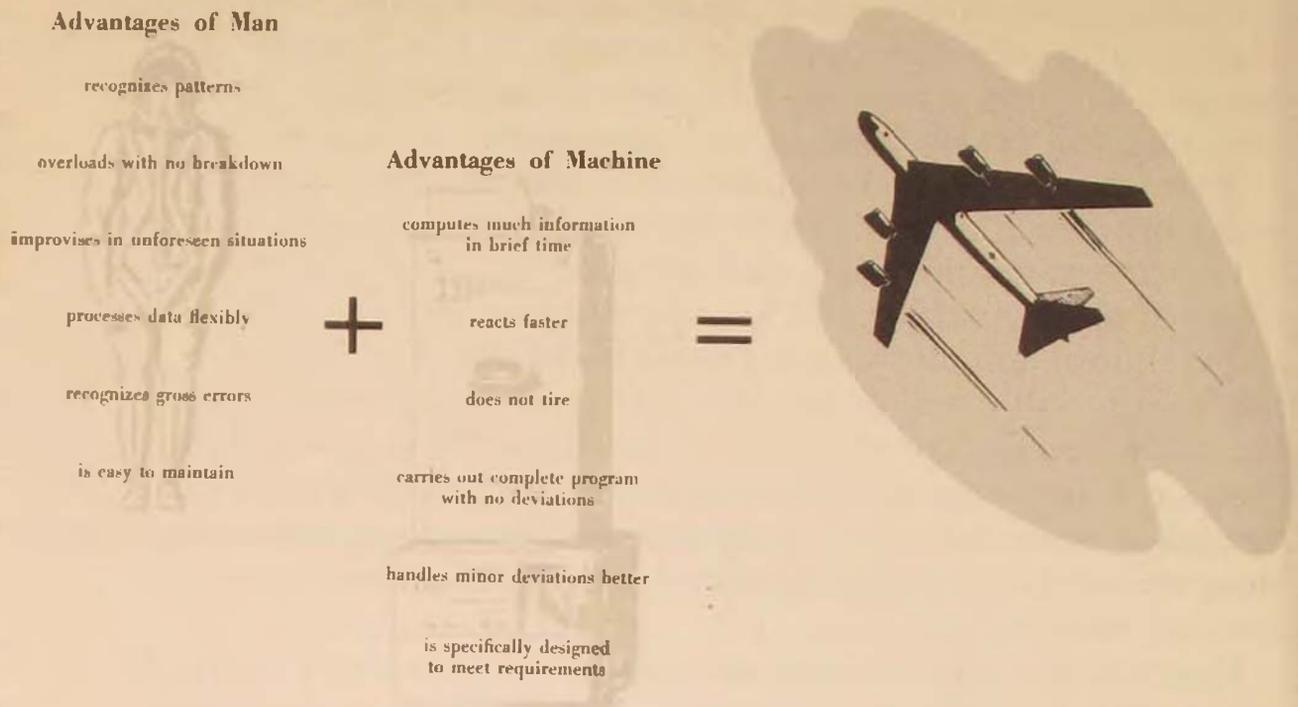
The operator who not only has to detect an error or malfunction but also has to take over the operation of the equipment in an emergency must know all the details of the situation at the time of the emergency, plus a certain amount of past history. This becomes extremely important in view of the extremely limited time that will be available in such operations. It may be better to have the man actually operate the machine with automatic safeguards which prevent him from making serious errors.

In some cases this may not be possible. The performance required of the machine may be such that human capabilities—reaction time or accuracy—are not equal to the task. If this is so, then the human will certainly not be suitable as an alternate system. He might be considered as a mere emergency device whose only function is to return the plane to its base if the automatic equipment fails. If so we should recognize the fact and save the weight and expense of the equipment which would allow him to perform as an alternate system.

Many of us who have studied human behavior in relation to engineering problems are convinced that the human has certain abilities that no machine can duplicate or will duplicate in the foreseeable future. These make him a desirable *operating* component in most systems. (I say this even at the risk of being accused of spreading propaganda for the benefit of the pilot's protective league.) We believe that better performance will be obtained from the weapons system if these human abilities are exploited—even if this entails a compromise on some aspects of performance.

What are some of these abilities, and why are they pertinent here? One, perhaps the most important, is the ability of the human to bring to any situation a vast amount of generalized background information pertinent to that situation. This enables the human to choose the proper course of action, even when he has only part of the necessary information on that particular situation. A machine, on the other hand, can solve problems only to the extent that the designer anticipates the combination of information inputs which require a given solution. The machine must be designed to take account of all variables that affect solutions to that problem. He must be sure that the variables necessary to a given solution will be available to the machine in each situation and in a form that the machine can receive and identify. In a great many operational situations these requirements cannot be met. Too often we just don't know what information will lead to a given decision. Any field commander knows that you cannot

Man's Best + Best Machines = Best System

Advantages of Man

recognizes patterns

overloads with no breakdown

improvises in unforeseen situations

processes data flexibly

recognizes gross errors

is easy to maintain

Advantages of Machine

computes much information
in brief time

reacts faster

does not tire

carries out complete program
with no deviations

handles minor deviations better

is specifically designed
to meet requirements

+

=

lay down a strict set of rules that can be depended upon to provide the answers in an operational situation. Anyone who has tried to teach tactics is aware that the best one can do is give examples of as many possible situations as one can and point out the proper solutions and why they are considered so. It is the interrelationship between many variables that is important, and too often these cannot be specified. Does any reader feel that he can specify the particular features of all the situations in which an interceptor pilot has to decide whether to press or abandon an attack upon an enemy plane? Even if they could be specified, their number in an operational situation is so great that the weight and size of the machine required to handle them would prohibit its use. Or at least its performance would have to justify its weight and size disadvantage over what you already have in a 200-pound man.

The human also has another kind of flexibility not possible in machines. He can consider and try many solutions to a given problem, sometimes completely novel solutions. The machine is limited to those built into it. The man can operate on the basis of incomplete information, and he can change his course of action as he proceeds. Machines have not and are not likely to be built with this degree of flexibility.

Closely related is another ability of human beings which no

machine yet devised can even approach. This is the ability to perceive patterns or form—to identify individual objects from various angles and conditions of illumination. Here again we are dealing with the direct perception of the relationship between parts. A human being can recognize a friend immediately under a variety of conditions. He can do this even when he sees the friend from different angles, under different degrees and colors of illumination, camouflaged with all types of clothes, and with or without hair. Two objects which to any machine yet devised will appear identical will be recognized by the human as different. We don't even know how to describe these relationships, much less design a machine that will detect them.

It seems to me that these characteristics, as well as many others that one might name, offer advantages that warrant considerable effort in designing equipment that will improve this effectiveness.

IF we do this, we must attach the same importance to the characteristics of the human component as we do to other elements of our systems. Also we must start considering him and his characteristics at the same time we begin to design the machine. Afterthought is too late and too costly.

Design planning should start by considering the various functions in the proposed system, weighing human abilities against engineering know-how and machine capabilities to perform each function. Where it seems best for humans to perform certain functions, the design features of the equipment they are to operate must be carefully planned to allow for human capabilities and limitations. For example one must take into account the peculiarities of the various sense modalities before deciding how best to present information. This is not merely a matter of sharing the work load between the eyes and the ears. The advantages of sharing are quite dubious. It is a matter of determining what sense is most efficient at receiving a certain type of information. There are very real differences. Information about rates, relative motion, position, or direction can be received and interpreted visually much more efficiently than through other sense modalities. On the other hand the human auditory mechanism is peculiarly adaptable to receiving other information. The ear can make discriminations about the minute structure of the signal coming to it. The eye cannot do this. Therefore such variations in radar signals as are caused by the turning of the propeller on a

bomber can be detected by the ear, as can the variation in signal from two targets whose relative speeds are only very slightly different. This means that for detecting such targets the ear is much more efficient than the eye.

But deciding on the sense modality is still only part of the job. The manner in which that information is presented to the particular sense is equally important. For example, recent studies on displays for fire-control systems have shown that merely reversing the movement relationships of the elements within the display decreased training time by better than 50 per cent and increased the final level of performance. The original display was similar to the conventional altitude gyro. The moving element represents the horizon, with a downward movement indicating a climb and vice versa. When the display was redesigned, the moving bar was made to represent the operator's airplane. Additional changes in the display finally reduced the training time to approximately 1/10 of the original time and increased the final level of proficiency by about 50 per cent.

Improvements of this order suggest that we have ignored the man while improving the machine.

Only by fully considering the requirements of the human operator—his limitations as well as his capabilities—can we achieve the best balance in our weapons system. This does not mean that we should completely compromise performance for ease of operation by the human being. Far from it. Each decision will no doubt represent a compromise. Any compromise should be based upon consideration of all of the elements in the system. The final design should represent the man-machine system that best insures the greatest number of successful missions.

Headquarters, Air Research and Development Command

Air War in Korea: XII

THE FIGHTER-BOMBER IN KOREA

Colonel Charles G. Teschner

OUR country's most recent large-scale geography lesson began on 25 June 1950. Millions of American citizens who had hitherto recognized Korea as only a name came to learn varying amounts of facts about this small country, old in history of war and subjugation. Many whose fortune was to travel and camp in Korea at government expense learned much of that peninsula's climate, topography, and customs. Others learned of Korea through letters sent home by those in the first category. These sources of information probably ranged from vivid and exaggerated word pictures to brief weather reports. News media brought Korea closer to the vast majority the ominous events that might ultimately cause them intolerable discomforts. Of all the Americans involved in the Korean War, the fighter-bomber pilot received the most comprehensive lesson of all. In addition to all that the others learned, he became well acquainted with the coastline, lakes, rivers, railroads, roads, and mountain trails.

The Korean War also generated much controversy ranging from international to individual in scope. For example, representatives of the United Nations Command and the Communists argue every time they can agree to get together. President Syngman Rhee is at odds with other representatives of the United Nations over the resumption of fighting to unite North and South Korea. National groups are quarrelling with each other about policies that either have been followed or should have been followed. Military leaders have presented controversial views on the use and misuse of forces. Individuals have argued heatedly over the ingredients and methods used in the preparation of kimchi. All of these debates stem from our participation in the Korean War.

In the field of controversy, the subject of the fighter-bomber ranks high. This is true for four primary reasons: First, all services—Army, Navy, Air Force, and Marines—participated in the use and control of fighter-bombers. Second, the fighter-bomber was the principal weapon used, at least during the last half of the Korean War, in carrying the war to the Communists. Third, considering the planning, requesting, communicating, directing, and actual flying of sorties, more personnel were involved in the use of the fighter-bomber than of any other weapon in Korea with the possible exception of the service rifle. Finally, since the Korean War was not fought to victory, evaluation of the fighter-bomber effort is impossible. Any logical approach can be supported by rationalization as well as can any other opinion.

There were nearly five complete turnovers of fighter-bomber pilots during the Korean War. This, coupled with the fact that there were five distinct phases in the Korean fighting, meant that fighter-bomber tours were by no means standardized. Some pilots flew entire tours of interdiction and armed reconnaissance without a single front-line coordinated strike. Others flew tours during the early retreat-and-advance phases, while nearly half flew

their tours after the main line of resistance stabilized in its present position. Changes in command policy and experimentation in new tactics tended to further break down the standardization of tours. Consequently veterans of Korea have widely divergent outlooks on joint air-ground operations. It is with this in mind that I am presenting a résumé of fighter-bomber operations in Korea.

Immediately prior to the outbreak of armed hostilities in Korea, fighter-bomber units in the Far East theater were assigned the mission of providing strategic air defense for Japan, the Ryukyu Islands and, within existing capabilities, the Mariana, Volcano, and Bonin Islands. In addition, air defense required U.S. bases and installations in the Philippine Islands, subject to the limitations imposed by agreements between the United States and the Republic of the Philippines. It was not the responsibility of the Commander, FEAF, to prepare an air defense for Korea or for the possible joint air-ground operations with ground units in Korea.

Two fighter-bomber groups were based in Japan and one group was stationed in the Philippines. All three groups were equipped with the F-80C aircraft. Conversion from propeller-driven F-51's to jet aircraft had posed many problems. One of the most serious problems was that of wing brackets for attaching auxiliary fuel tanks and ordnance. So much difficulty had been experienced that a substantial percentage of F-80C aircraft could not carry either wing-tip tanks or bombs when the Korean War began. Other deficiencies which adversely affected transition to jets were shortages of oxygen masks and helmets for pilots and auxiliary ground power and fuel servicing units for the aircraft. USAF budget ceilings had cut the training program. Cross-country flights had been curtailed and most of the navigational flights had been between well-known bases which had adequate radio aids along the route. This training served little purpose when pilots went into combat where navigational aids were scarce. When dead reckoning navigation suddenly became necessary, few pilots were prepared. Rocket training was all but halted due to the economy program levied on the services. Some practice had been done with a sub-caliber aerial rocket but none with five-inch high-velocity aerial rockets (HVAR's), which were later used in combat.

Since FEAF's mission had been one of defense, unit tactical training had mainly consisted of interception missions and exercises. There had been intermittent joint training maneuvers with the Eighth Army, but these were canned problems conducted over well-known areas. They offered little in the way of combat conditioning for either air or ground elements.

Phase One
Retreat to Pusan: 25 June—25 September 1950

At the outbreak of hostilities, fighter-bomber squadrons were deployed away from their home bases on training exercises or joint maneuvers. Most of the pilots, having recently survived an officer reduction-in-force, were experienced, stable, and seriously aggressive. They were just getting comfortably used to their new airplanes when orders came to proceed with aircraft to bases in southern Japan. All available fighter-bombers converged on the Fukuoka area where Fifth Air Force established an advance headquarters and a joint operations center at Itazuke Air Base.

The public view of the Korean air war was largely of exploits of sharpshooting fighter-interceptors patrolling MIG Alley or the valiant little helicopter whirling down behind enemy lines to pick up a downed airman. But important as these other phases of the air war continued to be, by far the largest number of sorties and the most important air effort in terms of effect upon the enemy was that of the fighter-bombers. It was a grueling type of fighting—zooming and twisting among the mountains and valleys, roaring down at jet speeds on small elusive targets, all in a red-hot maze of antiaircraft fire. Colonel Charles G. Teschner, Chief, Combat Operations Division, Hq FEAF, and formerly Assistant Director of Operations, Fifth Air Force, outlines the main trends in the fighter-bomber war in Korea.

The first fighter-bomber missions were dispatched on 28 June 1950, just three days after the war began. These missions were in support of a hard-pressed UNC Army which was retreating toward southeastern Korea. They were mainly armed reconnaissance missions aimed at blasting moving columns of enemy equipment, supplies, and personnel.

Even though bases of operations were as close as possible to Korea, the F-80C's could remain in the target area only a few minutes. If FEAF aircraft were to have adequate endurance for Korean operations, their range must be extended or they must be based in South Korea. Range was extended by adding two cells to the standard wing-tip tanks, but the additional weight resulted in numerous wing failures.

The two best Korean airfields, Kimpo and Suwon, were lost in the early ground actions, but K-2 at Taegu and K-3 at Pohang became usable as advance bases with the addition of pierced steel planking..

At this time, consideration was given to replacing the F-80C's with F-51's. F-51's were better suited for operations from rough Korean fields, even though the F-80 had proved to be a rugged aircraft; the F-51's had more endurance at low altitudes while on armed reconnaissance and close-support missions; F-51's used less fuel. For these reasons and because F-51's and spare parts were available from Air National Guard units, the change was made.

By mid-July a joint operations center (JOC) and tactical air control center (TACC) were established at Taegu after a short stay at Taejon. Tactical air direction centers (TADCs) were not used because of a shortage of equipment and the lack of enemy air opposition. Eighteen tactical air command posts (TACPs) did yeoman service controlling strikes against the advancing enemy. A little later, airborne air controllers were put into service and did a wonderful job helping fighter-bombers find the most lucrative targets. At best all communication channels were overloaded, and the only control many missions had was the information given pilots at briefings.

In August when the Communists' advanced positions penetrated to within the K-2 traffic pattern, the ground situation was so grave that the aircraft and supporting units were withdrawn to Japan. This increased the operational problems of the fighter-bombers, but they continued to hammer away in support of the retreating ground forces until the Pusan perimeter defense line was established.

Phase Two
Advance to the Yalu: 26 September—25 November 1950

As the United Nations ground forces regrouped and were resupplied at Pusan, the North Korean forces, with their long supply lines under attack by the fighter-bombers, grew weaker. The break-out from the Pusan perimeter combined with the amphibious landing at Inchon set off the fast UNC advance to the Yalu. Here, as in the first phase, the targets for fighter-bombers were plentiful—interdiction targets to slow down the enemy and personnel and equipment targets to demoralize and defeat the enemy. Interdiction succeeded so well in knocking out roads that the advance of friendly forces was slowed down.

To continue the pursuit into North Korea, it was again necessary to move the air units to Korean airfields. Living conditions were austere in every sense of the word, but morale was high because victory seemed more

The sturdy F-51 was recalled to combat service in the early days of the Korean War because the fluctuating battlelines and variety of targets called for a dependable, versatile aircraft that could spend more time over the target than could the F-80. Mixed loads of armament were the order of the day. In this picture an F-51 awaits take-off armed with two napalm tanks and four of the deadly 5-inch rockets.

certain as each day passed. Resourcefulness, ingenuity, and long hours of hard work kept operations going until targets all but ceased to exist between the friendly forces south of the Yalu and the Manchurian sanctuary to the north.

Phase Three
Second Retreat: 26 November 1950—5 January 1951

On 24 November 1950, the Eighth Army launched an all-out attack. On 26 November hordes of Chinese counterattacked furiously on most of the western front. The fighter-bombers devoted almost their entire effort to close support of the hard-pressed United Nations ground troops. In support of the 3rd Marine and 7th Infantry Divisions evacuating their positions in the Chosen Reservoir area and along the east coast, the fighter-bombers flew 736 combat sorties from 28 November to 20 December 1950. Armed reconnaissance and interdiction missions were flown to a lesser degree to harass the enemy and slow down his forward movement. As a result of the interdiction and close support, friendly ground troops were able to stabilize their front lines in early January 1951.

Forward airfields in the Pyongyang and Wonsan areas were lost in this withdrawal, as were K-13 at Suwon and K-14 at Kimpo. Aircraft were shifted

with the changing tide, and flexibility was demonstrated by the continued intensity in ground-support air attacks. Most FEAF squadrons were re-equipped with F-80C's in November, and the jet proved to be a good ground-support airplane. FEAF fighter-bomber forces were also increased in late November by a SAC fighter-escort wing which immediately gave an excellent account of itself in a tactical air role.

Aircraft control and communications had gradually improved in the first six months even under what would normally constitute adverse conditions. An adequate variety of VHF frequencies had been provided. Early confusion generated by overcrowding the limited number of channels was greatly diminished.

In the first six months of the Korean War the fighter-bomber pilot had received a variety of experience in a short time. He had been suddenly removed from peacetime training, had entered combat with little preparation, had changed aircraft without transition, and had flown continuous combat support from marginal facilities.

Phase Four
Main Line of Resistance is Stabilized: 6 January–25 June 1951

As the Communists' supply lines lengthened again, fighter-bomber attacks against them permitted friendly ground forces to hold along a poorly defined line south of the 38th parallel. Fighter-bomber units were assigned armed-reconnaissance areas in which they maintained constant daytime reconnaissance flights. Pilots became thoroughly familiar with their assigned areas and called in additional aircraft when targets developed. In this manner they were able to stop the Communists' supply effort during daylight hours.

By March the UNC forces were ready again to advance toward the north and the requirement for close-support sorties increased. In connection with this advance the fighter-bombers interdicted an area near Munsan prior to an airdrop of a regimental combat team on 28 March 1951. The drop was accomplished with little or no opposition. Though not as rapid as the push to the Yalu the past November, the current advance plodded on successfully until it was stopped to await an armistice agreement—a wait that lasted over two years.

Phase Five
Air Pressure for Peace: 26 June 1951–27 July 1953

FOR this entire period there were no significant changes in the main line of resistance. Ground action by both sides consisted of probing patrols and limited-objective attacks. On several occasions intelligence indicated that the Communists were preparing for a break-through, but they were never able to launch another major attack. The UNC forces never attempted such an effort. But the stagnant ground situation did not diminish the fighter-bomber effort. On the contrary fighter-bomber strength continued to be built up and the highest sustained sortie rate of the war was flown in the closing months.

Increase in the effectiveness of the fighter-bombers was a constant goal throughout the war, but it could be given more direct attention now that the movement of the enemy was not dictating operations. In addition to an

increase in the number of fighter-bombers, older types of aircraft were being phased out. It was not until the last six months of the war that the last F-51's and F-80's were replaced with the fighter-bomber version of the F-86.

Theater combat-readiness training was given a high priority that was not previously possible. New pilots were given from thirty to forty hours of closely supervised training before being declared combat ready. This was a heavy drain on the flying time available to units. At times as much as a third of the flying time was devoted to training—an impressive figure considering that most logistic support had to be supplied from the ZI. Justification for this expensive training was found in the reduction of combat losses and the increased bombing accuracy of the pilots. Training missions were never flown at the expense of combat requirements. Operational commitments were always met first, and training was all but stopped during brief periods of heavy commitments.

Improvements in control and communications facilities contributed to the increase in effective use of fighter-bombers. The stabilized front, which permitted the semi-permanent installation of a complete tactical control net, also increased the requirement for such a net. Targets such as trucks, tanks, and troops in the open became so rare and fleeting that when a target of this nature was spotted by reconnaissance or ground observers, fast and dependable communications were essential to assist aircraft in finding the target. This was true regardless of whether the combat aircraft were on air or runway alert. Fixes from tactical air direction centers to aircraft not under control of forward air controllers or tactical air coordinators became increasingly important to prevent strikes on friendly positions. Such service was also an additional aid to navigation and permitted location of targets under marginal weather conditions. When weather positively prevented visual bombing, the tactical air direction posts directed strikes while the fighter-bombers flew in close four-ship formation on instruments. This gave an all-weather strike capability, but since the resulting bomb patterns were not concentrated enough for pinpoint targets, this method of fighter-bombing was not used extensively.

When the ground campaign had become somewhat stabilized, the F-80's began to replace the F-51 as the backbone of Fifth Air Force fighter-bomber effort in Korea. The aircraft were faced with a big job on a heavy schedule. Turn-around time was low. Here a ground crew swarms over an F-80, preparing it for another mission and attaching to the wings its massive load of four 1000-pound general-purpose bombs.

All pilots who flew in this last phase of the war will remember the increasing number of restrictions and restrictive procedures that were placed on pilots as a result of incidents which involved the inadvertent bombing of friendly positions. These incidents were few and the number steadily decreased. But since they had more news value than other current Korean events, they received undue publicity in the national news periodicals. Aside from the fact that these incidents were extremely regrettable and all that was humanly possible was done to prevent their happening, the pressure brought on by each occurrence usually resulted in a new restriction or restrictive procedure that made the fighter-bomber's job more exacting and difficult.

Restrictions also resulted from a concerted effort to reduce combat losses. It was readily apparent that, with the slowing tempo of the war, there were few if any targets that were worth the loss of a plane and pilot. Studies showed that the greatest amount of aircraft damage had been sustained at altitudes below three thousand feet and on the second and third passes at targets. Consequently attacks were limited to one pass per aircraft with a minimum recovery altitude of three thousand feet on most targets. As a result, accuracy suffered, but combat losses were substantially reduced.

The final operation of the fighter-bombers was a postholing of all North Korean airfields. As the curtain fell, 352,023 sorties had been flown by

The last two years of the war in Korea saw a considerable change in equipment of Fifth Air Force. F-84's (left) replaced the F-80 as the backbone of the fighter-bomber force. Six months before the end of the war the last F-51's and F-80's had been replaced by a fighter-bomber version of the famous F-86 (below).

The main job of the fighter-bomber in Korea was the never-ending battle to choke off enemy supplies moving to the front. Interdiction curtailed the Communist supplies to such an extent that they could not launch a major offensive, but it was never a complete or final success because the hordes of enemy manpower were filling bomb craters as soon as the smoke died away. The picture above is a striking example of the ebb and flow in the interdiction struggle. The marshalling yards at Kowan were on the main line from Hamhung on the east coast to Pyongyang. They were a vital switching point for supplies headed for the front. Hundreds of bomb craters, some of them very recent, testify to the many heavy air strikes which had repeatedly shattered not only the tracks but the very roadbed. Yet in this photograph the tracks are once more intact, and trains are again getting through.

Far East Air Forces and Fifth Air Force-controlled fighter-bombers. While I have discussed the operations of fighter-bombers in retrospect without mention of fighter-interceptors, or light or medium bombers, it was impossible to plan and initiate operations without integrating the efforts of all air weapons.

THROUGHOUT the Korean War, though no startling new departures were made from the concepts and tactics used in Europe in World War II, many man hours of thought and effort were spent in improving and adapting the accepted concepts and tactics to the Korean situation. Problems that were specific products of the war, but of less magnitude than winning the war,

were resolved. In the process many people received valuable experience in the mechanics of problem solution under wartime conditions. Political limitations, the lack of an aim to fight to a victory, and the failure to use our most effective weapons conspired to make the entire war artificial. Consequently many of the problems, their solutions, and the experience gained are somewhat adulterated. Great care must be used in evaluating what should and what should not be reflected in future planning.

Let us consider, for example, the fighter-bomber interdiction program. Within the political limitations, various tactics were used with unevaluated success. That the Communists were hurt was evidenced by their prompt and vigorous reactions which in turn required innovations in our program. When our fighter-bombers forced the Communists off the roads during daylight hours, they started moving supplies at night. The B-26 effort was then used to supplement the interdiction program at night. The B-26's homed in on convoys by the truck headlights. The Communists then instituted an elaborate warning system which warned the trucks to turn out their lights when aircraft approached.

When we concentrated on the Communist rail and road nets, they stockpiled repair materials and prepositioned repair crews along the entire length of their main supply routes to counteract the effectiveness of our bombing, and impressed thousands of A-frame carriers into service to move delayed supplies. This chain of actions and reactions went on week after week. Regardless of the amount and the effectiveness of effort, one hundred per cent interdiction is impossible.

If a twenty-four inch tree is cut to within three inches of its diameter, it is almost certain to fall immediately. A four-inch tree cut to within three inches of its diameter will stand indefinitely. It is just as invalid to say that interdiction failed in Korea, as it is to say any tree with three inches of its diameter remaining will not fall.

If the experience gained from the Korean War, individually and collectively, is properly evaluated and applied, the efforts expended will have been well worthwhile in light of the resultant increase in our military strength.

Headquarters, Far East Air Forces

AIR TRAFFIC CONTROL IN THE FAR EAST

LIEUTENANT COLONEL CHARLES V. BURNS

AIR traffic control in the Far East Command area is unique in that the entire system is operated and controlled by a military agency. West from Midway, Wake, and Johnston Islands and north from the Philippines to the shores of Asia the majority of the air traffic control service is provided by Airways and Air Communications Service (AACS) under direction of military commanders. This area is the focal point for the airways serving the free world in the Pacific. Japan itself is now the terminus for airways from Asia, Australia, and the United States.

Rapid and orderly flow of air traffic is dependent upon adequate communications and timely coordination between all participating agencies. But the enormity of the control task did not become apparent until the outbreak of hostilities in Korea, when large numbers of tactical and support missions were superimposed on an increase in commercial and contract carrier traffic.

At the start of the Korean War in July 1950 only one unnumbered air route existed in Japan from Tokyo to Fukuoka and one route from Fukuoka to Kimpo. All flying was controlled from the military air transport controls (MATCONs) at Fukuoka and Tokyo through reports from aircraft control and warning (AC&W) sites subsequently relayed to the centers. With the outbreak of war, traffic suddenly tripled and at times quadrupled. Before the war Tokyo Control averaged approximately 3000 flights per month under instrument flight rules (IFR). Immediately after hostilities began, traffic handled by Tokyo Control jumped to an average of 9000 flights per month and has remained at that figure ever since. If flights under visual flight rules (VFR) are included, the total traffic compares to that of any major terminal area in the United States.

A similar situation developed in the Fukuoka area, where fighter, fighter-bomber, combat cargo, and administrative aircraft were all operating from air fields within an area of approximately 20 miles. It immediately became evident that the current air traffic control system could not cope with the additional traffic.

The addition of tactical traffic was the largest difficulty, subordinating the companion problems of terrain, communication, personnel, and navigational aids. Combat aircraft on armed missions could not be interfered with; combat cargo aircraft, as well as regular administrative and normal commercial traffic, also must be kept moving.

Having once decided that tactical aircraft were to be given priority in clearances within control areas, FEAF ordered each operational unit to develop tactical standing operating procedures outlining arrival and departure procedures. When a mission was taking off or returning, MATCON would clear the necessary airspace for the tactical traffic. In theory, and for a few units, this might have been satisfactory. But the individual standing operating procedures for a particular area were not coordinated into the operating procedures and traffic flow pattern for that area. A secondary problem developed when all tactical units (i.e., fighters, interceptors, bombers, and combat cargo) all demanded first priority on the tactical priority for airspace.

Other problems quickly highlighted the lack of over-all coordination. Tactical control centers sometimes issued control instruction to aircraft in control areas with no prior coordination with MATCON to insure adequate separation from other traffic. Air defense and tactical control agencies were demanding a constant flow of information on normal traffic and furnishing very little information on tactical flights to MATCON. All agencies seemingly overlooked the basic fact that tactical aircraft (both offensive and defensive) and normal air traffic operate in the same airspace. The systems for control are so interdependent that they cannot operate efficiently without the closest coordination.

The interim solution to these problems was the semipermanent allocation of numerous altitude blocks. This reduced the amount of traffic which could be handled in any given period. Also normal altitude separation was

reduced to 500 feet during periods of military necessity. Since the necessity existed nearly all of the time, these separation standards became the rule rather than the exception.

An extensive air traffic control survey revealed that the MATCON centers at Fukuoka and Tokyo contrasted sharply in effectiveness and that both were below desirable standards. Under certain circumstances Fukuoka Control was so unsystematic that it was virtually ineffective. A further complication was that many people thought of the center primarily as a means of handling communications messages for air defense control centers and various base operations offices. Considerable confusion was evident in the relation between control of normal air traffic and tactical operations. The personnel from the center, AC&W units, air defense control centers (ADCCs) and tactical air control centers (TACCs), as well as those from the operational groups, did not agree on the actual procedures for control of tactical traffic within the control area.

In addition to the armed tactical missions, combat cargo operations also required special procedures between Japan and Korea. Here again the expedient solution was the use of blocked altitudes. But the principles of employing reserved airspaces were not generally understood. Delays were numerous although these blocked altitudes were not in continuous use.

While the organization of the center at Tokyo was somewhat better than that at Fukuoka, the same problems were in evidence on a smaller scale. Here and in the towers throughout Japan, standard ANC Air Traffic Control Procedures were not being fully utilized. Lack of supervision and basic coordination had caused laxity in conformance to standing operating procedures.

The most outstanding fact pointed up by this survey was the lack of a common meeting ground on which mutual problems could be discussed and requirements could be determined.
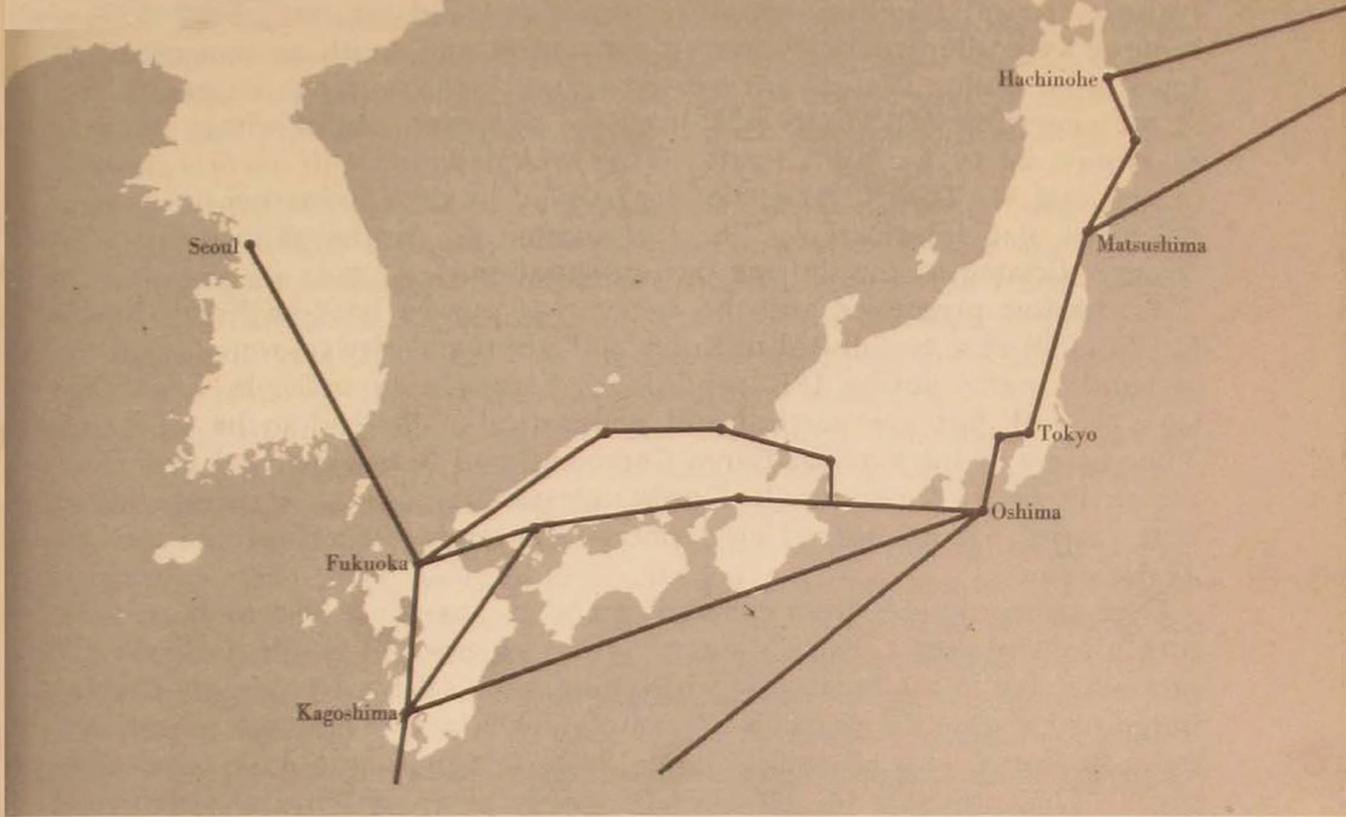
It was also obvious that available navigational aids and communication facilities were inadequate to accommodate the increased load. While plans were immediately made to increase the number of facilities, it was some time before the physical results of this planning became evident. One of the complicating factors was that in mountainous Japan the available radio ranges were also unreliable and could be used only as homing facilities. This problem still exists. Consequently the entire airways system in Japan and Korea is based upon nondirectional radio facilities.

FEAF Traffic Survey

As a direct result of the air traffic control survey, the FEAF Air Traffic Control Committee was organized in February 1951. This high-level committee was to solve the problem of adequate, authoritative coordination of procedures for all units operating in Japan and Korea. Requirements and priorities were decided upon and integrated into the over-all FEAF mission. The apparent conflict between agencies such as MATCON, AC&W, fighter operations, and transport operations were examined and resolved. Simultaneously area air traffic control committees were established with functions similar to those of the FEAF Air Traffic Control Committee, but their decisions and recommendations were subject to final FEAF approval.

Airways System in Japan
1949

Seoul, Hachinohe, Matsushima, Tokyo, Oshima, Fukuoka, Kagoshima

1952

Chitose, Misawa, Matsushima, Niigata, Daigo, Tokyo, Oshima, Seoul, Taejon, Taegu, Pohang-dong, Mineyama, Miho, Komaki, Pusan, Fukuoka, Kushimoto
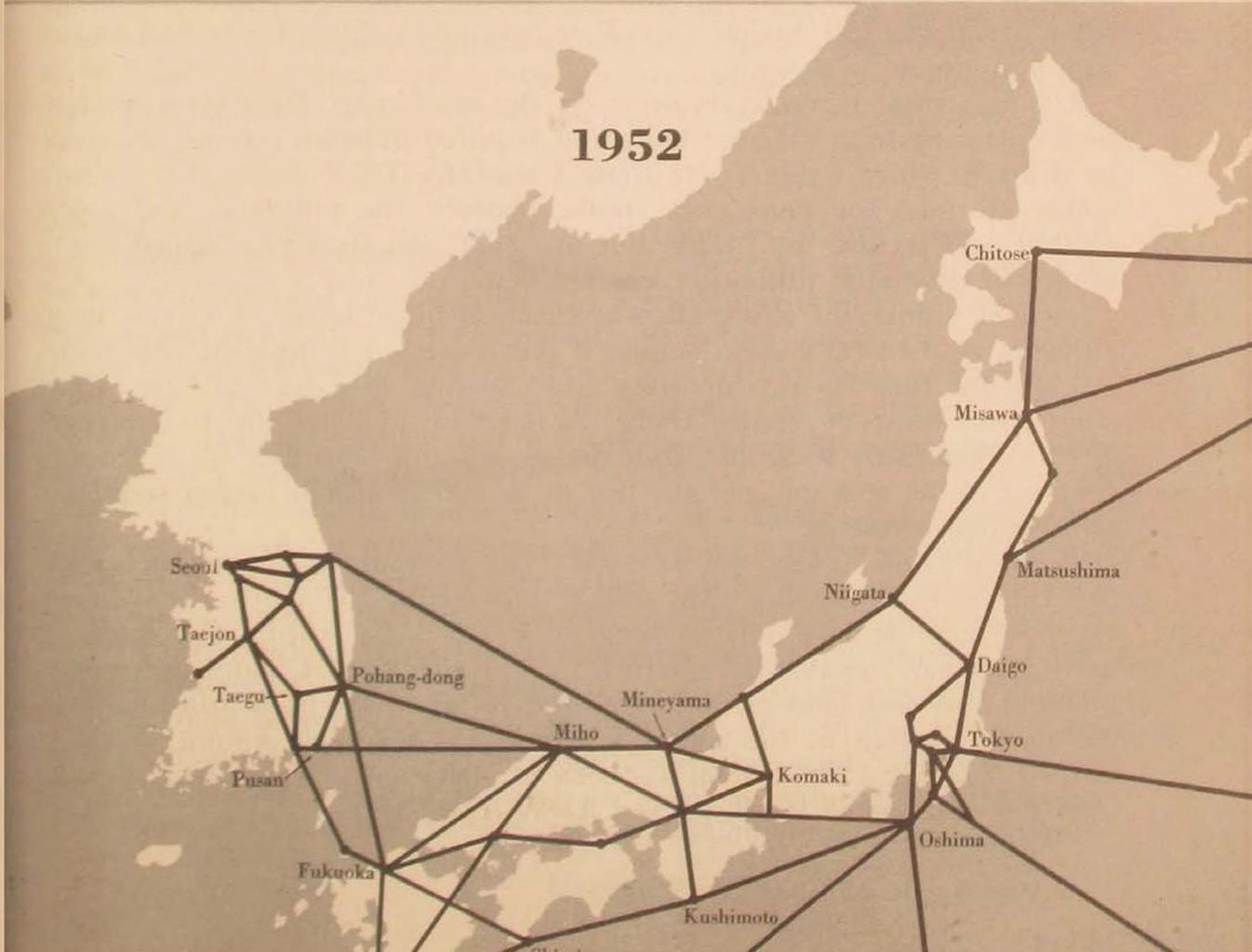
These committees brought together all of the agencies in one area. Mutual problems were discussed and each agency made aware of the effects of its actions upon the others. From the recommendations of these committees, realistic tactical standing operating procedures and air traffic control procedures were adopted to ensure air separation and quick movement of all types of air traffic. Tactical aircraft were given first priority in clearances and at the same time MATCON was given the necessary control within its areas to ensure safety for all aircraft. The workload on both tactical control centers and MATCON was materially reduced by the elimination of unessential flight plan information. The area committees continued to recommend changes dictated by the shifting tactical situation.

As the war progressed and the enemy was pushed back to North Korea, MATCONS were established in Korea and additional airways were designated to handle traffic during IFR conditions. Formerly all traffic in Korea had been tactical, but now tactical and non-tactical traffic had to be separated. The mission of the Combat Cargo Command had been expanded to include the airlift of R&R personnel. Except for specific missions, these operations were carried out on normal air traffic clearances in the manner of a scheduled air line.

Here again agencies were demanding the exclusive use of certain altitudes within control areas. Tactical aircraft from all bases in South Korea had to proceed north to the bomb line with a minimum of interference, yet Combat Cargo had a schedule to make. A top of 12,000 feet was put on control altitudes in Korea with all traffic above 12,000 feet operating on tactical flight plans. This provided for jet aircraft, except when arriving and departing their home fields. Separation for the lower-flying B-26's was the major problem. The tactical aircraft had to proceed from bases in South Korea below the 12,000 feet tactical altitude to operate in North Korea and return with a minimum of delay.

The first solution was again arbitrary altitude blocks. Since these aircraft were operating from different bases and required different crossing altitudes on different airways there were times when MATCON had as few as two usable altitudes for non-tactical traffic between the minimum and route altitude and tactical top. Reduction in separation standards helped somewhat, but maximum utilization was not being obtained.

A slight refinement was made when tactical units agreed to release their altitudes to MATCON upon request if they were not being used. But there was still the time lag in requesting and releasing altitudes. As long as the main operation of the tactical traffic was north of the bomb line this arrangement worked fairly well. But with the cessation of hostilities, all traffic was confined to the area south of the line of demarkation and further coordination became necessary.

So the previous system was reversed. The air route traffic control center (ARTC) used all altitudes until receipt of a tactical flight plan. It reserved the necessary airspace only as long as it was being used. The result—a moving airspace reservation in which tactical aircraft had complete freedom inbound and outbound to the target and yet air route traffic control could use those portions of the routes where it was definitely known that the airspace was free. This system has been in operation in Korea since shortly after the cessation of hostilities and has operated very well.

Remaining Problems

Such an arrangement is dependent upon adequate communications, well-trained controller personnel, and the education of all concerned on the importance of coordination between ARTC and the tactical agencies. The lack of either coordination or communication is reason enough to reserve altitudes and provide other safety factors which inevitably reduce the flow of traffic.

Second only to adequate coordination is the problem of well-trained controller personnel. Because this area is the only one in which the military has complete air traffic control responsibility, and because the USAF has no source of qualified air traffic control personnel, the training problem has been constant and difficult. The practice of assigning inexperienced air traffic controllers to this theater has not proven satisfactory. The normal tour (especially in Korea) is so short that controllers are rotated to the ZI at the very time when they have reached peak efficiency. Untrained assignees require the time of qualified controllers to supervise their training. The training requirement placed upon the 1808th AACS Wing required an outstanding effort barely to keep pace with the attrition of normal rotation. Incidentally there is a great deal of difference in the training and job of an ATC controller and an AC&W or tactical air direction post controller, although the Air Force classification system makes no differentiation.

A more satisfactory solution to the Air Traffic Controller problem would be to train personnel within the ZI so that when assigned to an overseas theater they would require only area familiarization. This training might very well be done under the superivision of the CAA and include on-the-job training in towers and centers in the ZI. The advantages of having controllers qualified at the beginning of their tour, and of producing a more effective air traffic control system should outweigh any additional cost. This is especially true in view of the USAF-wide shortage of air traffic controllers.

The Future

Looking to the future developments in air traffic control, radar for terminal area control will become increasingly important. The terminal area is at the moment the most crucial point. As aircraft speeds increase, more and more aircraft will arrive in the terminal area before the aircraft which are present can be let down. Once saturation reaches the point where aircraft must be held en route, the system begins to break down. Where radar has assisted terminal area control within FEAF, separation standards have been safely reduced and traffic expedited.

Present policies and economic considerations militate against providing separate, expensive radar facilities for AC&W and air traffic control agencies. If this is not possible, serious consideration should be given to combining the facilities and activities of these two agencies, even though technical problems may preclude this action at the moment. As the speed of aircraft increases, the time for identification of each radar blip decreases. If normal air traffic could be controlled from the center which identifies (or declares hostile) each radar blip, tactical operations would be greatly improved. The time consumed in cross-telling information would be reduced, and the radar information could more effectively reduce separation and expedite all traffic.

Headquarters, Far East Air Forces

THE AIR TERMINAL GROUP

Colonel Robert B. Nowell

THE air terminal group, also known as an aerial port squadron, is Troop Carrier's newest baby. It was born, tested, seasoned, and proved during the Korean conflict. Troop Carrier operations of the future will include air terminals as an integral part of the airlift system. This will be particularly true in combat conditions when vast amounts of air-landed logistics support are needed. It is then that the terminal reaches its maximum efficiency.

The functions of the air terminal group are not new within the USAF. Many of them existed for years within the MATS traffic-handling system. From this organization came many ideas, doctrines, techniques, and people in the formulation of Troop Carrier's air terminals.

The airlift situation in the Far East in the fall of 1950 showed the need for one organization to handle terminal activities. A number of cargo aircraft were physically present in the theater and under the command of the airlift commander. But previous airlift doctrine and training had been for air drop only. Korea was destined to rely on air-landed supply and re-supply; air drop would remain in a filler role.

The enormous daily demand for supply and re-supply found the airheads available, the aircrews qualified, and the cargo aircraft available for loading or off-loading. While not enough to do the job, they represented a sizable airlift potential. But the key to success was missing. That key was a mobile, semi-tactical Air Force unit, composed of USAF personnel qualified to process and document the airlift traffic; to load the aircraft with passengers, cargo, and mail; to effect the proper weight and balance of the load in the plane; to receive and off-load the traffic at its destination airfield; to contact consignees and advise them that their air freight had arrived; to ensure the uninterrupted flow of vital war materials at all originating and terminating airfields.

When the Korean War began, the only units-in-being charged with these functions were the Army's aerial port units—again in anticipation that most supply would be by air drop. Interim measures had to bridge the shift to air landing by air drop. A temporary Air Force organization was formed and manned by personnel on temporary duty from major air components in the Far East. Air terminal detachments were established at every air-head serviced by the airlift. Air Force and Army personnel worked side by side. The supplies got to their destination but the system was justified only by the emergency that made it necessary.

By December of 1950 the proponents of an integral USAF air terminal organization had seen their plans and concepts adopted. Their stand had been that maximum effectiveness and efficiency in air-landed re-supply could be realized only by reducing ground time for traffic handling to a minimum. The airplane and crew must not sit idle waiting for loading or off-loading. The air carrier system must produce fast turn-arounds. Reduction in traffic ground time also reduces the possibility of saturating airfields with cargo aircraft, again increasing the air-landed re-supply potential. These ground tasks must fall to a unit under the command of the Theater Air Transport Commander because he must be able to control his aircraft turn-around times.

The New System

In February 1951 an air terminal group was officially activated with subordinate detachments within Japan and Korea. Ground handling equipment was requisitioned but in many cases had to be borrowed from the Army. By 31 March 1951 all Army personnel and equipment had been phased out and full operational control of all air terminal detachments in the Far East was vested in an Air Force unit with one exception. The Army retained primary responsibility for preparing, loading, and lashing supplies when air-drop was to be the method of delivery.

So much for the historical aspects. Just what did this air terminal achieve?

1. From March 1951 to the peace talk preliminaries (July 1951), average turn-around times were reduced each successive month. As to the scope of the operation being undertaken, in June 1951 over one hundred million pounds of cargo, passengers, and mail were loaded or off-loaded by thirteen terminal detachments.

2. On twenty-four hours' advance notice new detachments were activated, manned, equipped, and moved into new airheads. Within forty-eight hours, they were fully operational.

3. This mobility which must be inherent in an air terminal organization meant that detachments could move quickly into and out of fields quite close to the front lines. At times ammunition so off-loaded was fired within a few hours.

4. Unit move control teams were included in the air terminal concept. These teams functioned when the airlift of a service unit was planned and a terminal detachment was not established at the origin of the lift. In such cases the team would visit the unit and controllers and central liaison between the unit being moved and the aircraft involved.

A Day With an Air Terminal Group

To get a closer look at these activities, let's briefly review a typical day's operation within a terminal group. A ground handling activity for air-landed traffic previously approved for airlift, the terminal group does not issue traffic priorities nor does it have authority to approve traffic for lift. It has no aircraft under its operational control. A higher-level coordinating agency, normally known as Traffic Movement Control (TMC) and located in the headquarters of the airlift command, schedules the daily lift and coordinates it with the troop carrier groups, shippers, and consignees.

A daily operations order is transmitted by ground-to-ground radio nets from TMC direct to each detachment. An information copy is sent to terminal group headquarters so that detachment workloads can be monitored. Upon receipt of this order, the detachment prepares and documents cargo or mail that is physically present. Passengers, cargo, and mail not physically present are called forward in accordance with scheduled aircraft departures.

Continually during the day direct liaison is maintained between the detachments and TMC on matters of traffic movement such as:

1. Need for additional aircraft to complete a project.
2. Reports of backlog traffic.
3. Reports on out-of-commission aircraft.
4. Cancellation of projects and aircraft no longer needed.

This liaison furnishes TMC with information pertinent to the next day's operations order. Some cancellations of scheduled lift are possible by limited diversion authority within each detachment. Judicious use of this procedure makes for economy in cargo aircraft sorties. Scheduled aircraft are diverted between detachments to decrease the number of planes returning to home station without pay loads.

Land-line "load messages" between detachments communicate information on incoming loads and space available. This is adequate unless many airlift fields are located close together. Then the plane often beats the load message. But detachments can utilize what is known as a "space control radio" for air-to-ground load data. This air-to-ground contact is sort of a "company frequency." Advance notice of from fifteen to thirty minutes is satisfactory.

The movement of cargo and mail runs fairly smoothly unless weather or other factors interrupt the programmed flow of aircraft. Passenger traffic is another thing entirely. Even in a combat theater a certain degree of passenger protocol must be maintained. Quite a bit of additional effort, time, and personnel must be directed into passenger handling. Physical facilities normally preclude passenger service of the MATS or commercial type, but it is a rare passenger who does not expect it. Particularly in a foreign country, passenger traffic also carries the problem of revenue, in which government-to-government accountability is only one of many ramifications.

Terminal Group Requirements

Up to this point nothing has been said about the numbers of people or the amount of handling equipment required at the terminal end of a big airlift. These two are closely allied; the more and better equipment on hand, the less is the manpower requirement. The development of more efficient materials-handling equipment offers a wide-open opportunity. There never seems to be enough equipment nor the type of equipment best suited to the particular airplane waiting to be loaded. As long as so many types of cargo aircraft are used, the need for manpower will remain high. In a foreign country, indigenous labor must be purchased or pressed into service to function under far lesser numbers of USAF supervisory personnel.

But back to materials-handling equipment. The amount and type needed to support a major air-landed airlift effort depends again on the type of cargo aircraft being utilized as well as the volume and proportions of the cargo. What was adequate for the high-tonnage days of the 1950 and 1951 Korean action later proved a faulty gauge as the situation became static. During the early days, most of the cargo load was made up of POL, rations, and ammunition. These could be manhandled both in the freight yard and on and off any type airplane. Vehicles were the prime necessity to get the stuff to and from the plane. In later days these "easy" loads were few and far between. Repair parts, reparables, jet engines, and other sensitive equipment comprised an increasing percentage of the total load. The right piece of materials handling equipment could spell success or failure in completing a load. Improvisations were made then and will have to be in the future. New loading techniques were experimented with. A traffic man has never lived dangerously until he has seen his airmen passing a canned jet engine from one fork lift to another as a "test" attempt to get it in a C-46. If he has experienced that and seen them drop it on a cement ramp, he will face a

courtmartial rather than undergo the "test" again. A high-lift truck would have simplified this procedure—had a high-lift truck been available.

Then as well as now the airplane that could be loaded and off-loaded the quickest and easiest was one designed for the mission it was performing—the C-119. With this plane or any with a truck-bed-height floor, less handling equipment need be on hand. The C-124 presents no great loading or off-loading problem if it is equipped with its winching cable. The problem with this plane is not the vehicle itself but rather its lifting capability. Once shippers are aware of the tonnage the C-124 can handle and the size and proportions of its interior, they clamor for airlift priority for enormous items. The C-54, C-46, and C-47 are excellent for passengers and small-volume, standard-size cargo. For non-standard types of cargo, they present ground safety hazards unless special types of handling equipment are available.

Where handling equipment is at a premium, it should be controlled from a central point, such as air terminal group headquarters. Equipment, as well as people, must be available for quick shifting when the airlift pattern changes or demands for new detachments present themselves.

Demands for the services of the terminal are so large that they cannot all be accommodated. Criteria are needed to help determine the priority on terminal services:

1. Number of transport sorties required daily into a particular airfield.
2. Number of allied or U.N. units serviced by the lift into that field.
3. Effect on the transport fleet if no terminal detachment is present.

Headquarters, United States Air Force

AIR FORCE RESEARCH AND DEVELOPMENT IN ALASKA

Colonel Andrew E. Krieger, Jr.

AMERICANS have learned how to fight in all areas of the globe. Whether the scene of action is desert or mountain, tropical jungle or arctic island, the magnificent arms and equipment supplied them have functioned well almost any place. But World War II did underline two deficiencies which might sometime become critical—materiel failure and human inefficiency when equipment and men were exposed to extreme cold.

Since nations had rarely chosen the inhospitable Arctic and sub-arctic for war theaters, they had never given the same intensive study to the problems of cold-weather operations as they had to those in other climates. A sudden and drastic alteration of international strategy had been brought on by the airplane and its ability to ignore the surface over which it flew. Wars were no longer bound to patterns determined by the shapes of oceans and the routes of land traffic. Wars became truly global, and a straight line at last was truly the shortest distance between two points. If that line passed over the Pole, then the airplane could theoretically fly that route quite as easily as any other. As it turned out, this grand concept was held up by minor nuisances, one of which was mechanical failure in cold weather.

Aircraft specifications have long included a requirement for operation at -65°F., but this amounted to a paperwork nod in the direction of the problem, for no production aircraft *would* work at such extreme temperatures. Manufacturers ignored the specification for a variety of reasons: a dearth of any knowledge about the causes of failures, the expense of complying with the requirement, and the extreme unlikelihood that the product would ever be tested in such temperature conditions. General Arnold had actually foreseen the difficulty even before World War II, and in 1939 had established a cold weather experimental station at Ladd Field, Fairbanks, Alaska. Ever since then, Ladd has served as our principal cold weather research and development agency. Today this work is continued by the Cold Weather Materiel Testing Squadron and the Arctic Aeromedical Laboratory. The former concerns itself with the testing and improving of aircraft and equipment, the latter with the effect of cold and the arctic environment generally upon man.

The 5064th Cold Weather Materiel Testing Squadron

The mission of this unit, as defined by AFR 24-3, is:

a. To monitor all arctic tests of aircraft, materiel, and equipment used or proposed for use by the Air Force which are conducted in Alaska and adjacent areas.

b. To furnish test facilities, administrative services, and test support aircraft and equipment to test units from Air Force commands conducting tests in the Alaskan area.

The testing commands referred to are, of course, the Air Research and Development Command and the Air Proving Ground Command. The bulk of activity is represented by the test projects of the commands mentioned. Occasionally the Air Force, and the Army and Navy as well, conduct special test projects in Alaska which are outside the planned annual program, and in these cases the CWT Squadron participates as well by furnishing support.

Planning for a winter's testing starts in the preceding spring. At an annual Cold Weather Conference held alternately by APGC and ARDC, each command presents its tentative program; obvious faults are eliminated, items are added to or deleted from the lists, and foreseeable difficulties are discussed. The program is then submitted to Hq USAF for approval.

The summer and fall are taken up with logistic planning and the movement of supplies to Ladd Air Force Base, in order to be ready for the October arrival of project officers and their crews from Eglin or Wright-Patterson.

Really cold weather does not appear before November, but experience has shown the advisability of having everything and everybody in place well in advance—personnel settled down in barracks, arctic gear issued, the aircraft inspected, handling equipment winterized, and in general everything prepared for testing by the time the polar front moves down from the Arctic Ocean.

Climatology charts show the mean minimum daily temperatures to be anticipated in Fairbanks:

November	-10°
December	-20°
January	-25°
February	-20°
March	-10°

During this period, extreme temperatures may dip into the minus 60's, and extended periods may be expected in December, January, and February when the mercury never rises above -40°F. Fairbanks is not the coldest spot on the North American continent; Fort Yukon for example has reported temperatures below -70°F. But Fairbanks is undoubtedly the coldest place which is easily supportable logistically, being served by rail and highway as well as by air. In this respect the Soviet Union has an advantage, if it may be termed that, for in its immense arctic land mass it has many places which record both lower means and lower extremes than occur anywhere in our hemisphere.

Both developmental testing and proof testing are conducted at Ladd Air Force Base. The Air Research and Development Command, as its name implies, is concerned with a period earlier in the life of a new item of equipment than concerns the Air Proving Ground Command. ARDC's

In recent years, as the threat to world peace has more clearly defined its source and its nature, the defenses of the United States have crept steadily north. The importance of the mission of these forces has served to emphasize a problem which previously had received only sporadic attention: we must greatly improve the efficiency of our equipment and men operating under the unique difficulties of extremely cold weather. Colonel Andrew E. Krieger, Jr., Deputy for Research and Development, 11th Air Division(Defense), Ladd Air Force Base, Alaska, reviews the nature and progress of the Air Force battle of wits against the Arctic hazards.

A shot of the flight line at Ladd Air Force Base. In this picture a B-45, B-29, C-47, and B-17 are visible. Every new type aircraft accepted by the Air Force must first prove its worth in Alaska. Much can be learned about improving new types by refitting older aircraft, including the old "Gooney Bird," against cold weather.

developmental tests are used in the building and perfecting of a prototype, while APGC confines its testing to determining whether the final production model is ready for assignment to operational units, or whether it must undergo still more improvement. Perhaps this variance in interests can best be shown by an example: when ARDC tests a new fighter at Ladd, its primary concern may be the elimination of an in-flight stability problem induced by low temperature; the space allowed for guns is apt to be occupied by a battery of measuring instruments. It will probably be the following year when APGC tests the same type fighter; perhaps a year later it will then appear in full combat dress, guns and everything else installed, for a test of whether it will really fly and fight.

Between these two testing agencies, supporting both with men and facilities, and providing a reservoir of experience born of its long preoccupation with arctic problems, is the Cold Weather Materiel Testing Squadron. All of its officers and many of its airmen come from the research and development agencies of the Air Force within the Zone of the Interior under a policy of mutual rotation which retains special interests and skills. This wise personnel allocation raises the over-all efficiency of the cold weather testing program. To provide the support required for the arctic tests, the Cold Weather Testing Squadron has certain facilities over and above those supplied by the air base wing. Special shops handle test requirements so that the work load will not conflict with other base requirements. These shops are designed to provide all echelons of maintenance. They include special testing equipment not normally found in field maintenance shops but needed for routine checking of new-model aircraft, instrumentation of test items, and analysis of results. Normally the special shops are manned only during the testing season.

Engine test stands are among the best and most modern available to the Air Force, and have a particular advantage over refrigerated stands in the U.S. in that there is no limitation on running time; the supply of cold air is inexhaustible.

A large modern hangar houses offices and maintenance facilities. Despite progress in cold weather operations, some work requires shelter, particularly

One of the Air Proving Ground Command projects at Ladd AFB was the building of a snow-compacted runway to test the feasibility of constructing isolated tactical air bases from highly compressed snow. This tractor is pulling a "Pulvimixer" which mixes and heats the snow sufficiently so it can be compressed to a hard surface. Below, a B-47 has landed on the snow runway. Extreme cold makes the snow very dry, providing good braking action. In the cold, dense air of the Arctic, take-offs and landings are shorter than what is considered normal in the United States.

One of the great barriers to arctic operations has always been the problem of starting engines in very cold weather. Much progress has been made on more efficient techniques of starting. Jet engines are easier to start because of their small bearing surfaces. The photo of an F-89 (above) shows the variety of ground equipment needed to start an engine in very cold weather. More men are assigned to a ground crew at arctic bases because the cold weather reduces individual efficiency. The center photo shows an F-86D being started on a winter night. Since many of the winter days have only three to four hours of sunlight, much of the maintenance must be done under lights, and pilots have no trouble getting their night flying in. Even the B-36 (below) can be operated from Alaskan bases, but at the cost of a great deal more work and preparation than would be necessary in the U.S. It was not very cold when photo was taken or there would have been two preheaters on each engine instead of one.

At temperatures below -30°F., arctic bases may be temporarily closed by a heavy ice fog generated by the exhaust of internal combustion engines, heating plants, or other sources of moisture. When this C-124 has started its engines and taken off, the ice fog formed from its engines may close the runway for several minutes.

if it is to be done carefully and quickly. Technical Order changes on new aircraft are usually done on the inside, although a certain number are accomplished in ambient outside air to determine how difficult such work will be. In this regard, it may be mentioned that experience has shown it most advisable to park, service, and perform routine maintenance out-of-doors. An airplane that has been kept in a warm hangar immediately develops troubles when brought outside because materials contract when exposed to large temperature reductions.

The operational benefit to the Air Force from this cold weather testing activity has been considerable. Only a few years ago the cold weather of Alaska grounded all aircraft for a considerable portion of the year. At the beginning of World War II no military aircraft could operate in temperatures now taken as matter-of-course operating conditions in Alaska. A few bush pilots kept going all winter at the expense of great personal hardship. They had developed quite a bag of tricks, all of which have been carefully examined by Cold Weather Test personnel and adapted, where applicable, to Air Force use. The bush pilots were immensely valuable to us from the start because of their long experience in this inhospitable climate. The most famous of them, Joe Crosson, crashed six times in attempting his first long cross-country flight in Alaska, but he learned a lot and passed it on. In the absence of engine heaters, for instance, oil can be drained onto the ground, where it will freeze solid. At take-off, the oil can be picked up, put in a can and melted, and put back in the engine. Such methods are crude but effective; they are not done any more as a general practice, because ground handling equipment has improved along with aircraft. Heaters are better, starters are better, even oil is better.
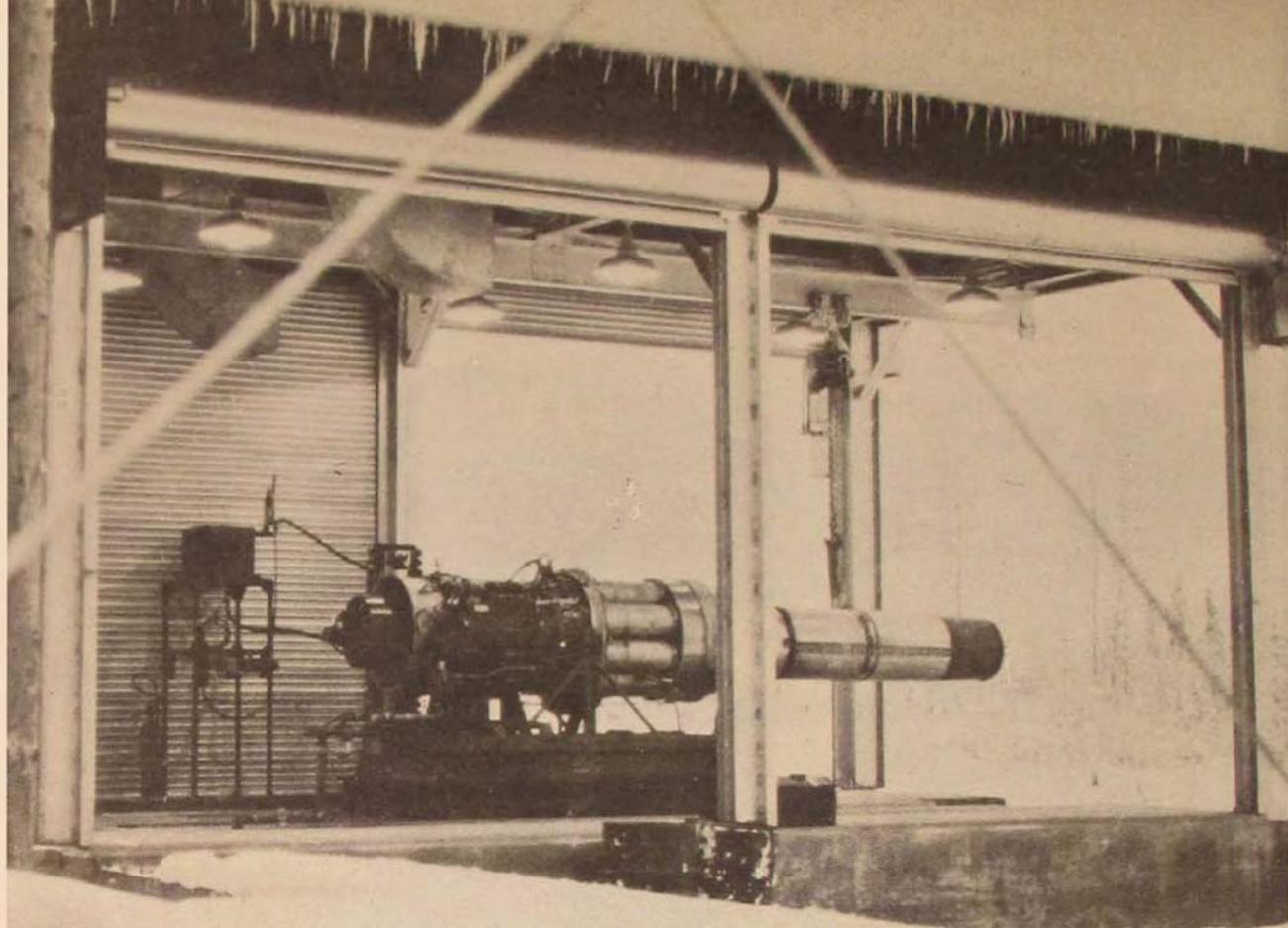
A J-47 jet engine is being coldweather-tested in one of the modern test stands at Ladd Air Force Base. With the metal sides of the building rolling up to admit an inexhaustible supply of cold air, there is no limitation on the length of test runs. A corner of the control building can be seen at the left of the photograph.

Older airplanes have been "retrofitted" with winterization kits which improve their resistance to cold, and newer ones have the improvements designed into them. Whereas a few years ago a ground temperature of -40°F. would immobilize a C-47, these days it is Alaska's workhorse. It flies every day, regardless of temperature, both on military jobs and on civil airlines. Some of our first strategic bombers became maintenance nightmares when the temperature sank, but the B-47 thrives on cold weather.

Much of the increased ease of maintenance and reliability in operation of modern aircraft may be attributed to the inherent simplicity of the jet engine, but this does not explain it nearly so accurately as does the increased know-how which has come from cold weather testing. The new fighters such as the F-89 are more complicated in every way than the old bombers such as the B-17, yet they work better in cold weather. Not just the engine is involved, but the weapons system, the electronics system, the hydraulic system, and the ground handling system and its associated equipment.

This over-all drastic improvement so far as cold weather reliability is concerned, this change from the impossible to the workaday, cannot be claimed by the Cold Weather Testing Squadron alone. It originally discovered failings, and it enlisted the help of the oldtimers in Alaska to assist in correcting them. But then the engineers at Wright Field, and in the manufacturer's laboratories, jumped in. The Air Proving Ground built the Climatic Hangar where every item of Air Force equipment is tested rigorously at -65°F. before it ever comes to Ladd. The result is that extreme cold

is one more of the weather phenomena that have been beaten. It is still harder to operate from arctic bases than from those in the United States, but the Alaskan Air Command now flies every day in the year.

The Arctic Aeromedical Laboratory

THE Arctic Aeromedical Laboratory was activated in 1947 at the Air Force School of Aviation Medicine, Randolph Air Force Base, Texas, and personnel were assigned to Alaskan Air Command from that organization. It has been in operation at Ladd Air Force Base since that time, in temporary buildings. New permanent laboratory buildings now under construction will greatly increase its capacity and efficiency.

The mission of the laboratory includes five general areas:

(1) To investigate medical problems affecting the health and combat efficiency of military personnel in the northern latitudes.

(2) To study and recommend flying safety aids, protective, emergency, and survival equipment as they pertain to the Alaskan Theater.

(3) To investigate the natural food and water sources, diet requirements, and survival aid existent or required in the theater.

(4) To determine and to investigate the disease vectors and potentialities in the theater and to study pertinent preventive medicine technique and procedure.

(5) To investigate problems in support of the medical defense against biological warfare agents insofar as such problems are peculiar to northern latitudes.

To accomplish the mission of the Laboratory, seven major projects are being conducted on the various problems represented in the mission. In-service research, as well as an annual program of contract research with approximately twenty-five universities in the United States, is seeking solutions to these problems.

One of the problems affecting the efficiency of personnel in the Arctic, as well as in other areas, is that of selecting those personnel who will be best adapted to the peculiar aspects of their environment and of their duties. Research has indicated that the Alaskan environment at major bases is not significantly different from similar duty assignments in other regions. Persons assigned to Alaska, in many cases, do have preconceived dislikes for such assignment and dread the cold and supposed isolation. But once they are assigned, their effectiveness is similar to that found elsewhere. Results of research have shown that psychological tests will predict with fair results those personnel who will adjust most satisfactorily to Alaskan duty, and can also predict the persons who will voluntarily request to extend their Alaskan duty tour. Conversely the personal characteristics which make for successful adjustment have been evaluated and reported for use by administrative offices. There remains the broad problem of how to choose individuals who will perform satisfactorily at small isolated stations. Also methods must be developed for improving or maintaining the morale of personnel assigned to such stations.

Another area under active investigation by the Laboratory is that of increasing the reliability of various equipment in the cold environment by taking full advantage of human capabilities. Liaison with the Cold Weather Test Squadron determines the aircraft malfunctions that may be attributed

to cold weather. With such knowledge it is hoped that changes in maintenance procedures, equipment, and operating techniques may be found that will compensate for the effects of temperature and other cold weather conditions. Electrically heated mechanics' suits, various items of personal equipment and clothing, and items of survival and emergency equipment are being evaluated and modified to obtain greater human efficiency under winter operational conditions.

Various aspects of physiological and psychological problems of survival in the Arctic are being investigated. Survival ration requirements and various types of rations are evaluated to determine the types and amounts of food required under emergency conditions and to develop a type of ration which will provide these requirements in the least bulk and weight. All of the presently available rations are unsatisfactory in some respect, but the Laboratory hopes to develop one which will fill the bill. A comprehensive survey of the wild plants of Alaska is attempting to determine the prevalence of edible and poisonous plants, and to find the actual food value of such wild plants as may be suitable for human consumption. A report on a wide variety of plants, giving their description, probable seasonal prevalence, and recommended use, has been published for inclusion in various survival handbooks and indoctrination training programs.

Results obtained to date indicate that survival manuals have perhaps created too glowing an impression as to the amount of food value in wild plants. While they may be considered valuable additions to diet, they should not be treated as staples, but as sources of vitamins or merely as variety for the sake of taste. Too much may have been written about some wild grass or other that is "just as nutritional as cabbage." If it is understood that it may take 30 pounds of cabbage to satisfy a man's daily caloric requirements, the wild grass does not appear such a panacea for survival purposes.

On Fletcher's Island, a large ice island floating in the Arctic Basin, a survey has been made of food resources on the Arctic sea ice and from the sea itself that are available for survival. Preliminary results indicate that edible sea life may be available in most areas of the Arctic Basin. These food sources will be evaluated for nutritional value and efforts will be made to devise methods of obtaining useful quantities during survival situations.

Major emphasis is being placed on determining the basic mechanisms affecting heat balance in human beings subjected to cold. With an increased understanding of the basal metabolic processes, means may be evolved to alter these processes in such a manner as to obtain heat balance or greater heat

Basal metabolic rate is measured at the Arctic Aeromedical Laboratory. This rates goes up and down with the type of food the subject eats, and its level determines the individual's tolerance to cold.

This is an Eskimo home at Anaktuvik Pass in the Brooks Range, Northern Alaska. The tribe to which this family belongs is completely primitive and uninfluenced by the white man's ways. Its entire economy is based on the caribou, and from it comes food, clothing, shelter, and trade. Eskimo diet and living habits are studied for cues on how man can live and work more comfortably and safely in the Arctic.

production under conditions of extreme cold. People living in the North have often wondered about the Eskimo's apparently superior ability to tolerate cold weather and various theories have been advanced to account for it. It was finally discovered that his basal metabolism is higher than the white man's. It was thought at first that this was a racial characteristic, perhaps acquired through many generations of living in cold climates. But the Laboratory has established beyond much doubt that there is no essential difference between the races in this respect. Eskimos eat a great deal of meat and little else. When they are placed on the white man's diet, their basal metabolic rates fall. Conversely, the white man who goes on a diet of Eskimo food increases his basal metabolism and so does not feel the cold as much. The mechanisms of heat loss through various insulating materials are also being investigated to provide better specifications for protective clothing, shelters, etc.

Various types of shelters, survival equipment, insulating materials, and personal clothing and equipment are subjected to extensive field evaluation each winter under simulated survival conditions. Results of these tests are

submitted to developmental agencies for further modification of the items, for additional developmental work, or with recommendation for utilization by the Air Force. During these field studies, techniques of survival, construction of shelters, and various types of equipment and rations are studied, and recommendations are made for changes in survival training methods or materials.

Alaska has a wide variety of insect life which contains many possible disease vectors. Collections of these various insects are made and studied for disease-carrying capability and for the presence of actual disease. Tularemia has been found to be prevalent in certain regions of Alaska, particularly in the vicinity of populated areas. A species of schistosomes causing a skin irritation commonly called "swimmers itch" has been found in the waters of a large number of Alaskan lakes. Data collected by the Laboratory will serve as a basis for establishing preventive medicine procedures to guard against the spread of diseases and to protect Air Force personnel from contracting the diseases.

Similar studies of parasites in Alaskan mammals have recently been initiated. Most Alaskan mammals have been found to be heavily parasitized. It is believed that a considerable proportion of these parasites could be or could become possible sources of disease in man. With a knowledge of the types and prevalence of the various parasites, it is hoped that adequate preventive medicine procedures may be developed to prevent serious hazard to military personnel in Alaska.

The long periods of snow cover during the winter and the presence of extensive areas of permafrost cause a special hazard of contamination of drinking water sources during the spring thaw period. Improperly disposed refuse remains frozen during the winter. In the spring run-off the permanently frozen ground will not absorb and retain the thawed material, so the refuse injects contaminated materials into the water sources. In cooperation with the Alaska Public Health Service, the Arctic Aeromedical Laboratory is engaged in a survey of the various water sources at populated areas in interior Alaska during various times of the year to determine the presence of contamination, the source of contamination, its type, and to recommended treatment of drinking water.

This, then, is the pattern of research and development in Alaska. A combination of scientific research, developmental testing, and operational testing is constantly improving the performance of both equipment and men in cold weather operations. Much has been achieved; much remains to be done. Years of indifference and neglect of the problems of cold weather operation must be overcome in a hurry, for if war were forced upon us, the icy reaches of the Arctic would overnight become the most important frontier in the world.

Headquarters, 11th Air Division (Defense)

So You Want To Publish an Article . . .

How-to-do-it suggestions
by the Editors of the Quarterly Review

1. Sit Down and Write

LT. COL. KENNETH F. GANTZ

2. Official Clearance for Publication

DR. FRANK W. ANDERSON, JR.

In association with the recent impetus given by the Vice Chief of Staff to Air Force writing and speaking, a number of requests have been made to the Editors of the *Air University Quarterly Review* for instructive material in the more professional aspects of composing and publishing a magazine article. Part One of the resulting "text" has been prepared to help prospective authors in visualizing, structuring, and filling the article form and in polishing their phrasing. It assumes the ability to write reasonably correct English in grammar and syntax, but it takes over, step by step, from there. Having long themselves wrestled with the problems discussed, the Editors believe that most of the precepts, admonitions, and coachings assembled may be usefully considered in whatever daily writing is demanded of Air Force officers, as well as in the creation of matter for publication. Part Two explains why the Air Force author must have official USAF clearance for public release of certain kinds of information and how he may obtain it.

1

Sit Down and Write

LT. COL. KENNETH F. GANTZ, EDITOR

COLERIDGE was a genius. He did things like reading from the upper left-hand corner to the lower right-hand corner of Christ's Hospital library. One day he dreamed a marvelous poem. Awaking from his sleep with every scene vivid in his memory, he seized a pen and began setting down the haunting verses we call "Kubla Khan." In the middle of his hurried scribbling, a visitor knocked on his door. When the inopportune caller had gone, so had the rest of "Kubla Khan." Coleridge could recapture nothing past the last lines he had managed to write down. To the end of his life the poem, one of the finest romantic compositions in English, remained a fragment.

That is one way to write. But Coleridge was a literary genius. Even for him the method was hardly reliable. Most of us have to fall back on planning something of interest to say, on thoughtful choice of what we say about it, on clear organization of what we choose to say, and on careful selection of methods of saying it.

A very great teacher of English in the University of Chicago always began his famous course in writing for publication by emphasizing that a writer must first have something to say. "What are your materials?" he invariably demanded of his students. "Are you really informed about the steel industry? Or do you just have the desire to write about it? You must have a body of sound knowledge about something or other before you have anything to transfer to a reader. The basis of good writing is purpose illuminated by knowledge. But first of all you must know something that is not known to your reader and that is significant enough or interesting enough or amusing enough for him to pay you attention."

The first lesson the novice writer must learn is therefore

simple. Without interesting, important, or entertaining knowledge—real or imaginative—no writer has anything to write about. He has no content to repay his reader for reading him. Without emotional or intellectual content no artist, even with the finest of technical skill, can paint a worthwhile picture. Without something to say no musician can compose beyond the level of exercises. The *Unfinished Symphony* is that way because Shubert himself was unable to find anything more to say that would complete it on the level of its immortal beauty. So he let it alone.

You may as well face it—if you haven't already. Successful writing depends on something of value to say. There is neither technique nor method, no secret that you can learn, no skill that you can develop, that will overcome the fact of having nothing to say. The first thing the editor will think when he picks up your effort is—"What's this Joe got to say that makes any difference to my readers?"

If you now believe you have something to say that will make a difference, let's go on further. But not to write. You have some more questions to ask yourself. First we'll discuss them. Then you answer them. While you are answering them, you will also be planning your article. So set your answers down concisely but exactly. When we are through, then you can really SIT DOWN AND WRITE the article you have planned.

On page 104 is a suggested *check list* for planning an article to be derived from your own materials and your own objectives. Look over the list to get an idea of where you are going. Then we'll explain the items before you actually answer them. But be sure to answer them as you go along.

We hope you noticed that the planning check list is divided into four main parts. These four parts have to do with your four main planning problems. First you have to decide what kind of article you are going to write: a short semi-technical but easy-to-understand piece on navigation for a boys' magazine, intended to interest fourteen-year-olds in the Air Force as a future career; or a contribution to a trade journal highlighting the application of electronic equipment to modern air combat operations and thus bringing a specialized group of readers to closer understanding of what the USAF really is. Supposing you choose the second, and that you have 3000 words—no more—to accomplish your purpose. Your next planning problem is selection. From all the dozens, maybe hundreds, of facts and anecdotes and examples that you have available, you must choose the most effective ones to fill your limited space. Your third problem is to determine an order of

Check List for Article Planning

ESTABLISHING THE BASIC CONCEPT OF THE ARTICLE

1. What materials do I have to write about?
2. Why do I want to write about my materials?
3. What type of publication do I want to write an article for?
4. What kind of article does this type of publication usually favor?
5. What particular publication do I want to write the article for?
6. What special characteristics does this selection impose on the article?
7. Who are the readers of this publication that I must attract and hold?
8. What level of difficulty and intensity of treatment does this imply?
9. Now, specifically, what will be the exact subject of my article?
10. Exactly what will be my purpose in writing about it?
11. What value can my subject have for my planned readers?

ESTABLISHING THE CONTENT OF THE ARTICLE

12. Can I express my exact and complete subject in a single statement? What is it?
13. What major points or statements should I make about my subject?
14. What sub-points and blocs of material are needed under each major point?
15. In view of the special requirements of my chosen publication, especially length and level of difficulty, should I eliminate anything from my preliminary outline?

ORDERING THE CONTENT OF THE ARTICLE

16. What will be the sequence of the major points in my article?
17. Does this sequence emphasize my purpose in writing the article?
18. What will be the sequence of the materials under each of the major points?
19. Will the over-all sequence of my article pick up the reader easily and sweep him along systematically through a progressive transfer of content?

CHOOSING EFFECTIVE METHODS AND STYLE OF PRESENTING THE ARTICLE

20. How will I overcome the normal reader resistance?
21. What will make a good lead for my article?
22. What will make a good ending for my article?
23. What revealing comparisons or suggestive comment will strengthen the development of my thought?
24. What good illustrative examples can I use to reinforce significant points?
25. Where do I need directionals to guide the reader through the sequence of my thought?
26. What will be an appropriate and effective writing style for my article?

arrangement for your selected materials. Fourth and finally you have to give a lot of thought to making your write-up appealing and understandable, with careful regard for the particular kind of readers you have chosen to address.

This is all very much like building the house every one intends to build some day. First you have to decide upon the general idea for your house. Its location, what you expect it to give you in the way of living, how many people will live in it and what are their needs, how much you can spend on it. Now what's going into this house? How many rooms and what kind? What major items of furniture and equipment are necessary? After that, you get down to style of architecture and floor plans and arrangement of major furnishings and equipment. And finally you come to the decoration, the style of the furniture, the color of the walls, the type of flooring, the landscaping, and the many other things that will make the house and its furnishings into just what you want for yourself.

Almost every "construction" job has these four main planning phases. First you establish the basic concept of what you intend to do. Then you identify the major components that will go into your product. After that, you arrange and order your components. Then you finalize your product—give it the polish, the window dressing—the characteristics that fend off failure and invite success.

Now let's get on with planning your article. Ask yourself the following questions.

Establishing the Basic Concept of the Article

1. What materials do I have to write about?

First of all you are a member of the Air Force. We know that, and we assume you are intending to write something about the Air Force. But if you are about to answer this first question that simply, stop. Go back and reread the third paragraph of this piece. Remember—when you write an article you are proclaiming yourself something of an authority on what you are writing about. Your reader has a right to expect that you have rich and detailed knowledge or experience that makes you especially worth listening to on your chosen subject. Skimming the top won't do. You have to know a lot about something to be worth the reader's time. He also expects you to be able to select from everything you know just those things he himself needs for understanding. And he also has a right to his faith that you have put the facts and opinions you give him in fair relation to all the other

facts that bear on them. A little learning is a dangerous thing for the amateur writer. The professionals themselves shy away from topics they don't know a great deal about or can't learn a great deal about through research, interview, and intense study directed at a very specific and limited area of investigation.

Write about what you really know yourself or can investigate to the point that your knowledge is authoritative. If you are a former commander of a reconnaissance squadron with extended combat experience in Korea and are more recently a student in a class on international affairs, stay away from that pundit pronouncement on the Geneva Conference you think you might base on your term paper and get back to the problems and methods and experiences of combat reconnaissance. Editors are not looking for the student to write their articles. They can just as easily have the master.

Let's say then, for example, that your answer to the first question is this. "I am going to write some articles about my experiences as commander and leader of reconnaissance in the Korean War. Realizing that no one is interested in my life history as such, I shall concentrate on the problems, methods, successes, and failures of the employment of reconnaissance in air action in Korea."

If you are unable to discover anything so ready-made among your mental souvenirs, you may like to think a little more on materials to write about. There are thousands of publications demanding content material. For every article based on unique knowledge or high-level cerebration several dozen articles are printed that are not. The Air Force is a mine big enough for all of us to dig in and to come up with something of interest and value . . . if we remember to limit ourselves to something very specific and to inform ourselves thoroughly about it. You handicap yourself uselessly if you look for topics outside Air Force areas that you don't already know a lot about, at least in general. Maybe maintenance men would do just as well to avoid writing about psychological warfare, even if they have read a couple of books about it. Stay in your own back yard. It's a good idea not only to remain where your training and experience can assist you but also to keep your topic down to your size. More about that toughie later under Question 3.

We might get on by observing the two types of general material that can lead to a successful article: *new material* and *old material with a new or special or timely slant.*

New Material. The chances are that any new information that you might have or might readily acquire will stem from your Air Force assignments. This professional knowledge may be fresh because it deals with new developments. For a great many periodicals like trade journals, family magazines, juveniles, and other secondary publications, it may still be fresh because no one else has gotten around to reporting the information in a manner to interest one of these specialized audiences. New topics might include:

> "The New Emphasis on Air Power in U.S. Strategy"
> "What the Air University Will Teach in Its New ————
>   Course"
> "Nato Airfield Construction in 1954"
> "Diet and High-Altitude Flying in Korea" (Quarterly Review,
>   VI,2)
> "The Status of Atomic-Powered Aircraft"

In the second category might be topics like:

> "Moving a B-47 Wing to England"
> "The B-26 on Night Interdiction"
> "A Combat Mission in an F-89 Flight Simulator"
> "Pingpong Balls to Tractors—the C-119 as an Air Freighter"

Old Material—New Slant. Here is real elbow room for the article author. As long as you can give your materials a slant that is interesting to your readers or give it some application of value to them, you don't have to worry about how new it is. Imagination and a fresh viewpoint give old facts new vitality. Examples?

> "The F-86 Was Also a Fighter-Bomber"
> "Ten Decisions that Shaped the Air Force"
> "A Jet Pilot's View of Geography"
> "Why Not a 'Flying Tiger' Air Force in Indo-China?"
> "Our Specialist Non-Coms Should Learn Their Military ABC's"

Now that you have a little ground work in what may be usable material, look back over your experience with a critical eye. Remember that the reader may not know what you know. Look at your experience, your store of information, from the other man's point of view. What blocks of your experience or information might have meaningful interest or amusement to offer a reader? Especially if you can relate them to the needs or interests of some particular group of people? Your list of possible article topics can also be increased by timeliness. Events are constantly freshening old matters, making them applicable to the news and again worthy of attention. For example, the impact of the events in Indo-China on the experiences of the Korean War.

This first question has taken time to answer, but it is important. Most failures in writing start with poor choice of subject, and your basic materials are fundamental to your choice of subject.

2. Why do I want to write about my materials?

You heard about the captain who was commended in his Efficiency Report because he wrote an article for the *Quarterly Review* in his spare time? You think you might pick up some dollars from a civilian magazine? Either way it's a good deal. Nothing is wrong with either of these motives. Except that neither is enough. Like the understandable desire to see your name in print, both are too general to give point and force to your effort. A definite reason for addressing your particular information to certain readers will give vitality and impact to what you say. There is a difference between talking with a man to pass the time of day and persuading him to do something you want. Like getting him to concur in a change of standing operating procedure. In the light of your purpose you choose certain things to say and certain things not to say as unessential or distracting. Your purpose also underlies the entire planning of an article. It unifies your facts into a logical, orderly procession of thoughts to a predetermined goal. It gives depth and color to what you say by giving it direction and significance.

Your over-all purpose with regard to your basic materials may be, for instance, to contribute to the public understanding of the Air Force mission and its requirements. It may be to enlarge, by means of professional discussion, the Air Force officer's knowledge of logistic operations at a forward base. You must affirm at least a general purpose in inviting a reader's atten-

tion to your basic materials. Otherwise you will find it difficult to determine a definite, exact subject for your article. With an over-all purpose in mind you can then choose a specific subject from your basic material that will permit you to accomplish it.

3.   What type of publication do I want to write an article for?

4.   What kind of article does this type of publication usually favor?

5.   What particular publication do I want to write the article for?

6.   What special characteristics does this selection impose on the article?

7.   Who are the readers of this publication that I must attract and hold?

8.   What level of difficulty and intensity of treatment does this imply?

These questions add up to the choice of a "market" for your article and to the effect that choice of market has upon the article itself. They indicate the detailed familiarity you must have with the publication in which you hope to publish your piece. You must also acquire a fair understanding of the general characteristics of the class of publications to which your choice belongs. Professional writers, with whom you may be competing, know their outlets thoroughly . . . the types of materials they publish and the specifications that guide their editors in making up their "books." This sort of information is essential. Without it the prospect of a "sale" is almost hopeless. Nothing can eliminate the necessity for careful study and analysis of several recent back issues of your "market." A good introduction to the "families" of magazines and the current requirements of their members is the latest annual edition of one of the market guides* or the current market lists in such magazines edited for free-lance writers as *Writer's Digest, Author and Journalist,* and *The Writer,* which are available monthly on news stands. Study of this literature for semiprofessionals is useful to acquaint you with the fact that a multitude of outlets exists for your material. Also with the fact that each one has special characteristics its editor observes in selecting its contents.

There are two considerations in the choice of your market: what the various kinds of magazines want and what you, as the author, want. We'll return later to the first. For the moment let's continue to look at this article-writing business from your point of view. Here we come back to your purpose in writing the article. Are you trying to persuade certain people? If you are trying to convince aircraft equipment contractors and manufacturers that the Air Force system for monitoring research and development contracts is a good one, then an aviation industry publication of moderate

Writer's Market, ed. by Ruth Jones and Aron Mathieu, published by Writer's Digest Co. (Cincinnati). *Writer's Handbook,* published by The Writer, Inc. (Boston).

circulation would be more useful to you than a popular magazine, no matter how great its circulation.

Closely related is the question of the appeal of your subject. Is it of general interest to almost any audience? Or is it likely to appeal only to people who have had the same kind of experience you have had or who are in certain work that predisposes them to interest in it? In actual practice, then, one may choose a publication to fit his subject and purpose, or he may choose a publication he wishes to write for and then tailor his subject to fit the publication. The first is perhaps more logical, but the second is often more practical, for the beginner at least. In either, the choice of the publication has important bearing on the planning and writing of the article.

Actually your basic material is probably more flexible than you think. What choice of subjects does it offer you, as you review the requirements of your prospective editor? Suppose that your basic information is represented by your monumental staff study on the mechanization of packaging and shipping in an Air Force supply depot. Even to your prejudiced eye it may seem that the only heart that would quicken at the sight of this stuff would be that of another Air Force supply officer, an efficiency expert, or the manufacturer of the conveyor belt you describe.

Let's take a look at a few ways you might adapt this storehouse of raw knowledge to the interests of different categories of readers:

(1) *For popular fiction:* The brilliant but shy young Air Force engineer has worked out a system of mechanized supply that would break a critical bottleneck—a bottleneck that threatens the mission of a B-47 wing to defeat an impending *coup d'état* in an allied country. The lad is opposed by a stuffed-shirt supervisor who can't see beyond the horse and the mule; he gets our hero in dutch with the general and tries to get him reassigned. But, cleverly abetted by his girl friend, the general's daughter, the hard-working young genius plows through his opposition, makes a brilliant end run around the wall of red tape, gets his system working, and saves the day.

(2) *For a popular article:* The Air Force has copied and improved upon the methods of big business; mechanized supply is one example of a spectacular success.

(3) *For trade magazines:* The Air Force has found new and startling uses for conveyor belts, fork-lift trucks, and automatic packaging machines.

(4) *For a professional management journal:* Here are the technical details of the Air Force supply problem, the factors in the design and construction of the new equipment, and the results: before-and-after statistics on output show production up 30 per cent, overhead reduced by 20 per cent.

(5) *For an aviation magazine:* Supply operations now have the speed and flexibility to support the Air Force in its global mission.

These are by no means the only approaches; they are merely standard ones. The *Quarterly Review*, as a professional Air Force journal, might be interested in several other approaches:

(a) This improvement in supply technique is but one way in which Air Force supply might be streamlined; here are others.

(b) Here is a notable improvement in supply efficiency; but how much good does it do if the quickly assembled supplies bog down in a supply pipeline tied to ground transportation? Move supplies by air.

(c)   This improvement is the forerunner of complete mechanization of an Air Force supply depot; supplies will be untouched by human hands.

(d)   How this improvement affects manpower and scheduling problems.
An article is the creative product of a man's mind.   There is no *one* way to write it.

Don't let this pep talk go to your head.   There are limitations, both in the subject and in the author.   In spite of the example you just read, many staff studies and research papers are too narrow in scope to convert into publishable articles.   Almost certainly they will not be suitable in anything near their present form, even in professional journals that have a special interest in your subject matter.   No editor will welcome that old research paper with the footnotes taken out or that staff study that you "fixed up" by cutting it to half.

Your own limitations as a writer are also important.   What do your capabilities qualify you for?   Sure, you can write.   You can also run; but you wouldn't enter yourself for the Olympic games in the 100-yard dash.   If you are an amateur in the art of writing, don't deliberately choose a publication whose editor can pay for the services of "name" writers.   Or don't choose one whose highly informed readers demand authors of authority and prestige in their difficult or sophisticated fields.

What kind of articles does the editor want?   The best way to find out is to study his magazine.

Now that either your subject or your inclination has interested you in a certain magazine, you must examine closely the characteristics of its articles. Periodicals are like a community; within the community are families, which in turn are made up of individuals.   Members of a family of magazines compete for the same general type of material because they serve roughly the same audience—the wide-circulation general magazine like *Collier's* or the *Saturday Evening Post*; the women's magazines like *McCall's* or the *Ladies Home Journal*; the specialized publications dealing with a certain interest, like *American Aviation,* or *Hunting and Fishing* magazine, or *Popular Science*; the trade journals that limit themselves to a particular industry, like *Furniture Age* or *Modern Packaging* or *Hardware Retailer*; the house organs of individual companies, like *Pegasus* or *Boeing* magazine.   Other families are the juveniles, the religious magazines; there are the Sunday supplements of newspapers, the news magazines, picture magazines, and scholarly and scientific journals.   There are dozens of types and groups, and overlapping types and groups—like the religious juveniles—and thousands of individual and possible places for you to publish an article based on Air Force material. Over 7000 periodicals, not counting newspapers, are published in the United States.

Each family of magazines specializes in certain subject matters and specializes even more in certain approaches to subjects. Within the family each magazine has further strict requirements in matters of style and length of articles.   The author is only using common sense if he determines the requirements he will have to meet—*before he writes a word* of his article.   Why buck the system?   Thumb through a few copies of the magazine you want to send your article to.   Note the kinds of articles it publishes, the number of short and medium-length articles in each issue as opposed to long ones.   In short, figure out the best odds.   Get the "feel" of the magazine.

You don't need to be an expert to size up a magazine. Just be sure you know what to look for. What do its articles average in the way of content, style, and length? What kind of an audience does the editor try to appeal to? Can you build an article around your subject or out of your material that will meet these requirements? The exactness with which your manuscript fills the magazine's bill may make the difference between acceptance and rejection. Look at it from the editor's chair. He gets in a steady stream of manuscripts, many more than he can use. This does not mean that he is swamped with good material. Any editor will tell you that he always has room for absolutely first-rate articles. But he operates on fixed deadlines. He has to budget his time; he can afford only so much time and expense on one article. What will he do when he reads your article?

● If your article is interesting and worthwhile for his particular readers, if it reaches his standards in presentation, and if it fits his requirements on format, he will "buy" it.

● If your information is *really* hot, he will always be interested. He may even assign a staff member to write an article from scratch or to rewrite your article.

● If your information and presentation have definite possibilities but are not quite in line with or suitable for his own requirements, he may take the time to go over it and suggest revisions for you to make.

● If your article has marginal possibilities in content but does not come close to his format requirements, he likely will not give it further consideration. Back it will bounce with an outright rejection slip.

● If your offering is inadequate in information, presentation, and conformance to his requirements, he will examine it only enough to ascertain these defects.

What does all this talk about a magazine's requirements add up to? Simply this: pick your magazine, learn what *it* wants, and write *for* it.

9. Now specifically, what will be the exact subject of my article?

10. Exactly what will be my purpose in writing about it?

These two questions go together. Now we are no longer thinking about general material but about the subject of a particular article. It is the difference between the general topic of "combat reconnaissance" and the specific subject: "Dicing shots are frequently unnecessary." Notice also that a "subject" and a "title" are not as a rule the same things. A good title functions to attract attention or give a clue to the subject. It may be only a word or a phrase.

A carefully defined and limited article subject is a statement. It is the entire article reduced to one sentence, which we may call a "subject sentence." More precisely, it is the single statement that will be expanded into the article. Although the subject may be nowhere precisely stated as a single sentence, everything in the article should contribute to the explanation or full comprehension of an "understood" subject sentence. If the writer's purpose is also

persuasion, everything he says should contribute in some way to winning assent to the assertion of his subject sentence.

A good article subject is "limited." It is narrowed down to a definitely restricted statement within the general topical area to which it belongs. If you should say your subject is "combat reconnaissance," where do you begin? Where are you going? You would have to write volumes of miscellaneous information to "cover" your subject. Limitation is the "shred-out" of a subject of very specific concern. Unless you are going to write a book or a very general, orientation-type article, the somewhat limited subject "Combat reconnaissance in Korea" is still likely to be too broad. Sharpen your focal point of interest. Even the subject taken as an example, "Dicing shots are frequently unnecessary," can be further limited. For a certain purpose a short paper might be written on "The dicing shots requested of_____ contributed no intelligence data worth the risk."

Consideration of our example subject, "Dicing shots are frequently unnecessary," also reveals that the writer's purpose is implicit in the statement of his subject. In fact he will find it difficult to express his actual subject in a single subject sentence without realizing a definite attitude toward his topic. Why does he wish to talk about dicing shots? Purpose and topic blend in establishing a subject for his article.

Always express your subject as a subject sentence before you attempt to develop it. Write this sentence down as a check and a guide.

11.   What value can my subject have for my planned readers?

This question introduces the business of showing the reader that the article applies to him in some way. That it in fact involves his interests. In recent years editors have coined a phrase to indicate a quality they currently value very highly, although there is nothing new about it. "We want articles and stories with *reader identification*," they proclaim, meaning of course their own readers. Possibly this quality is easier to understand in fiction.

A story that proceeds out of an everyday situation and involves the kind of people the reader knows familiarly is said to have strong reader identification. For example, the "soap opera" stories common on daytime radio, have listener identification. The housewives and mothers listen to the travails of a housewife and mother, whose troubles, though frequent, exaggerated, and prolonged, are the *kind* of troubles they are familiar with in everyday life. They can easily identify themselves with the heroine, who meets her troubles head on and rises above them. Likewise with nonfiction. Editors want articles that help their reader understand *his* problems and furnish him with ideas and know-how that are useful in *his* life.

Unless you yourself can see how your subject bears on your reader's interests, it is improbable that he will discover how it does himself. If you want your reader to say, "Yes, I am glad to know this," you yourself will have to see clearly why he should be glad to know it. This is reminiscent of the technique of the skillful insurance agent, who doesn't approach you to sell you a life insurance policy but "to assist you in safeguarding the security of your family." He gives his sales purpose "consumer identification." Without being obtrusive about it, an article should be pitched to identify itself with the interests of its prospective readers.

Establishing the Content of the Article

12. Can I express my exact and complete subject in a single statement? What is it?

We have said that a true subject is expressed as a statement . . . a complete sentence, with subject and predicate. Some rhetoricians call this "subject sentence" a thesis. It bears the same relation to your article that the topic sentence does to a formally organized paragraph. You need not include this thesis or subject sentence in your actual article, but you should write it at the head of your outline and use it to test the usefulness of every bit of material in your article. Everything you say must contribute to fuller understanding of the thesis.

To describe a thesis precisely, we will have to use some grammatical terminology. A thesis sentence is a declarative sentence with only one independent clause. (A compound sentence would express a twin subject.) Since a thesis expresses a declaration, then the article is the exposition of that declaration. The details of your article are put into it to explain the thesis, to illustrate it, to emphasize it, to make it believable, to prove it, or to do something else for it. But the details are there because of the thesis . . . not the other way around. Everything in the article is related to the subject and useful to it. As the rhetoricians put it, content materials must be both relevant and pertinent to the subject.

Some sample theses made from one of the topics suggested earlier display the fact that you do not have an exact subject until you can express it as a thesis:

TOPIC
"The New Emphasis on Air Power in U.S. Strategy"

THESES

"The New Look in U.S. defense policy is merely emphasis of standing USAF concepts."

"The new emphasis on air power in U.S. strategy is belated recognition of the revolution in warfare caused by the aircraft."

"The new emphasis on air power in U.S. strategy will give us more defense for our defense dollars."

"The new emphasis on air power in U.S. strategy offers the USAF a great challenge."

"The new emphasis on air power in U.S. defense forces recognizes our most effective challenge to our enemy."

"The new emphasis on air power in U.S. defense policy entails reconsideration of the implementing forces."

A "topic" may embrace hundreds of "subjects." That is why you cannot write a strong, unified article without limiting a topic to a subject. Even if you limit it to a subject so broad as "There is a new emphasis on air power in U.S. defense." Unless you have a true subject, a thesis, you cannot decide

what materials to include as content. Each of the above examples would require different detail to explain and support them.

13.   What major points or statements should I make about my subject?

With your subject (thesis) firmly in mind, preferably written down across the top of a piece of paper, you are ready to set down under it the main points of your outline. Don't worry now about the order to put them in; just set them down as they suggest themselves. For clarity and good planning, write down each point as a single, complete, declarative sentence. Actually you are identifying the sub-theses under your thesis. Each of these will be the control statement or "topic sentence" for a major section of your article, just as your thesis controls your entire article. Remember that each major point should contribute importantly to the explanation of your thesis.

14.   What sub-points and blocks of material are needed under each major point?

Now you are dealing in terms of completeness of explanation, with particular concern for understanding by typical readers of your chosen publication. First check your list of main points. Do all of them relate directly to your thesis, or might some of them more properly be considered as subordinate to others? Next fill in the spaces under your surviving main points with indications of the principal things you intend to say about them. Again your test for inclusion is, does this material contribute significantly to the understanding of the point it is under? Don't worry now about the order of sub-points under a main point.

15.   In view of the special requirements of my chosen publication, especially length and level of difficulty, should I eliminate anything from my preliminary outline?

If you want your final display of information to be lucid and understandable, without lumps of half-explained material or obscure, partly presented concepts, you must plan your article content with length and proportions in mind. Discipline your advance planning. You will find it easier in the long run to make your first draft come out about the right length than to rescale a long finished article to a shorter length your outlet will accept. Nor should you attempt a history of the United States in 500 words, even if Calvin Coolidge did. He had a reputation as a man of few words. If you think your subject absolutely requires the inclusion of ten main points to explain it, and your space allotment is 1500 words, either you must limit your subject more severely or you must bring it in sharper focus otherwise . . . perhaps by concentrating on two or three of the most important main points as examples of the remainder. All this adds up to a very simple goal: Don't try to tell everything you know about your subject in your article, but do be sure to

include what your reader needs to know to understand you. Like an architect the writer must keep the size and density of his blocks of information in proportion to the lines of his total structure.

Ordering the Content of the Article

16. What will be the sequence of the major points in my article?

17. Does this sequence build up to and emphasize my purpose in writing the article?

18. What will be the sequence of the materials under each of the major points?

You are now ready to marshal your chosen materials in an order of presentation to the reader. No matter how strong your information is, an article is not a pot into which you throw handfuls of miscellaneous facts. To organize your article effectively, you must group your ideas into logical packages. Then you must add them to the development of your subject, package by package, in a sequence that makes for easy understanding.

There are several time-tried formal orders for material, such as the dramatic order of building up to a climax. Many expositions fall naturally into a chronological order. Frequently some things must be said first so that others may be understood. But whatever order you choose for your materials, it should be one that you have planned deliberately. Most careful writers use a written outline, not only as a try-square for shaping the proportions of their materials but as a scale drawing to plan and test the combination of their building materials.

Respect the time-tried practice of making an outline. First put your major points in a sequence that does each of them some good by the very fact they are in that order. Review this order with your purpose and your readers in mind. How will your readers pass from one point to another? Do the points have cumulative effect on those yet to come? What gain is there in saying first what you have placed first? What do you gain by your last point—in that position? Now apply the same process of ordering and testing to the subpoints under each main point.

19. Will the over-all sequence of my article pick up the reader easily and sweep him along systematically through a progressive transfer of content?

So far we have thought of sequence as the arranging of semi-independent blocks of material in a line. Question 19 contemplates the over-all effect of your order on readability and reader-pull. A good sequence picks the reader up at some convenient or strategic entry into the subject and draws him along effortlessly from consideration to consideration until he emerges into the light of full understanding. The major stations of the reader's journey through the material appear one by one, without gymnastics on his part, to

adjust them to his understanding. He is a well-cared-for traveller. When a question arises, there immediately at hand is the answer. If he needs more detail, it is provided. What he comes to next may surprise him, but never confuses him. The path he travels runs steadily and purposively ahead. When he is stopped for fuller view of a scene, he has no trouble resuming his way. There are no stop-overs while the author confesses the awkwardness of the itinerary by carrying him back to a previous stop for some neglected explanation.

Choosing Effective Methods and Style of Presenting the Article

20.　How will I overcome the normal reader resistance?

First of all you will have to realize that it exists. The editor knows it. He will attempt to assemble in his own attitude all the adverse reactions his readers may have. He will try to find your article unimportant, if his readers might. He will test it to see if it is dull, hard to read, confusing, uncertain, wrongly interpreted, poorly written, without impact, amateurish, out of date, or unrelated to his interests or gives him any other reason for denying it attention and therefore rejecting it. Your trick is to pick up his interest and sustain it, to give him confidence that you yourself are worth listening to, to convince him that you are giving him something worth knowing about, and to stimulate his understanding and regard by the way you bring your statements home to him.

We have underscored the major importance of careful planning for attaining these ends: a sharply defined subject and a clearly realized attitude toward it; a judicious choice of content material properly addressed to a well-visualized reader; the need for effective sequence. Proper observance of these basic requirements has yielded you the hard core of your article . . . a body of material ready for effective presentation. Now you must consider the numerous devices that skillful writers have invented to attract attention, to clarify statements, to emphasize important points, to visualize concepts . . . in short, to make certain that the story gets across with force.

So many possibilities exist among these inventions that a close study of a number of articles repays even the reasonably experienced writer for his time. Some usages, like that of the second person in this article to establish a collaboration between author and reader, are so common that you will recognize them as trademarks of certain types of writing. Some, like that ever-present young married couple, Bill and Anne, beloved in the ads, have been so overplayed, particularly in frothy, cozy, bright-happy little slick pieces, that they have become hucksters' gimmicks. But most are as valid and useful as the specialized techniques of any other profession. Only when they are strained and obtrusive, as when the unskilled after-dinner speaker tries to get off on the right foot with a commonplace joke that has nothing to do with his

subject, does the reader object or even become aware that his interest is being deliberately stimulated or his understanding expertly enriched.

The following questions relate to planning for effective presentation.

21. What would make a good lead for my article?

Editors call the beginning of an article the "lead." This is a good term for you to adopt, because it describes the effect of a good beginning. A good beginning catches the attention of the reader at once and *leads* him deep into the heart of the first thing the author wants to say about his subject. When the lead is apt and skillfully handled, the reader will not notice the transition into the body of the piece. A good lead may be only a sentence or even a phrase. It may fill several paragraphs. Generally 50 to 200 words is about right to get the average article (3000 words) off to a good start.

Leads may be as varied as the subjects they introduce, but certain kinds are met with again and again. Perhaps the lead currently in widest favor is the pertinent anecdote. This is not quite like the joke the after-dinner speaker is reminded of, for a beginning. Usually it is an actual, concrete example important to an understanding of the subject. It is a situation described or an incident told like a very brief story in terms of persons or objects involved. Turn back to the opening of this article. Examine also the leads of several articles in popular slick magazines, where the anecdote lead is nearly mandatory. If the incident or situation, real or imaginary, is genuinely introductory to the material that follows it and if it is interesting in its own right, the anecdote lead is extremely effective:

> **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 ensure a flow of new products, we maintain our stumbling department."—"Basic Research in the Air Force," AU Quarterly Review, VI, 4 (Winter 1953-54), 85.**

A bonus value is yielded if the anecdote lead also dramatizes the reason the reader has for reading what you have to say:

> **"Will proceed . . . TDY . . . Maxwell AFB, Ala . . . purpose attending Sq Off Crse . . . report . . . Comdt AC&SS . . . NLT . . ." When First Lieutenant Joe Doakes received his orders he muttered, "Why me? I'm not a desk jockey. I'm a pilot! What's this course like? What's in it for me?"**

Another familiar lead is the challenging statement related to the main idea of the article:

> **The true story of the World War II battle for Crete has never been told.**

Frequently this one includes, either openly or by implication, a hint that there is more to the matter than meets the eye.

An old standby is the lead that states briefly what the article is about and why the author thinks it is important to know what he has to say.* This lead is common in the professional journals, where the interest of the reader is presupposed. It is weak in the more popular article, where the lead is expected to attract immediately and to hold the reader's interest. Frequently a good substitute is the interesting tangent. The lead begins with a fact, or

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*For an example see "The Korean War Speaks to the Indo-Chinese War," *AU Quarterly Review*, VII, 1 (Spring 1954), 44.

the author's comment on a fact, that is interesting in itself. Soon the reader sees that this fact throws an interesting side light on something else and that this something else is what the author is getting ready to talk about in his article.

There is no lost motion in a good lead. It intrigues the reader with its first words and builds up his desire to read on.

> In late 1952 a small group of USAF commanders designed a plan to "buy" a piece of North Korean real estate and deny the enemy its use for a sustained period of time. The method: occupation and control by air forces.—"The Bridges at Sinanju and Yongmidong," AU Quarterly Review, VII, 1 (Spring 1954).

Give a lot of thought to your lead.

22.   What would make a good ending for my article?

Editors' jargon often refers to the ending of an article as the "sign-off." Like the lead the sign-off is a well-recognized component of good article structure. It is more than just the place you quit, the last paragraph. It deserves your careful attention as an important structural element.

Probably the most familiar sign-off to the non-pro is the summary of the article's principal points. The professionals seldom use this one, except in formal, learned journals. The sign-off resembles the lead in purpose and technique, except that it looks backward as well as forward. A good sign-off will usually lead back in some way either into the core of the article or to some especial high light. At the same time it closes the book, prodding the reader toward the reaction the author intends him to have:

> This presents a compelling challenge to those who give the Air Force its life and direction. In the proper exploitation of these resources lies our best hope that our nation will never have to commit these forces in total war. The strongest military force ever known demands like strength in its leadership. There must be much of the idealist and much of the realist in those who would shape the air age to produce the essentials for peace. The speed and scope of air development create situations which demand vision and imagination, while the solemn responsibility of the Air Force mission requires hardheaded realism and a profound respect for the power which is ours.—General Thomas D. White, "The Current Concept of American Military Strength," AU Quarterly Review, VII, 1 (Spring 1954), 14.

Again like the lead the sign-off is found in various forms: the anecdote, the revelation of the article's unusual personal significance for the reader, a suggested course of action that the reader will want to take now that he understands, or, as in the following example, the challenging or inspirational application of the content of the article:

> Europe's skeptical critique of United States performance in the cold war may err on the side of pessimism. However galling some of its negative conclusions may be to our pride, they cannot be ignored simply because they fail to confirm our own evaluation. Perhaps the results of our efforts do not warrant as much optimism as we are temperamentally prone to exhibit. Much has been achieved, especially in Europe. But the Soviet Union remains the same formidable opponent it has always been. And complacency and self-deception are still the most dangerous enemies of democratic peoples. —Professor Robert Strausz-Hupé, "The Nuclear Backfire," AU Quarterly Review, VII, 1 (Spring 1954), 43.

Very frequently the sign-off takes a brief glance at the article content from another point of view that gives it significance on another plane and rings down the curtain memorably:

> One thing that should be clear to everyone by now is that air power is indivisible. It can put at risk all important elements of a national structure. Attempts to classify it by types of aircraft, types of operations, or types of targets have led to confusion and misunderstandings. For that reason I have tried to think of it in terms of objectives, threats, and opportunities. The results desired, balanced against threats and opportunities, determine the weight, timing, and phasing of air attacks. Successful integration of these considerations into a pattern of employment is a complex business. Successful resolution of these problems is the primary aim and responsibility of the airman.—General Otto P. Weyland, "The Air Campaign in Korea," AU Quarterly Review, VI, 3 (Fall 1953), 28.

The final "anecdote," for another example, which is frequently used for a sign-off, may relate the reader's attention to the one concept the author would most wish to have remembered from his article:

> This was SOC. For Joe it was not to become merely a memory of rich experiences but would mark the acquisition of the tools he would need when he took that next step forward in his profession. For himself, for his unit, and for the Air Force, SOC had been a good investment.—"The Squadron Officer Course," AU Quarterly Review, VI, 3 (Fall 1953), 112.

Writing a good sign-off is not easy, but it is essential that you try. Your purpose will be to release the reader's attention gracefully but with a final flick of emphasis to something important.

23. What revealing comparisons or suggestive comment will strengthen the development of my thought?

24. What good illustrative examples can I use to reinforce significant points?

These two questions lead into the technique of making bare facts and abstract or general statements understandable, meaningful, and memorable. Readers quickly grasp and assimilate information that is presented or enlarged by specific comparisons, actual or hypothetical examples, picture-making details, or vivid, concrete terms.

The following quote shows the technique in a short paragraph. Notice how the second and fourth sentences give fuller, clearer meaning to the generalized first and fourth sentences by restating their content in concrete, specific terms. The second sentence offers a visualizable comparison; the fourth a specific example. Imbedded in the third is another instance of the technique: restatement of the abstract phrase, "illusion of reality," in the other words of a suggestive concept, "the joy of becoming lost in another world," that ties it in vividly and tightly with the paragraph topic. A visual image is also injected into the first sentence by its last word.

> Reading requires relaxation, and one does not relax at a mental gallop. One must saunter through the story, knapsack on back, pausing often to admire the adjectives, revel in the descriptions, become acquainted with the characters. The illusion of reality, the joy of becoming lost in another world, is attained only by fully sharing the experiences of a story.

This technique has been highly developed and is used copiously by professional writers who are seeking reader appeal. You will find it reflected in almost every line of the newsstand magazines. The wider the reader audience addressed, the more intensely the technique is usually applied. You cannot afford to disregard it in your article. Otherwise the bread you offer your reader will be unleavened, flavorless, and indigestible. Maybe it will have basic food value, but who will eat it?

How are you going to tell a man how moose meat tastes unless you compare its flavor and texture with slightly sweet, heavy beef and so bring the unfamiliar into the range of the familiar? The device of comparison, or suggested similarity, is probably the simplest form of the leavening technique. You have used it all your life to explain what you were talking about. The trick is to discover readily understandable comparisons or similarities with clarifying impact and then to dovetail them smoothly and unobtrusively into your thought sequence. Suppose you have written that "The USAF now makes 90,000 to 100,000 refueling operations a year." You might add for the benefit of most readers: "That is equal to refueling a USAF plane in the air every five minutes, every twenty-four hours, every day in the year." Comparisons must reach into the familiar if they are to provide full meaning. How about the oft-repeated comparison of the Hiroshima A-bomb to the explosive force of 20,000 tons of TNT? This one won't mean much to the average reader, who probably has no idea about the force of a ton of TNT. The writer who said the Hiroshima bomb was equal to the bomb load of 1000 World War II B-17's may have done a little better, for Air Force readers, but the one who expressed its explosive violence in terms of leveling a certain number of city blocks very likely did best of all for most readers, practically all of whom have a firm mental image of the mass of a city block.

Another way to vitalize abstract content is to do away with some of your prosy explanations in favor of apt examples, real or hypothetical. Often these examples can be told as anecdotes, a paragraph or two illustrating the point dramatically by a little episode involving persons in a pertinent situation. Examples may also be used to clarify the steps in a process, the application of a principle, the force of an idea, the complexity or magnitude of an operation, the interplay of controversy. Since it is difficult to show this device out of context, you are urged to study its use in two or three articles in the big-circulation general magazines. Many such articles are literally a sequence of anecdotal examples, closely strung along the thread of logical development, like beads. You will see that they lead the reader through a series of mental pictures. They are verbal illustrations.

25. Where do I need directionals to guide the reader through the sequence of my thought?

Directionals are phrases, statements, or paragraphs that indicate the relation of what you are about to say to what you have already said. At the end of the discussion of a principal sub-topic, for example, you may reinforce the reader's understanding if you unobtrusively underscore the point you have

just made and at the same time look forward to its bearing on the next main point. The phrase *for example* in the last sentence is a simple directional linking the sentence into this paragraph. Likewise the beginning of a new major section of the article must be made apparent. A group of paragraphs that turns aside to supplementary matter should be signaled. In short the reader should be directed from paragraph to paragraph and from sub-topic to sub-topic with clear understanding of the relation of all parts to each other and to the whole article.

You will have to beware of the trap set for you by your own knowledge of your subject. You will frequently be tempted to think that because *you* know so well how a certain idea follows from the one you have just been talking about, the reader must also know. These breaks in continuity are sure death to reader interest, not to speak of understanding. Your editor is not likely to find it worth while to stop, read over the two paragraphs again, and puzzle out how they fit together.

Furnish your reader with direction posts to point out his path through your article. The trick is to work them in so smoothly that they merge into and become a part of the flow of thought.

26. What would be an appropriate and effective writing style for my article?

What is this thing called writing style? Books have been written about it, as a blend of how the writer thinks, what forms and shapes of language his thought evokes, and with what resources of imaginative concept and phrase he can refine his thought. For your purpose in planning an article, let's define style as the way *you* say what you have to say.

With regard to the whole of your article, the style should be conditioned by your subject, by the publication (the readers) you have chosen, and by your predetermined attitude toward your material.

Obviously you must visualize your proposed readers and get far enough into their minds to determine if your phrases will be apt and meaningful, sometimes vivid, for them. All that we have said about reader comprehension and reader appeal bears two-fold on style of writing. You don't use the same approach and the same terms in a man's magazine as in a religious juvenile weekly.

Likewise with your own attitude toward your material. One manner of style says, "I have something here that will interest and help you." Another: "This will amuse you." The serious approach says, "I have a message you will want to hear." And the reportorial: "Here is the ungarbled word." Any of these attitudes, properly handled, is appropriate in most magazines. The main idea is to be consistent. Once you have adopted your approach, you must sustain it throughout the article.

Beyond the over-all approach, good writing style is a phenomenon of the actual phrasing rather than the planning of the article. Yet you must understand its qualities before you can wrestle with it, as wrestle with it you must, from first word to your last. Before you begin to write even your first draft, we ought to list and talk briefly about the more apparent qualities of a good style. We will confine ourselves largely to what, with practice, you may reasonably hope to attain. Here are eight positive virtues, all of which you

already exhibit in at least some degree in your natural manner of talking. Each and all may be cultivated without end. As Horace, grappling with them, mumbled: "Art is long and life is fleeting."

The Eight Cardinal Virtues of Good Style

(1) Clarity. Possessing clarity, the writer may find all else is forgiven. Confused writing may actually be the sign of the writer's shaky grasp of his material. He writes generally and vaguely because he doesn't understand specifically and exactly. If you have taken to heart the earlier paragraphs of our discussion, you will not come to this pass. Confusion may also result from carelessness. Examine your sentences as thought-units. Is the main thought in the main clause or lost in an overload of modifiers? Have you crammed four or five principal ideas into a single sentence? Are all pronoun references, particularly of demonstratives like *this*, immediately identifiable? Are all the words there that syntax demands? If you are having these troubles, you will need to get out your old freshman handbook of English and bone up on the structure of passable sentences.

For a working start toward the crisp, lean, well-ordered, immediately understandable thought-units of the professional, let's say that you are going to write relatively short sentences, most of them under twenty words. Many of them under twelve. Each of these sentences is going to be dominated by one central idea. You are going to crystallize this idea before you begin to write the sentence. You are going to choose meticulously the words that make up this sentence, with loving care for the exact word to render your precise meaning. You are going to rely more for lucidity on nouns and verbs packed with *your* precise meaning than on adjectives and adverbs to point up the meaning of your primary words. You are going to avoid undue complexity of sentence structure. In particular you will reduce dependent clauses to phrases at most opportunities and will reduce strings of modifying phrases to a single phrase, usually a gain.

(2) Conciseness. Economy of language is the other face of clarity, as much of the above advice reveals. But don't mistake mere brevity for conciseness, or mere length for wordiness. Pruning out statements or summarizing passages does not always bring conciseness. In the process you may well remove accuracy, emphasis, and vividness. Nevertheless the work of the not-too-skilled writer is laden with *drone* words and phrases and sentence construction that invites awkward "talking around" the idea rather than striking directly into it, often motivated by needless desire for hair-splitting accuracy. Strike out drone words or rephrase to avoid them.

> Courses are being offered in the field of geography.
> Courses are offered in geography.

> Fifth Air Force has entered into a program of improvement of its support facilities.
> Fifth Air Force is improving its support facilities.

> In order to carry out the increased scope of the procurement function several changes in the procurement organization and procedures were instituted.
> The increase in procurement brought on several changes in organization and procedure.

(3) Emphasis. Some concepts are more important to the development of your subject than others. They should be stressed, usually by greater detail, always by the manner of their statement. The writer must distinguish between the major idea of a sentence, paragraph, or passage and a minor or supplementary one and then must indicate their relative values to the reader.

You can give emphasis to your own writing by a number of devices well within the capability of even a beginner:

By position: The first and last sentence of a paragraph are important. The central idea of the paragraph therefore often comes first, as an announcement, or last, as a climax.

By separation: An idea may be emphasized by breaking it out as a separate short sentence, or series of short sentences.

By subordination: Modifying and qualifying ideas belong in dependent clauses and phrases, controlling ideas in simple sentences or main clauses.

By suspense: Holding the significance-giving thought until the last of the sentence or the paragraph is a trick to stress it.

By structure: The parallelism of ideas can be emphasized by parallel expression, that is, by sentences, clauses, or phrases built on the same grammatical plan.

Government of the people, by the people, for the people . . .

By repetition: Repeating important words or phrases will focus the reader's attention on them.

I will not do these things. I will not ask you to do these things. But inevitably these things must be done.

By detail: Embellishment of a concept by treating it in finer detail, with effective imagery, by concrete example, or by dramatic anecdote will give it emphasis.

Here is some specific, though negative, advice. Avoid words and constructions that de-emphasize, unless you use them deliberately to de-emphasize. Non-professional writing is often mushed-up by this fault. Formal military style of the old school is beset by it. For example:

Passive voice is effective when the thing acted upon is more important than the doer of the action. Otherwise it weakens your sentence by subordinating its subject in a phrasal modifier:

**Travel orders are issued by the adjutant.
The adjutant issues travel orders.**

Expletive sentences: "It is" and "there are" sentences are occasionally useful. But only occasionally. Keep your subject in its natural English position. Ahead of the verb.

**There are several officers waiting for orders.
Several officers are waiting for orders.**

Weak verbs: Give-away verbs like *appear* and *seem* are lifeless. They indicate a lack of certainty about the statement. Use forceful verbs. Unless you are uncertain.

**It seemed to him that he was right.
He believed he was right.**

(4) Vividness. Good writing is alive with color and sound and motion. Its thought flows along through a blend of word images that suggests exactly what the writer means. It is brought home to the human mind with the

living, breathing vocabulary of seeing, hearing, and doing. When King Lear invoked the storm against all mankind, he didn't cry out for a storm "big enough to destroy the earth" but for one that would

Strike flat the thick rotundity o' th' world . . .

Vivid writing rises from the power to think in terms of reality. It is the effect of words and phrases that relate your thought to the physical world of existable objects and actions.

Even if the Nazi legions stood triumphant on the Black Sea, or indeed upon the Caspian, even if Hitler was at the gates of India, it would profit him nothing if at the same time the entire economic and scientific apparatus of German war power lay shattered and pulverized at home.—Winston Churchill, 20 August 1940, on the certainty of victory through the air.

This is the craft of the master, but the apprentice can attend to a certain definite practice with profit.

For a starter you can go to work on the nouns, verbs, and adjectives in your sentences. Knock out many of your broad, general nouns and substitute very specific ones that create definite sense images. *Clay, loam, dust, gravel, sand,* and *turf,* suggest sharper images than *ground.* The same for verbs:

He got under the fence. (He wriggled, crept, inched, crawled, dug, plunged, slipped, rolled, rooted under the fence.)

A descriptive verb is often more vivid than a verb-adverb combination:

He spoke indistinctly. (He muttered, mumbled, stammered.)

Although descriptive adjectives should be used sparingly, you may improve your sentence, when you use one, if you describe specifically rather than vaguely or generally. Do you mean by a "good" book that it is instructive, informative, entertaining, inspiring, or moral? Or maybe that it is a choice product of the printer's craft?

A second technique that you will want to adopt is the use of figures of speech, particularly unforced and meaningful metaphors and similes. What is it like? Use a verbal picture as an answer:

The waters drove at the beach like a charge of mad cavalry.

Finally there is the short "anecdote." Try the life-giving infusion of the one, two, three, four, or five-sentence little stories. Ernie Pyle used the following one, with a second and subordinate anecdote imbedded, to suggest the tremendous war-might of America. The time: the morning of D plus 1, at Omaha Beach:

And standing out there on the water beyond all this wreckage was the greatest armada man has ever seen. You simply could not believe the gigantic collection of ships that lay out there waiting to unload. Looking from the bluff, it lay thick and clear to the far horizon of the sea and on beyond, and it spread out to the sides and was miles wide. Its utter enormity would move the hardest man. As I stood up there I noticed a group of freshly taken German prisoners standing nearby. They had not yet been put in the prison cage. They were just standing there, a couple of doughboys leisurely guarding them with tommy guns. The prisoners, too, were looking out to sea—the same bit of sea that for months and years had been so safely empty before their gaze. Now they stood staring almost as if in a trance. They didn't say a word to each other. They didn't need to.

(5) Variety This characteristic of good style is obvious. From the infinite possibilities of language the writer must choose a sequence of diversified

phrasings, sentence structures, and sentence lengths. You may approach this art somewhat mechanically by attending to the following:

—Vary the beginnings of sentences from the normal subject-opening.

—Do not begin several successive sentences with the same word, with subordinate clauses, or with participial phrases, except for special effect.

—Mix simple sentences with complex sentences.

—Use compound sentences sparingly.

—Mix short, terse sentences with longer ones.

—Do not overwork *where, when, while,* and *as.*

—Use the reference words *this, that, these, those,* and *it* sparingly.

—Do not monotonously repeat certain words that may be frequently invited by your subject.

(6) Freshness. The negative aspect of this essential quality of good writing is avoidance of trite phrases, hackneyed comparisons, and corny detail. In short the whole realm of the cliché, where items are either last-but-not-least or few-and-far-between, where teeth are like pearls, and where the rigid traditions of journalism decree that the murderess is always beautiful.

The positive virtue of freshness is verbal invention that seems never to have been said before and that, having been said, is difficult to conceive being said in other fashion. The Gettysburg Address, if you want a supreme example.

(7) Idiom. Good style is, in the literal sense of the word, native. We are all aware that the word-for-word translation of a paragraph of good English into even so closely related a language as German does not render a good German paragraph. Probably the translation will not even have sense. The cause is idiom, the fact that languages differ not only in vocabulary but in their customs of phrasing. The German says, literally, "the up to her knees in the water standing cow." Idiom is the native manner of speech, deep-rooted in the folkways of generations. Over and above obvious differences in personality a Churchill or a Franklin Roosevelt manifests innate intimacy with his native tongue.

Naturally we all speak our native tongue idiomatically; but if the less-gifted writer finds any excellence of the master difficult, it is the nativity of his work, so strongly bred that it is often untranslatable beyond the bare meaning.

Composition without an ear for native word combinations and native word orders sounds bookish and stilted. Its poorer manifestations are not readily intelligible. It is un-English.

Fortunately, here again, there are definite aids for you, even if you don't have a fine ear for language. You can at least strive to observe the proprieties of good English in choice of words and in combining words into phrases. This means you will avoid twisting words from their natural meanings or forcing them into unidiomatic associations with other words. Naturally you will avoid bad grammar (she looks *well* in pastel colors), vulgarisms *(misremember)*, improprieties in meaning *(leave* for *let, assure* for *ensure)*, dialect *(reckon* for *suppose)*, barbarisms *(preventative* for *preventive)*, unidiomatic phrasal combinations *(seldom or ever* for *seldom if ever)*, and slangy or low-folksy diction. Own a good handbook on current usage and gradually make its content your own. Above all own a good dictionary.

(8) Grace. Reject any sentence that sounds awkward when you read it aloud. To be doubly sure, have someone else read it aloud while you listen for his uncertainties of stress or difficulties in putting your words together into spoken phrases. Your sentences must *read*.

Do something about the following:

——*Unpronounceable phrasing.*—Avoid tongue twisters and harsh combinations of sound that are difficult to pronounce.

——*Needless repetition.*—Do not awkwardly repeat the same word or phrase. Use pronouns or synonyms, or reword the sentence.

——*Ear appeal.*—Avoid rhyming *(finger-breaking hand shaking)*, unpleasant dissonance *(overalarming air raid warning)*, and alliteration *(stealthily stepped)*.

Beyond the mere avoidance of awkwardness is grace of style. In one way fine writing is like music. It may be listened to with pleasure in its sound and movement. Although you may expect only silent reading for your article, you will want to give it pleasant-sounding word combinations and liquid continuity. The felicitous prose of the master may derive from talent, but attention and industry have some yield for the amateur.

——*Prose rhythm.*—Choose a pleasant diversity of sentences to follow one another. Avoid both the choppy monotony of unrelieved brevity and the mouth-filling complexity of meandering, wordy conglomerates. Good prose has rhythm, not like that of poetry and music but akin to the cadence and sequence of human life itself, composed of elements and seasons ever the same yet ever fresh and diverging. The passages we have quoted from Churchill and Ernie Pyle are samples, the one cadenced in the grand manner, the other in the homely rhythms of everyday speech.

If you would have true grace of style, then this final admonition. You must cultivate and bring into your writing all the other seven virtues of good style. Grace is the ultimate of them all.

Fortunately for all of us without great talent, very many thousands of articles are fed into our publications each year. Few editors can exact the finest authorship. If you have planned good answers to our 25 questions and if now you try with all your might for the seven virtues of good style, with perhaps a bare touch of the eighth, you will be printable. Good luck!

Now Sit Down and Write . . .

So You Did Write a Draft

Take a good look at it and revise . . .

TIME passes. Your quarters are permanently tainted with stale tobacco smoke. Your mass of accumulated scribblings is impressive. You have finished the first draft of your article. If you have successfully planned

and have written according to plan, your draft will approach the requirements implied in questions 5-25 of the Planning Check List.

Now it is time to make sure that you have satisfied them. As you read over your draft, study it as a whole. As a unit. As an article. Does it do what you intended? Study it against all the questions on the Check List, except the last. Save Question 26 for later. Probe mercilessly for weak spots. Is your draft truly a unit? Does it concern itself exclusively with your exact subject and focus directly on it? Is the thought sequence easy to follow? Do your main points emerge readily and prominently from the explanatory detail? Are your explanations lucid and apt? Are your details fresh and interesting?

If the answer to any of these questions is "no," you are in for some major repairs. Don't be surprised. Professionals revise. Then they revise again. For exactly the same reasons.

Revision comes hard. Authors mother their products. They don't really want to find anything wrong. The successful pro has been able to reverse this attitude. He searches for things that he can improve in his piece. He gives his changes the same close scrutiny he gave his original draft. He ruthlessly prunes, substitutes, and rephrases until he can do no better.

Now polish your revised draft . . .

YOUR manuscript is now ready for the final grace notes. Study the suggestions under Question 26 again, and edit your draft as well against them as you can. Paragraph by paragraph, sentence by sentence, polish its style, rephrasing, adding and subtracting, finding the best expression you are capable of.

Now dress up your manuscript for market . . .

TYPE a clean copy, double-spaced, on standard-sized typewriter white bond paper of at least 20-pound weight. Leave margins of an inch at top, bottom, and right and at least an inch and a half at left. Top margin on page one should be three inches down to your title. Put your full name and mailing address on page one, in the upper righthand corner. Put your last name, followed by the page number, at the extreme upper left corner of every succeeding page. Write "end" on the final page after the last line. Always mail manuscripts of more than five pages flat, without stapling or binding. A paper clip is customary. No letter of transmittal is necessary, but if you include one, make it brief. Don't forget to inclose a self-addressed, stamped return envelope of appropriate size.

One final thing. CLEARANCE. If your article deals with Air Force subject matter or derives from it, you must have official clearance for publication. Part II, which follows immediately, will deal with why and how.

Now you are in business. All you have to do is find an editor bright enough to appreciate your masterpiece.

Air University Quarterly Review

2

Official Clearance for Publication

Dr. Frank W. Anderson, Jr., Managing Editor

A FEW years ago the USAF had under development the XF-85, a parasite-type experimental fighter designed to extend fighter protection for long-range bombers. An unauthorized news story disclosed the mission, size, and configuration of the new fighter, the type of power plant and its thrust, performance data, armament details, and an "authoritative"-source statement that the whole project was impractical. Part of this information would have been released in another year or so; parts of it would not have been released until the aircraft was obsolescent. The data in this release not only enabled foreign nations to calculate with surprising accuracy the complete performance of the aircraft but revealed that the USAF had progressed to the development stage on a radical new approach to defense of strategic bombers. A potentially hostile nation had been given valuable information several years before it would normally have acquired it. It is for the purpose of preventing leaks like this one that Air Force authors are required to clear their articles before publication.

You now have copies of your article. You are ready to break into print. But you have been told that any article by a service-man on Air Force subject matter must be cleared through Office of Information Services channels before it can be submitted to a publisher. To get a clearer understanding of the whys and where-fores of clearance, let's make up a list of questions that may arise in your mind.

1. What is the purpose of clearance?
2. What kinds of information have to be cleared?
3. What are the channels for submitting an article for clearance?
4. What does the clearance procedure look for in an article?
5. What are the chances of getting an article through clearance?

1. What is the purpose of clearance?

The USAF clearance process is intended to provide a systematic, correlated release of as much of the Air Force story as restrictions of policy and security permit. A positive rather than a negative approach to the release of information, it is set up not to prevent information from reaching the public but to ensure that the public is *correctly* informed. As stated in the Air Force regulation on public relations (AFR 190-6, dated 13 October 1952) and emphasized by recent statements by the Vice Chief of Staff, Air Force authors, military and civilian, are encouraged to write and publish their own work, provided the writing is done in off-duty time and provided they clear their manuscripts with the proper authorities.

In an organization the size of the Air Force there must be some system which makes sure that information presented to the public by Air Force authors is correct in its interpretation of Air Force policies and actions. If two or three authors present conflicting accounts of what the Air Force has done or what the Air Force position is in a given situation, they only confuse the public and undermine public confidence in the Air Force. Information Services channels are set up to verify the accuracy of statements on specific Air Force actions or policies. The Information Services Officer can coordinate the manuscript through the appropriate staff agencies at his headquarters to be sure that the information is accurate and consistent. This action does not mean that for clearance of an article the official review agencies must necessarily agree with the author's opinions, interpretations, or recommendations. It does mean that the author must not misrepresent the Air Force.

Other aspects of policy governing the publication of Air Force writing are likewise designed to protect the best interests of the Air Force and the nation. It is not proper for persons in the Air Force to criticize in public the political, diplomatic, legislative, or administrative actions of the Government. Nor can their writings be allowed to affect service discipline, to involve their superiors in controversy, or to comment on Air Force policies which have not yet been made public. For the same reasons articles that clearly lead to interservice controversy are not approved. Suggestions and recommendations involving these topics are best brought to attention through normal service channels, rather than by published articles, which provoke public debate and emotional countercharges more than objective consideration.

An important partial exception to this general rule is made for articles to appear in official military publications. Here, where discussion of sensitive policy areas is for the express purpose of contributing to professional understanding within the military service, a degree of latitude is permissible. An author can recommend and discuss certain changes in national or Air Force policy or procedure to show how these changes would advance a specific strategy or concept. He is allowed to do this because his service audience will clearly understand that he speaks as an individual and not as a representative of the Air Force.

2. What kinds of information have to be cleared?

For material drawn from your Air Force experience or comments on international, national, or military matters, you must obtain official approval

for publication *before* it is sent to a publisher. (Except possibly for *official* military journals, most of which will secure clearances for their authors. Not all do this, however; it is wise for your own protection to find out what an official magazine's policy is in this regard and, if necessary, have the article cleared yourself.) As long as you can be identified as a member of the Air Force, your written opinion bearing on these subjects is a matter of interest to the government. If your subject is completely removed from your Air Force experience and from the affairs of government, no clearance is necessary. This would be true of an article on fishing, or stamp-collecting, or driving a racing car. It would also be true of an article of purely historical interest. If you wrote on a certain campaign in the War of 1812, you would not need a clearance to publish. But if you applied your generalizations on the War of 1812 to the military situation today, you must get the article approved. The best rule of thumb: when in doubt, have the article cleared. Then you will be protected, and the Air Force will be spared any possible embarrassment. Like any sensible regulatory program, the clearance procedure is a two-way street. Not only does it serve the overriding consideration of protecting the national interest, but it also protects the individual military author and gives him confidence. Once your article comes back approved for publication, you will have the satisfaction of knowing that not even by inadvertence are you violating security or offending policy. Also you will have the protection of official release for the statements and facts you are making public.
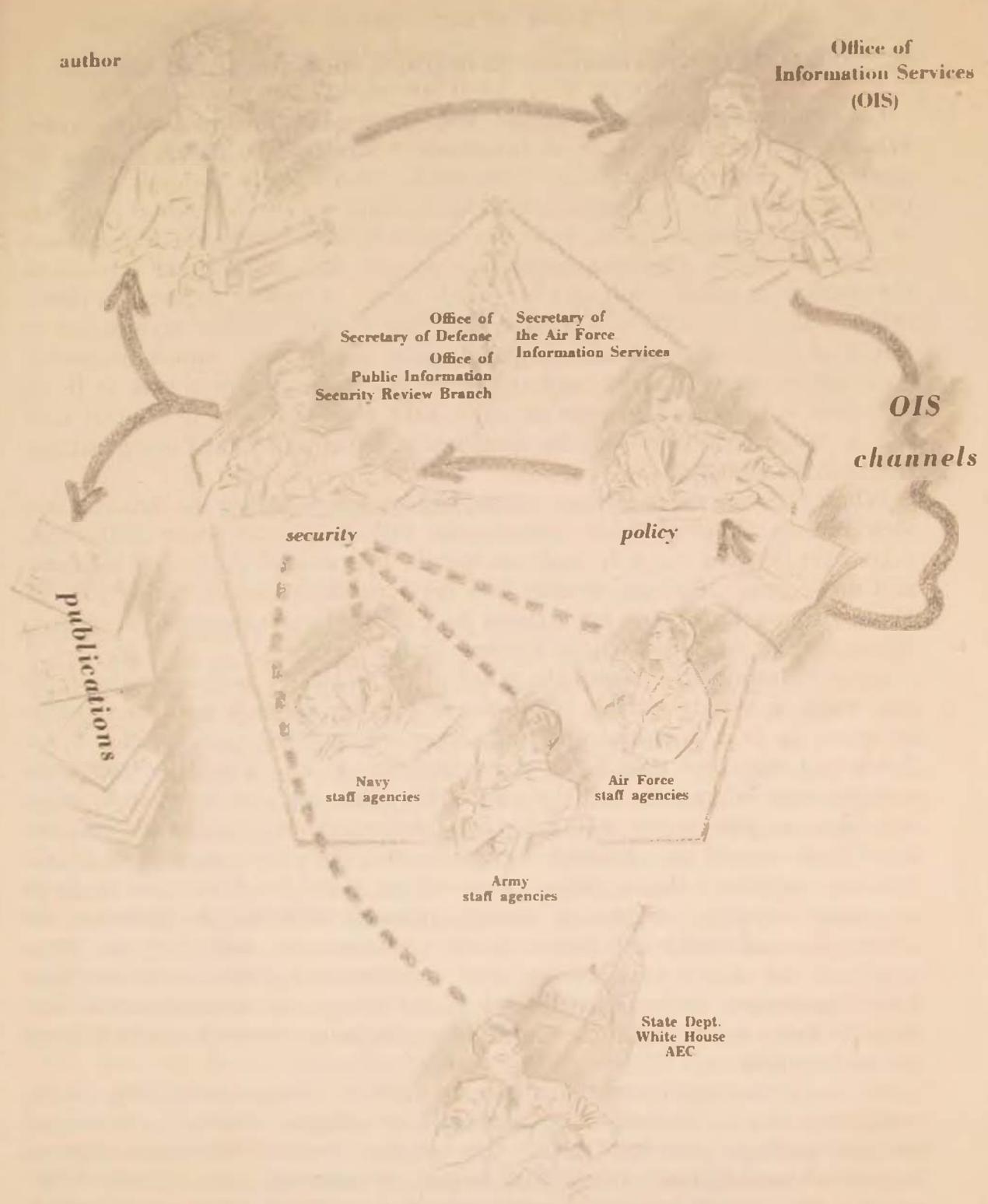
3.   What are the channels for submitting an article for clearance?

Your clearance channel is the Information Services Officer in your unit. How far up the OIS channel your article will have to go to obtain clearance depends on the subject matter. If your article deals only with your own base and is to be published in a paper or magazine of local circulation, the base ISO can clear your material. If your article concerns an activity of your major air command, the command ISO can clear the article. But any article which touches on the policies or actions of the entire Air Force, other government agencies, the government as a whole, or foreign governments must be cleared by the Office of Information Services, Hq USAF. Even an article of local interest must be cleared in Washington if it is to be printed in a magazine of national circulation.

Personal-experience material acquired in line of duty is the property of the Air Force until specifically released for your personal use. If you are a jet ace returning from Korea, and a magazine should dangle some cash in front of you for an article on your experiences, remember that the Air Force has prior right to your knowledge acquired in executing your official Air Force duties. The chances are the Air Force use of your material will not infringe at all on your personal-experience yarn, and you will be able to fulfill both commitments. Here again the ISO can give you the necessary go-ahead signal.

As for the details, clearance procedure requires that you send two copies of your article. The clearing office will stamp one copy and return it to you. It will keep the other on file in the office. If you already have a publisher

Air Force Clearance Procedures

author

Office of
Secretary of Defense

Secretary of
the Air Force
Information Services

Office of
Public Information
Security Review Branch

OIS

channels

security

policy

publications

Navy
staff agencies

Air Force
staff agencies

Army
staff agencies

State Dept.
White House
AEC

Clearance for articles written by Air Force authors is streamlined for quick service and authoritative judgment. The article goes from the author to his local Information Services Officer, through OIS channels to the appropriate action level. If subject matter must be approved by the Pentagon, it is reviewed there first by the Air Force OIS for policy, then screened and coordinated by the Security Review Branch for security information.

lined up, you can request that the cleared article be sent direct to the publisher rather than be returned to you.

4.   What does the clearance procedure look for in an article?

Let us suppose that your article must go to Washington for clearance. When it arrives at the Office of Information Services, Hq USAF, it must be cleared for policy and security. The check for Air Force policy is made in OIS. A staff of trained people, kept up to date on the Air Force positions on matters of public policy, read the article to make sure that the author's conception of the Air Force position is correct. OIS offers other services to the author. If publication of your article seems of benefit to the Air Force, OIS is willing to perform a limited edit and rewrite on your manuscript to put it in polished form. Also if you request it, OIS will contact magazines your article seems likely to appeal to and ask them to take a look at it. If an editor is interested in your material, OIS then puts him in contact with you so that you can work out the details of publication and any compensation that may be involved.

When OIS has checked your article for Air Force policy, the Security Review Branch, Office of Public Information, Office of the Secretary of Defense, takes over. Here a check is made on specific operational policy, on accuracy, and on security. Because security is a very important consideration for Air Force authors, let's pause for a closer look at the factors involved in security clearance and how the Security Review Branch operates.

Security frequently plagues the mind of the would-be military author. No one wants to violate security regulations. No one wants to pass on valuable information to a potential enemy. Consequently many persons in the Air Force feel that they should not write anything at all. They live and work with security information all the time. How, they ask, can they tell whether the ideas or even some of the factual information in their heads did not come from one of the classified documents that they have worked with? Or how do they know that a shrewd guess on what the Air Force should do in a certain situation might not actually coincide with highly classified Air Force plans of which the author is not even aware? Also they may have acquired the wide-spread feeling that security and policy restrictions on in-service writers are so much stricter than the ones on civilian authors that the Air Force writer has little chance of getting a worth-while article cleared for publication.

All these conceptions' are partly or completely wrong. Something worthwhile remains to be said about almost any subject. As was pointed out earlier, perhaps you have made the mistake, because the more general aspects of your subject are old stuff to you, of assuming that the only information that would interest a reader are those elements that are classified. It is true that certain subject areas are so close to the vitals of national defense that they are especially sensitive. Even in these cases articles can be written about the subjects—indeed, because of the strict limitations, an article on these subjects may be particularly worthwhile. But the author should have a broad knowledge of his subject and a pretty good idea of what the sore spots are. At any rate you can be sure that, except for the time you have invested in writing an article, there is no penalty attached to having it

SENSITIVE CLEARANCE SUBJECTS

Certain subjects are delicate ones for policy or security. While this by no means implies that the military author should not write about them, it does mean that he will have to be especially aware of the problems involved and more than usually careful in how he says what he has to say.

POLICY CONSIDERATIONS

1. Foreign policy
2. Interservice differences of opinion
3. Misconceptions on Air Force or U.S. policy

SECURITY CONSIDERATIONS

1. Guided weapons
2. Atomic weapons
3. Psychological warfare
4. Bacteriological and chemical warfare

rejected for security or policy reasons. If an article is rejected, you will be told why. You are at perfect liberty to revise the article to remove the objection and then submit it for clearance a second time. Frequently a clearance objection is not so much a matter of what is said as how it is said. Also it is true that many subjects change in sensitivity with the times. If you write that the Air Force must acquire bases in a certain foreign country, you may be quite correct and completely in line with Air Force thinking. But if the State Department is quietly engaged in very delicate negotiations with this foreign country for such bases, the Security Review Branch may quite properly decide that it would not be in the public interest to allow an article by an Air Force officer to appear in which he admits a desperate need the U.S. has for those bases. Yet six months earlier or six months later this particular item might be completely harmless.

This problem of timing the release of information has many facets. It is one of the main reasons for the existence of an inter-service clearing office. The Security Review Branch clears not only articles but speeches, movie film, publicity releases by military contractors, photographs, scripts for radio and television shows, books, etc. It also compiles, coordinates, and keeps up to date the security rulings of the various agencies in the Department of Defense. Only in this way can security regulations have the consistency of interpretation and the current information necessary to protect the national interest without unduly restricting the legitimate flow of information.

Another function of the Security Review Branch is to protect the military officer from unwitting violations of security regulations. Through its own files and its system of coordination with staff agencies in the Pentagon and in other government agencies, SRB can screen the information in an article and can depend on expert assistance on almost any subject relating to governmental activity.

Security exists for the purpose of protecting classified information for as long as it could have value to foreign nations. There is no halfway point in security. Once information is compromised, the cat is permanently out of the bag. The protection of information must be centrally controlled. Otherwise the little details that leak out here and there in uncoordinated releases can be interpolated by a foreign nation into a surprisingly accurate picture of a new weapon and even the accompanying strategy for its employment. It is all the more important to maintain close control over the pieces of information because some of the items simply cannot be concealed. An example of this is shown in the accompanying pictures. Until recently security regulations forbade the publishing of photographs or details of the landing gear of new aircraft for some time after the initial flight. But, as the accompanying pictures show, this information had usually been compromised during the initial flight. The released photograph of the initial flight of the YB-60 in April 1952 showed the aircraft barely off the runway but with no landing gear showing. Retouchers had carefully painted it out on the negative in conformance with security. Yet cars (below) had lined the fence of the airfield for blocks at the time of take-off. The B-60 can be seen airborne in the left distance. Many of the spectators along the fence had cameras with them—three are visible in this picture. There was no longer any secret about the landing gear of the YB-60. Most of the initial flights of new aircraft are made under similar conditions. Recently this particular security restriction has been dropped as impractical.

5. **What are the chances of getting an article through security clearance?**

The records of the Security Review Branch simply do not bear out the feeling that the cards are stacked against the military author. A check of the files covering the year 1953 reveals that articles submitted through Information Services channels fared better than did the articles voluntarily submitted for clearance by civilian publications. Both types encountered a rejection rate of less than 5 per cent. But only 24 per cent of the articles by military authors were amended before they were cleared, as opposed to 45 per cent of the articles submitted by civilian publications. To look at it another way, SRB cleared without change 71 per cent of the articles by military authors, but only 54 per cent of the articles by civilian magazines came through unscathed. While this statistical sampling indicates that military authors do not encounter more difficulty than do civilian authors writing on military subjects, it is true that a Government employee is in a sense a representative of the U.S. and, as such, must meet some special restrictions. A number of policy limitations have already been mentioned. Another restriction which should be mentioned is the one on the use of "informed speculation." Such cases arise when a military author cites a news story which quotes an unidentified "high official" or which derives its own interpretation of events in a series of second-guesses. For a person in the military service to quote some such unsubstantiated report and then base his article on it is unacceptable because it infers that the Air Force acknowledges the validity of the information.

Clearance procedures, then, serve three major functions: (1) they protect the best interests of the U.S.; (2) they correlate the information coming from the Air Force to the public so that the public gets a connected, coherent view of what the Air Force is doing and thinking; and (3) they protect the individual military author from inadvertently leaking security information or violating Air Force policy. The Office of Information Services channels and the Security Review Branch provide quick, official service. But remember this action must be taken *before* the article is sent to a magazine, unless it is going to an official military publication.

Air University Quarterly Review

The Quarterly Review Contributors

AIR MARSHAL SIR ROBERT SAUNDBY, KBE, CB, MC, DFC, AFC, FRES, war-time second in command of RAF Bomber Command, began his service career as an infantry officer in 1914. He transferred in 1915 to the Royal Flying Corps and spent the rest of the war as a fighter pilot. He served in Iraq and Aden from 1922 to 1926, during the initiation of "air control" in those countries. He is a graduate of the RAF Staff College and the Imperial Defence College and served on the Directing Staff (faculty) of the RAF Staff College from 1934 to 1936. From 1937 to 1940 he was Deputy Director of Operations, Director of Operational Requirements, and Assistant Chief of the Air Staff (Technical) at the Air Ministry. Assigned to Bomber Command at the end of 1940 as Senior Air Staff Officer, he was Deputy Commander-in-Chief of Bomber Command from the beginning of 1943 to the end of the war. He retired in 1946, because of disability from injuries received in Belgium in 1917.

BRIG. GEN. JAMES FERGUSON is Deputy Commander of the Ninth Air Force, Shaw AFB, South Carolina. In June 1951, he became Vice Commander of the Fifth Air Force in Korea, having previously been Assistant Vice Commander for Operations, Hq FEAF. In November 1947 General Ferguson went to Ankara, Turkey, where he served as Chief of the Training Division of the U.S. Air Force Group of the American Mission for Aid to Turkey; Chief of Staff for the Group; and Chief of the Group. From 1945 to 1947 he was a member of the staff and faculty of the Air University and served as Assistant Chief of Staff for Operations, Air University. During the war General Ferguson took the 405th Fighter Group to the European Theater in March 1944, and the following month he became Assistant Operations Officer of the XIX Tactical Air Command. General Ferguson was born in Smyrna, Turkey, later moved to the United States with his family and settled in Whittier, California. In 1934 he enlisted in the Air Corps and a year later was appointed a flying cadet.

LT. COL. TOMÁS C. TIRONA, formerly Chief of the Air Staff of the Philippine Air Force, is a graduate of the Philippine Military Academy, the Philippine Air Force and USAF pilot training schools, and of the Air Tactical School and the Field Officer Course of the Air Command and Staff School. During World War II he was an infantry company commander in Bataan and Corregidor, a POW for a time, and a guerrilla intelligence officer.

MAJ. GEN. SORY SMITH (U.S.M.A.), recently assigned as Commander, Pacific Air Force, was Director of Public Information, Hq USAF from 1950 to 1954. In June 1948 he was appointed Executive to the Chief of Staff of the Air Force with additional duty as Secretary General of the Air Board. In 1947-1948 General Smith attended the Air War College. General Smith was commissioned a second lieutenant in the Infantry in 1930. The following September he began flying training and after graduation was rated a pilot and transferred to the Air Corps. In

August 1941 General Smith was appointed a member of the U.S. Military North African Mission at Cairo, Egypt, and later was Assistant Chief of Staff for Personnel of the Ninth Air Force. During the war he was special assistant to the Commanding General of the European Division of ATC. In April 1945 he was appointed Chief of Staff of the IX Tactical Air Command in Europe.

LT. COLONEL GEORGE E. LONG (B.A., University of Richmond, M.A. and Ph.D., Columbia University) is Chief, Systems Applications Branch, Human Factors Division, Hq Air Research and Development Command. He graduated from flying school in June 1942 and instructed in single-, twin-, and four-engine flying training until December 1943. He was then assigned to the 96th Bomb Group (B-17's) of the Eighth Air Force in England and served as Operations Officer and later Squadron Commander of the 337th Bomb Squadron of that group. Colonel Long has been engaged in Human Engineering research and development since 1947.

COLONEL CHARLES G. TESCHNER is presently serving as Chief of Combat Operations Division, Hq FEAF. He entered flying school in 1939 and his flying career has been entirely with fighters and fighter-bombers. He was at Wheeler Field on 7 December 1941 and remained in the Pacific until spring 1943. He served in England in fall of 1943 with a P-47 squadron and was assigned to the Ninth Air Force. Later he was transferred to 354th Fighter Group and flew P-51's until fall of 1944. He served in Korea as a group commander of F-84 fighter-bombers and as Assistant Director of Operations, Fifth Air Force.

LT. COL. CHARLES V. BURNS has been Chief, Air Traffic Control Branch, Hq FEAF, since 1951. A 1940 graduate of flying school, Colonel Burns served his first four years as flight instructor, training supervisor, and base air inspector. In 1945 he became CO of 827th Bomb Squadron in Italy and later Director of Operations, Cazas AB, Casablanca. Following the war he was an airlines pilot until his recall in 1951. As U.S. Chairman of the CAA Subcommittee to the Joint Committee under the Administrative Agreement with Japan, Colonel Burns negotiated the Air Traffic Control Agreement for control of all civil and military traffic and operation of the Air Traffic Control System in Japan.

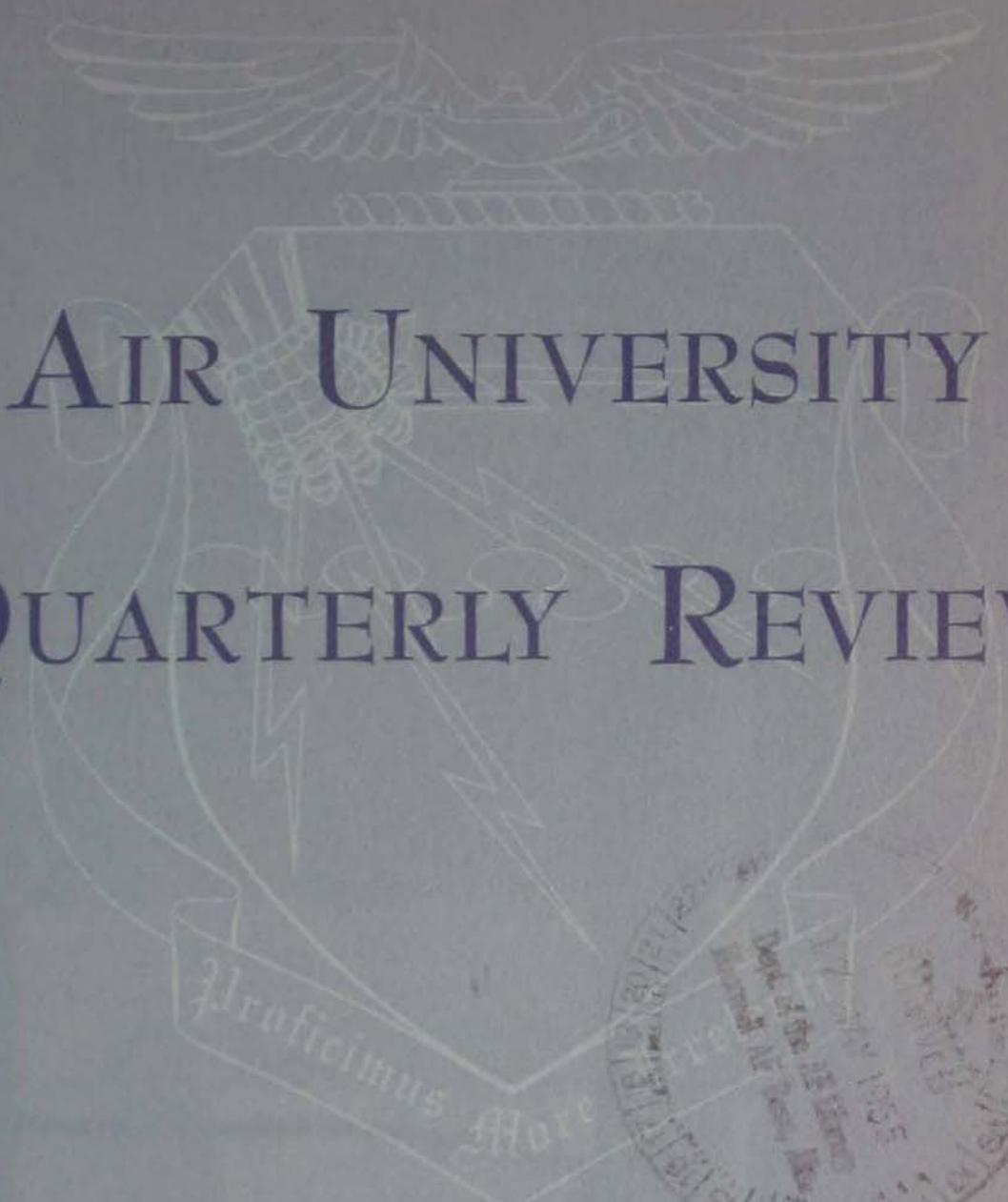COLONEL ROBERT B. NOWELL was one of the pioneers in developing the Air Terminal Group in Korea.

COLONEL ANDREW E. KRIEGER, JR. (Cornell University) is Deputy for Research and Development, 11th Air Division (Defense), Ladd AFB, Alaska. A fighter pilot during World War II, he served in that capacity successively in the Philippine Islands, New Guinea, and England prior to his assignment to the staff of the VIII Fighter Command. After the war he was stationed at Eglin AFB in charge of testing in the Climatic Hangar, following which he attended the Air Command and Staff School, 1947-48. From 1948 to 1951 he was an instructor at that school. He attended the Air War College in the class of 1951-52.

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