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AIR SUPERIORITY IN TACTICAL AIR WARFARE . . .
AEROMEDICAL EVACUATION . . . FUTURE OF NATO

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the cover

The destruction of a MIG-17 was recorded by an F-105's gun camera as the MIG crashed over North Vietnam, where our air superiority "has yet to be seriously challenged," according to General Bruce K. Holloway. In the lead article, "Air Superiority in Tactical Air Warfare," General Holloway discusses the essential elements of air superiority and considers it in past and future perspectives.

AIR SUPERIORITY IN TACTICAL AIR WARFARE

General Bruce K. Holloway

TWENTY-SIX million living Americans are veterans of military service, and most of them have served in wartime. How many of these 26 million ever had to face an enemy who held air superiority? Not many: the 20,000 Army, Air Corps, and Marine troops who were cut off and overrun in the Philippines immediately after Pearl Harbor; scattered units in the Pacific during the early days of World War II; the soldiers and airmen in the Southwest Pacific prior to our defeat of Japanese air power at Wewak in August 1943; U.S. forces in North Africa up to the battle of Kasserine Pass in February 1943. In all, probably no more than one out of 150, for after February 1943

the U.S. and our allies had undisputed air superiority in the Mediterranean and Western Europe; after August of 1943 we had it in the Pacific. From that time on, there were isolated and relatively rare instances in which our opponents gained temporary, local air superiority, especially in the Pacific, but these were the exceptions.

In Korea we won air superiority twice—from the North Korean Air Force in the first two months of that war, and again from the Chinese Air Force after November 1950. The latter was a novel kind of air superiority, prophetic of things to come; I will discuss it later. In South Vietnam, our air superiority has come by default. In North Vietnam it has yet to be seriously challenged.

A generation of American fighting men has almost forgotten what it is like *not* to have air superiority—what it is like to lose mobility except by night; to be cut off from supplies and reinforcements; to be constantly under the watchful eye of enemy reconnaissance aircraft; to be always vulnerable to strafing and bombing attacks; to see one's fighters and bombers burn on their hardstands; to be outnumbered, outgunned, and outmaneuvered in the air.

We sometimes forget, too, the cost of gaining air superiority from a well-equipped, well-trained, and determined enemy. In the European and Mediterranean Theaters alone, U.S. air forces lost 4325 fighters and bombers prior to June 1944. Nearly 17,000 of our aircrew people were killed in action, and more than 21,000 were missing or prisoners of war. The fighter losses were largely a result of the battle for air superiority. A major part of our bomber effort in preparation for the Allied invasion was devoted directly or indirectly to the air superiority mission.

From D-Day until the German surrender on 8 May 1945, a period of eleven months, the U.S. Eighth and Ninth Air Forces and the First Tactical Air Force flew 320,000 sorties to maintain the air superiority that we had won at so great a cost. This was about 25 percent of the total number of sorties flown during that eleven-month period. In addition to these sorties, fighters of the Fifteenth Air Force based in Italy gained air superiority there and carried fighter sweeps and escort missions deep into Germany.

Air superiority came hard and high. Although the Allied air forces had won air *supremacy* over Normandy and the Channel coast by the time of the invasion, Luftwaffe attacks on our bomber formations continued at a high level throughout the fall and winter of 1944–45. Not until the closing days of the war was theater-wide air supremacy finally achieved.

We entered World War II underestimating the importance of air superiority and the difficulty of winning it. We were unprepared both qualitatively and quantitatively. But we emerged from that war with an unrivaled mastery of the employment of air power. We learned the hard way that air superiority is the key to effective use of air power, which is in turn the key to successful surface operations.

In the years since then, that lesson seemed to be forgotten or ignored, or set aside, twice and relearned twice: first, in the period between World War II and the Korean War, when hopes for a stable, peaceful world were high. Korea at least temporarily changed that hope. Again between 1954 and the early 1960s there was a widely held belief that strategic nuclear superiority was virtually a universal deterrent and that any war which happened by accident or miscalculation was likely to be measured in terms of hours or days. In that context, tactical air superiority was again neglected.

The United States was not the only nation that learned in World War II the value of air superiority and the exorbitant cost of not having it. Hitler launched his attack on the Soviet Union with 164 divisions supported by 2000 German combat aircraft and 700 combat aircraft of his allies. The Russians opposed that force with about 119 divisions and some 5000 aircraft, most of them designed for support of ground forces. Within a week the Luftwaffe, with superior fighter aircraft and pilots, had achieved air superiority on the Eastern Front. Probably more than 4000 Soviet aircraft were destroyed on the ground and in

the air during that week. Luftwaffe fighter pilots scored phenomenal numbers of kills against inferior Soviet aircraft. They continued to shoot down Soviet aircraft wholesale until the Allied offensive had turned full-tide against Germany; her fighters were deprived of bases, fuel, and supplies; and the U.S.S.R. had achieved air superiority on the Eastern Front. This expensive lesson in air superiority was not lost on Soviet airmen.

Five years after V-E Day the Soviets were putting into the field jet fighters that were technically the equal of any air superiority fighter in the world. Before the close of 1950 we were to find out in MIG Alley just how good their fighters were.

Air Superiority—What and How Much?

Air superiority is a relative term, relative in both degree and scope. It is officially defined as "that degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea and air forces at a given time and place without prohibitive interference by the opposing force." That official definition establishes a minimum requirement for air superiority: the elimination of *prohibitive* interference. We want always to do much better than that.

At the other end of the air superiority spectrum lies air supremacy, "that degree of air superiority wherein the opposing air force is incapable of effective interference." That desirable goal may be unattainable, even unnecessary, against either a formidable opponent (such as the Japanese Air Force of World War II) or a less formidable enemy operating from sanctuaries (the Chinese Air Force during the second phase of the Korean War) or a minor power whose equipment is supplied by a noncombatant third power (as in Vietnam).

In China during World War II our air superiority was, indeed, relative. We were constantly outnumbered by enemy fighters and bombers; we were inadequately supplied and equipped with what was left over after the higher-priority theaters were taken care of. Despite these handicaps, we were able to maintain air superiority at times and places of our choosing. In three years of operations, the Fourteenth Air Force destroyed 2300 enemy aircraft at a cost of 500 of our own bombers and fighters lost from all causes, combat and noncombat. The 23d Fighter Group and its predecessor, the American Volunteer Group, shot down ten Japanese aircraft for every one of ours lost in combat—a total of 1238 kills. Our fighters and bombers sank and damaged more than two million tons of shipping, killed an estimated 60,000 enemy troops, and, together with the Chinese Army, tied down nearly a million Japanese troops in China.

Again, during the second phase of the Korean War, air superiority was relative, but in a different way. From November 1950 to June 1953, air battles between USAF F-86s and Chinese MIG-15s were waged continually along the Yalu. The kill ratio was heavily in our favor, but the Communist fighter force was never eliminated, since we were not able to attack its bases across the river in Manchuria. Nevertheless, we had a degree of air superiority approaching supremacy. The Communists were prevented from deploying their fighters to North Korea bases, which were continually neutralized by Far East Air Forces bombers and fighter-bombers as soon as they were completed. As a result of our bombers and fighters penning up the MIG's, there were virtually no air attacks on U.S. troops or supply lines during the entire course of the war. Our interdiction attacks greatly complicated the enemy's logistic problem, and by the war's end USAF pilots claimed 145,000 enemy troops killed by air-to-surface firepower. Only three Americans are known to have been killed on the ground by enemy air action.

What constitutes an acceptable degree of air superiority will depend on a wide range of circumstances including the kind of war postulated, types of weapons employed, both geographical and political environments, and economic factors. This is a problem that has to be considered in our force planning. It involves some very difficult decisions on allocation of resources among mission areas, systems

and subsystems, and force levels.

In a general nuclear war even immediate air supremacy would not be enough to prevent grave damage to our own country from an enemy's striking force which included both missiles and bombers. A high level of air superiority could, however, decide the final outcome: which contestant emerged with the greater degree of viability. Whether such an outcome could be described as "victory" is another question. Losing less than an opponent seems at least better than losing more. But since there could be no winner in the traditional sense, our first-priority task is to deter general nuclear war on terms that do not involve a bargaining away of national objectives in order to avoid a nuclear exchange.

Air superiority *is* an important element in deterrence or in the outcome of general war. In many ways it is easier to plan for in general war than in other types of war, since the strategic bomber threat to this country is quite well known both quantitatively and qualitatively, and the options open to a potential enemy are fewer than in limited war or insurgency. We have available, or potentially available, warning systems, an advanced interceptor, and an airborne warning and control system (AWACS) to supplement missiles as a counter to the threat of general war. I do not propose to deal in any greater detail with this special area of air superiority but rather will limit my observations to theater air superiority, which is primarily a task for tactical air forces.

Air Superiority— How and With What?

Air superiority begins far from the battlefield and long before the battle. Often the tendency is to look first and perhaps only at the end process, the battle itself, and to ignore that portion of the air superiority iceberg lying below the surface.

What are the elements that underlie the battle for air superiority? There are at least six.

Perhaps the starting point is *intelligence* information concerning the quantitative and qualitative strength of the potential enemy's forces, his research and development activities, and the courses of action open to him. This information is helpful in determining both the design characteristics of our fighters and our force levels. But because of the lead time required to take an advanced fighter from concept to flight line, intelligence is not an infallible index of long-range requirements. The Soviets may not themselves know what their newest fighters will be like in, say, 1975, and certainly they have not settled on force levels for that period any more than we have. Nevertheless, technical intelligence is a useful long-range guide, and in the short term it can provide us valuable information on hardware in-being, tactics, training programs, and deployments.

A second element of air superiority is our own *scientific/technical/industrial competence and capacity.* In this respect the United States enjoys a potential advantage that is unmatched by any other country, particularly in industrial capacity—and industrial capacity is a major determinant of success in a long war of attrition. In World War II we did not gain air superiority in any major theater of operations until we had achieved numerical superiority in fighter aircraft.

During that war the eleven leading U.S. aircraft companies produced 229,554 planes. Contrasting these figures with recent approved buys of military aircraft, including Army helicopters and light aircraft (between 2300 and 3000 a year), gives a rough indication of the additional capacity that could be generated in an emergency.

But we cannot count on throwing a switch and increasing production overnight by a factor of ten or five or even two. Hot production lines are a requisite for rapidly accelerating the output of current models. The lead time for developing and producing a new advanced aircraft is considerable; under optimum conditions it is probably between three and five years, depending on the type of aircraft. And production of aircraft does not alone bring a combat force into being. Crews have to be trained, a wide range of supporting systems and procedures provided. Scientific and technical competence are essential but

Although our bombers inflicted severe damage on the oil refineries at Ploesti, Romania, 1 August 1943, the cost was heavy. Germany's leading World War II ace, Erich Hartmann, alone claimed seven of our fighters that day—convincing evidence that professional experience is an important element in air superiority.

not a safe substitute for forces-in-being.

One of the most important but least tangible elements of air superiority is *doctrine*. This is a great lesson of World War II, where faulty doctrine brought us close to disaster in the European Theater.

During the 1920s and '30s, air leaders had given lip service, but not much more, to air superiority. The belief was widely held that bomber attacks on enemy industry and population centers would force surrender early—perhaps without the commitment of huge ground forces. Most airmen agreed that enemy "pursuit" aviation, as it then was called, could not seriously interfere with a determined bomber attack.

As a result of the lack of emphasis on fighter aviation, VIII Fighter Command P-38s and P-47s based in England were severely range-limited when they first were committed to combat in 1943. They could escort the bombers only to the European coast or a little beyond and could not stage offensive fighter sweeps to clear the skies of enemy fighters. The myth of bomber invulnerability was exploded over Schweinfurt, Regensburg, Kiel, and other targets in Germany before the end of that first year of combat, with losses on some missions running as high as 50 percent. After the second Schweinfurt raid of 14 October 1943 (Black Thursday), no more unescorted bomber penetrations were attempted until the Luftwaffe fighter threat had been reduced.

Belated attention was given to fighter range extension in late 1943. P-47 combat radius was extended from 175 miles to 400 miles with belly tanks. Our fighters began scoring heavily on offensive fighter sweeps into Germany, and by the spring of 1944 the tables had been turned. The Allies were in control of the air over Germany. The arrival of the P-51 in the summer of 1944 tightened this control. By war's end, the P-51's radius of action was greater than that of the B-17, and our mastery of German skies was complete.*

*For a detailed discussion of the fighter range problem and of the part Allied bombers played in gaining air superiority, see "The Defeat of the German Air Force," Military Analysis Division, The United States Strategic Bombing Survey, January 1947.

Many of the World War II lessons are still relevant today, even though weapon systems have changed drastically in the intervening 25 years. One of the most important lessons is the early advantage held by the side that enters a war with sound doctrine.

After World War II, our doctrine—so far as air superiority was concerned—lay dormant while we adjusted to nuclear weapons and stringent budgets. We were concerned primarily with the fighter's interceptor role, not with a possible battle for tactical air superiority.

The Korean War saw a revival of World War II doctrine, with some modifications. But after 1953, air superiority, so far as fighter aircraft were concerned, was again limited largely to the defense of the U.S. against enemy bombers. Our tactical fighters were designed primarily for nuclear war where penetration was more important than maneuverability, ordnance load-carrying ability more important than armament, alert status more important than sustained sortie rates. The tactical fighter became less and less an air superiority system, more and more what once was called an attack aircraft.

Since the beginnings of jet aviation, it is only in the last three years that real recognition has been given to the need for a true air superiority fighter in the types of war most likely to occur. With the exception of the F-4 we do not, even now, have a first-line tactical fighter that was designed primarily for air-to-air combat and only secondarily for the reconnaissance, interdiction, and close air support roles of tactical aviation. We now see quite clearly the need for one.

Throughout history, doctrine developed in time of peace more often than not has failed to stand the test of war. Quite consistently, it has had to be drastically modified or scrapped altogether once the shooting started. The side that refused, or was unable, to change its doctrine fought at a disadvantage. Witness the Luftwaffe of World War II.

We have better methods and means for studying doctrine (and tactics) than in the past, and a better appreciation of its importance. We therefore should do better in the future, but with no guarantee of infallibility. Flexibil-

ity and depth of forces are two hedges against man's inability to see into the future with clarity.

The other elements of air superiority that I'd like to discuss all relate directly to people. They are *professional experience*, *training*, and *command judgment*.

It probably is not possible to quantify the value of *professional experience*—of combat experience. We all know it is important; but how important and how to weight combat experience as compared to technical factors and to an opponent's experience curve are questions with no clear answers.

Germany's leading World War II ace, Erich Hartmann, is a good example of the value of experience. All of the 352 air-to-air victories credited to Hartmann were against Soviet pilots except for 7 U.S. fighters claimed over Ploesti. After 100 missions on the Eastern Front, he had scored 7 victories. Three months later, with 200 missions, his score stood at 34 kills. The following month (August 1943), he shot down 49 Russian aircraft; in September, 25; in October, 33. Several times in the later stages of his combat career he was credited with shooting down an enemy aircraft with a single cannon shell.

The value of experience also was clearly evident in Korea. Thirty-nine USAF pilots became jet aces in that war, but only five were below the rank of captain. As a group, they averaged about 2500 hours' flying time, 2000 hours in fighters, 80 previous combat missions, and two World War II victories. These 39 jet aces accounted for 312 MIG kills, or 40 percent of all MIG's shot down.

Our Vietnam experience has been somewhat comparable to Korea but not exactly parallel, since most of our World War II fighter pilots and many of the Korean veterans either are no longer on active duty or are not available for cockpit assignments. But the USAF pilots who have shot down MIG-17s and -21s over North Vietnam averaged 1779 hours' flying time and 1250 hours in jets as of December 1967.

The level of recent combat experience in the USAF is higher than that of any other air force. We should not, however, overstress the kill ratios achieved by U.S. fighter pilots in the latter stages of World War II, when we had heavy numerical superiority over enemy air forces that had already lost a high percentage of their experienced pilots. Or in Korea, where combat-experienced USAF pilots were matched against new and inexperienced North Korean and Chinese air forces. It is tempting to assume that similar kill ratios would apply against the experienced, well-trained pilots of a major power; hence that we can accept technical parity or numerical inferiority or both. We cannot rely on experience as a substitute for technical excellence, sound doctrine and tactics, and adequately sized forces.

Obviously, not all pilots committed to battle will have had previous combat experience. *Training*, then, becomes an important element in air superiority. Between 1954 and 1962 the USAF training curriculum for fighter pilots included little, if any, air-to-air combat. This omission was partly a result of doctrine, which then regarded tactical fighters primarily as a means for delivering nuclear ordnance. It was partly a reflection of concern for flying safety. In any event, as late as October 1963 it was reported that only four of 30 pilots in one fighter squadron had ever shot aerial gunnery. This deficiency has been corrected. Aerial gunnery, missile firing, and combat maneuvering are now important parts of the training program.

A final element in the air superiority equation is *command judgment* in the use of tactical air resources. That judgment has to be based on experience, assisted by the best operations analysis that can be done in an often fast-developing situation. It is a decisive element in the battle for air superiority. Correct allocation of effort among tactical air tasks spells the difference between success and failure. Without air superiority the other tasks, and hence surface operations, are much less likely to succeed.

A properly balanced force allows the commander maximum flexibility in the allocation of his resources. All tactical combat aircraft are effective in varying degrees in interdiction and close air support. But not all tactical aircraft were designed for or are effective in air-to-air combat (the A-7, for example, which is an attack aircraft rather than fighter). The Air

Force is attempting to determine the mix of tactical aircraft types that will allow us to carry out most effectively our tactical air missions under combat conditions that can be reasonably postulated. It seems highly unlikely that there will again be an all-purpose tactical aircraft, like the P-51, that can meet standards of technical feasibility and cost effectiveness. An acceptable degree of design compromise probably will continue to narrow, but it is likely to remain greater in an aircraft intended primarily for air-to-surface missions than in an air superiority fighter.

Air Superiority in the Future

Planning for air superiority in the future has to be based on three cardinal points:

(1) Control of the air will continue to be a first-priority military objective, since the effectiveness of all other tactical air force tasks, the freedom of maneuver of surface forces, and hence the likelihood of successful surface operations depend on it.

(2) We cannot assume that air superiority will be achieved by default at any level of conflict.

(3) As the Chief of Staff stated in his letter on air superiority to the major commands, dated 3 May 1965: "Regardless of the tactical air task or mode of attack, survival of the fighter aircraft we commit is at some time likely to hinge on air-to-air capability."

Achieving or maintaining air superiority in the kinds of war that are most likely to happen depends in a major way on two things: the ability to counter enemy surface-to-air missiles and gun fire, and the ability to defeat opposing fighters in air-to-air combat.

Of all enemy aircraft destroyed by AAF fighters in World War II, about 60 percent were shot down in air-to-air combat and 40 percent destroyed by fighter strafing or bombing. After the early elimination of the North Korean Air Force by bombers and fighters in the summer of 1950, maintaining air superiority against the Chinese Air Force in the Korean War was largely an air-to-air fighter show. In Vietnam, attacks on enemy fighters have been conducted entirely by U.S. fighter pilots, who have destroyed some enemy aircraft on the ground and 101 in aerial combat as of 31 December 1967.

Success in defeating or neutralizing the effects of surface-to-air fire is largely a function of electronic subsystems, with which we have gained a great deal of experience in Vietnam, and of refinement of our stand-off air-to-surface missiles. Further development of both electronic countermeasures and missiles certainly is related to, but largely independent of, tactical fighter development.

On the other hand, success against fighter aircraft that are likely to be in the Soviet inventory in the mid-1970s (and hence available to other potential U.S. opponents) cannot be assured by economically or technically feasible modifications of current U.S. fighters. The most pressing single air superiority problem is that of developing a fighter that will be superior in air-to-air combat to any that may fly against us.

In order to establish performance parameters for an air superiority fighter, we must have in mind the kinds of future wars in which the United States could become involved and the special fighter requirements these wars might create:

(1) *Small to medium conventional wars with no well-defined battle lines.* In a war of this kind—similar but not necessarily identical to Vietnam in political, geographical, and military environments—there might or might not be air opposition. If there were, the fighter aircraft probably would be Soviet-designed and would likely include current (but probably not the most advanced) types. In order to control this type of war and contain it at the lowest possible level, rapid establishment of air superiority would be an important objective. Quick reaction and the ability to operate from relatively undeveloped bases would be necessary. In addition, performance characteristics superior to those of first-line Soviet fighters would

The activity over Emden, Germany, on 27 September 1943 was part of the Allied effort to win and hold control of the air during World War II—a continuing effort until the Luftwaffe was finally defeated late in the war.

be mandatory, as they would be in all other types of war.

(2) *Medium to large conventional wars contiguous to Soviet, Communist Chinese, or other Communist-controlled territory.* In this type of war, there could be well-defined battle lines, and probably there would be high-quality air opposition. The likelihood of sanctuaries and necessary restrictions on military operations would reduce the opportunity to defeat air opposition by attacking the enemy's air forces on the ground. This would put a heavy premium on air-to-air combat and would very likely make a superior combat radius highly desirable in our air superiority fighters.

(3) *Large-scale conventional war against a major opponent, in which his most advanced fighter aircraft would be used against us.* This kind of war would very likely become a war of attrition in which all our air resources could be used to gain air superiority—and all the enemy's resources would be used against us. It would involve, on a recurring basis, combat in the air and attacks on air bases, communications, POL, surface-to-air defense, production bases, and other air facilities. It is quite likely that there would be no sanctuaries and that the restrictions on use of air power necessary in (1) and (2) above would not apply. Our own active air defense and passive measures would be an important factor in the counterair battle.

(4) *Theater war, with low-yield nuclear weapons.* Air-to-air combat capability would be extremely important in this type of war because of the destructive potential of the nuclear ordnance carried by even a single aircraft.

(5) *High-intensity nuclear war.* This is the only type of war in which the tactical air effort would be secondary to strategic forces.

All the varieties of combat in which our tactical fighters might engage have one thing in common. The opposition probably would be equipped with first- or second-string Soviet-designed fighters. Among the levels of war outlined above, the differences in combat environment would be considerable, respecting

One of the prerequisites of air superiority is scientific, technical, and industrial competence. The seemingly endless production line of Convair B-24s was typical of our World War II industrial capacity, but such achievement does not result from brief crash programs.

numbers of aircraft committed, control and warning, equipment of bases, sortie rates, and rules of engagement. The overriding consideration, however, is the quality of fighter opposition that would be characteristic of air-to-air combat across the full spectrum of conflict. We must achieve technical superiority in as many parameters as possible—speed, acceleration, ceiling, maneuverability, rate of roll, climb, armament, and electronics—and must design our tactics to take advantage of the areas of superiority that we achieve.

Since the Korean War, Soviet-designed fighters have consistently had a ceiling advantage over U.S. fighters, somewhat better acceleration, and better maneuverability. Our fighters have consistently had better combat radius, firepower, avionics, and payload. As a result, our margin of superiority for interdiction and close support tasks has been great, but our margin of superiority in air-to-air combat has been extremely narrow and significantly dependent on the skill and experience of our pilots. This margin could become dangerously thin in a situation where we had to fight for air superiority against a well-trained enemy.

One approach to the problem of air superiority in the future would be to modify existing tactical fighters. The A-7 attack aircraft is not a candidate, because of its low speed. The F-100 is too limited by performance, and the F-105 was designed as a compromise fighter, heavily weighted in favor of the air-to-surface roles. The F-4 has by far the best air-to-air characteristics of our current tactical fighters, but by the mid-1970s its technology will be about fifteen years old. To make any of our current fighters at all comparable to fighter aircraft which the U.S.S.R. will almost certainly have in its inventory six or seven years hence either would be technically impossible or, if possible at all, would


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require very extensive airframe and engine changes, would not allow the advantage of mating these changes with integrated armament and avionics, and, most important, could not take full advantage of the most advanced technology.

For all these reasons, the Air Force has vigorously supported the development of an advanced fighter *designed primarily for air-to-air combat* but also able to perform other tactical air tasks without compromising its principal role as an air superiority fighter. We are working on the design of this fighter, the F-X, with the Office of the Secretary of Defense and with Navy participation.

The technical characteristics of the F-X have been established with reasonable precision after more than a year of study. Of the advances incorporated in the contemplated design, these are the greatest:

- A tremendously improved thrust-to-weight ratio, which, coupled with a low wing loading, will produce high mach and ceiling along with superior climb, acceleration, and turn ability throughout the flight envelope.
- Advanced avionics and armament, which will provide the necessary ability to defeat any foreseen adversary with a wide variety of weapons, including missiles and guns, in a hostile electronic environment. Although the design is optimized for air-to-air combat, preliminary studies show that the range-payload characteristics of the F-X may be superior to those of the F-4E.

The armament systems proposed for the F-X are of particular interest to me. Even though the armament of our current fighters is superior to that of the MIG-21, I feel that we have not been as imaginative in the development of armament, particularly guns, as we should have been.

The F-X will have both air-to-air missiles and guns. No single air-to-air weapon can provide the range of coverage needed: that is, from less than 500 feet to a range in excess of that of weapons used by an enemy. Probably two types of missiles will be needed: a semiactive radar-guided missile for all-weather operations and attacks at long range, and an infrared (IR) or electro-optical missile for shorter ranges.

The effectiveness of fighter missiles can be significantly reduced by high-G maneuvers on the part of the target aircraft and by countermeasures. Also, there are limitations on use of missiles when friendly and hostile aircraft are mixed together in combat. These limitations are a major reason why an air superiority fighter must also be equipped with guns.

There are other persuasive reasons for developing new and better guns for our fighters, reasons that have been demonstrated repeatedly in Vietnam. In the most likely combat situations, the probability of surprise attack on an enemy fighter is very low. We would anticipate that most contacts will be made in areas where enemy fighters are operating under ground-controlled interception (GCI) procedures and hence will be aware of the presence of our fighters. Integral airborne electronic warning systems further reduce the likelihood of surprise. Also, while attacks beyond visual range are possible, they will depend on much better means of positively identifying an enemy aircraft than we now have or will have, probably, at the time the F-X could become operational. A tactical airborne warning and control system, similar to the AWACS, which is envisioned as a working partner of the proposed advanced interceptor, would greatly reduce the identification problem; but it seems unlikely that enough enemy fighters could be killed at very long range to determine the outcome of the air battle. In most cases, we probably would have to continue to close with enemy fighters, maneuver into firing position, and attack with guns.

The only countermeasures to gun fire are target aircraft performance and pilot skill. But even the excellent M-61 gun, which has been so successful against MIG's in Vietnam, will not be good enough in the future. As greater fighter speeds and altitudes have decreased maneuverability in absolute terms, aerial gunnery has become increasingly difficult. For example, kill claims in World War II were on the order of .5 or .6 of firing passes made. The ratio of kills to firing passes for the F-86 in Korea was reduced to .3. This reduction

is a function of the difficulty of closing to effective range. As aircraft performance increases, the firing ranges increase, and firing angles-off target decrease. In World War II, the tactical cone of fire was about 20° at 1000 feet; in Korea, 6° at 1400 feet. Many Korean combat veterans attributed their success against MIG-15s in about equal parts to combat experience and the combination of superior armament, plus the radar range-computing sight then in use.

For the F-X, we will investigate a new gun with very high muzzle velocity, a flat trajectory, and a variable rate of fire up to about 6000 rounds per minute. Developing a gun that will be effective in combat up to mach 2+ is extremely important.

I believe we are approaching—or already have reached—the practical limitations of performance in a gun where all the energy is imparted to the projectile within the gun barrel. One feasible solution is a machine gun that fires rocket-propelled projectiles. A spin-stabilized rocket projectile, comparable in size and weight to a 20- or 30-mm shell and fired from a gun-type barrel, should give greatly reduced times of flight with at least as good accuracy as the M-61 gun at ranges from 500 to 1500 yards.

THE OUTCOME of the air-to-air battle for air superiority, and all which that battle determines, depends on four factors: airframe performance, armament effectiveness, pilot proficiency, and numerically adequate fighter forces. Because technical ability does not recognize national boundaries, our margin of superiority over a first-rate opponent is likely to be narrow in the first three areas, but there must be some margin of superiority in each one. We have the resources to assure numerical adequacy. Cumulatively, these four factors spell the difference between success and either stalemate or failure.

The Vietnam war has shown once more that the firepower of tactical aircraft is a decisive factor in conventional warfare, as it was in World War II and Korea. The ability to deliver that firepower accurately and effectively, when and where it is needed, depends on our control of the air. The effectiveness of all lines of communication depends on control of the air. The survival of helicopters and other low-performance air vehicles depends on it. The outcome of the ground battle depends on it.

In the final analysis, gaining and holding air superiority rest on our ability to defeat an enemy in air-to-air combat. That is a fact, whether we are free to attack his bases and supporting facilities and to destroy some of his aircraft on the ground, or whether his air resources are secure in a sanctuary area.

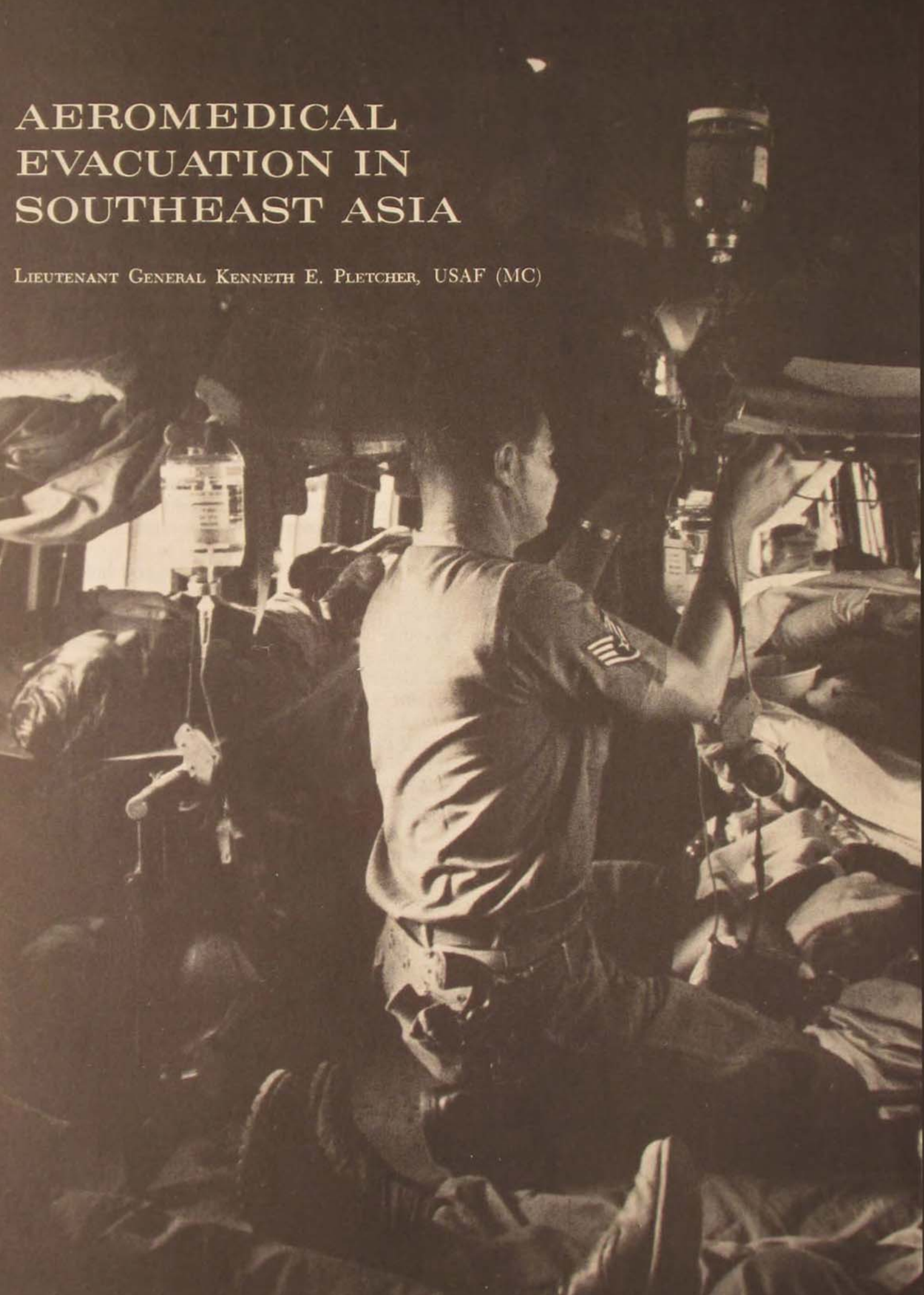
A recognized ability to win air superiority rapidly and decisively is a deterrent to conventional war, just as nuclear superiority is a deterrent to general war. Our objective is to deter both kinds of conflict.

The air superiority fighter is a most important key to that goal.

Hq United States Air Force

AEROMEDICAL EVACUATION IN SOUTHEAST ASIA

LIEUTENANT GENERAL KENNETH E. PLETCHER, USAF (MC)



THOUSANDS of U.S. fighting men are alive today because speed, new techniques, and trained personnel of aeromedical evacuation teams are giving the wounded in Vietnam better than twice the chance of survival than ever before.

The movement of patients from the battlefield and initial treatment points to specialized medical facilities has long been a problem and major concern of field commanders. The sooner a patient receives professional medical attention, the more likely he will recover and the sooner he will return to duty. This is especially important in combat, where troop strength must be maintained at the highest possible level. The key to the problem is speed—getting the patient to an adequate medical facility as quickly as possible.

New lifesaving techniques and equipment being used in Vietnam today include frozen whole blood, artificial kidneys, blood volume machines, and an ultrasound device that can locate shell fragments deep within the body by sonar. But the biggest step forward is the rapid airlift of wounded from the battlefield to a facility where they can be given the advantages of these new developments.

Although Air Force C-141 Starlifters can airlift a patient from Vietnam to a hospital in the United States in less than 24 hours, the most critical period occurs within the first few hours after he is wounded. In Vietnam, because of the terrain, dense foliage and other overland hazards, moving wounded by ground transportation is virtually impossible. Evacuation by air is the only solution.

Why the emphasis on airlift of casualties to the United States?

Field hospitals in Vietnam need bed space. No more than 60 percent of beds should be full at any one time. When new casualties come in, "old" patients must go. And in Vietnam, the only quick way out is "up."

Jet-evac of casualties makes sense from a logistic point of view. There is no wasted airlift with jet-evac. C-141 Starlifters that speed troops and cargo to the war zone are refitted—on the spot—with aeromedical equipment and supplies for a return trip with a full load of patients.

Jeep and ambulance trips from the battlefield to treatment points are almost a thing of the past. Airlift cuts shock and infection among wounded by at least two-thirds, more than doubling their odds for survival. No one is more than 25 minutes away, by air, from lifesaving surgery. Further, the skills of medical and surgical specialists now can be concentrated in the United States at institutions where the best of modern equipment already is installed and working.

The benefit of quick evacuation to the morale of the fighting man—and his family—is an obvious but important answer to the why of aeromedical airlift. Only one percent of all personnel injured by hostile action in Vietnam die after reaching a medical facility. In Korea, where fewer than 15 percent of the wounded were moved by helicopter, the rate was 2.5 percent; and in World War II, with no helicopters, the rate was 4.5 percent.

the how of aeromedical airlift

Aeromedical evacuation can be separated into four distinct systems: (1) forward aeromedical evacuation, (2) tactical and intratheater aeromedical evacuation, (3) strategic and intertheater aeromedical evacuation, and (4) domestic flights.

Although the first three systems operate independently of each other, each includes personnel of all services, and a common purpose combines their efforts, providing an integrated, smooth-running operation. The key word in management of the Air Force aeromedical lifeline is "flexibility." Scheduled flights move patients within Vietnam and to hospitals outside the combat area. But where those flights stop first—or last—or whether they stop at all—is determined by the seriousness of illness or injury of patients and by the need for bed space in field hospitals.

Evacuation from the battlefield is generally by Army or Marine helicopters that operate during the heat of battle, many times under intense enemy fire. It is estimated that more than 90 percent of all U.S. wounded in Vietnam are evacuated from the combat area by helicopter. In some cases, where the terrain

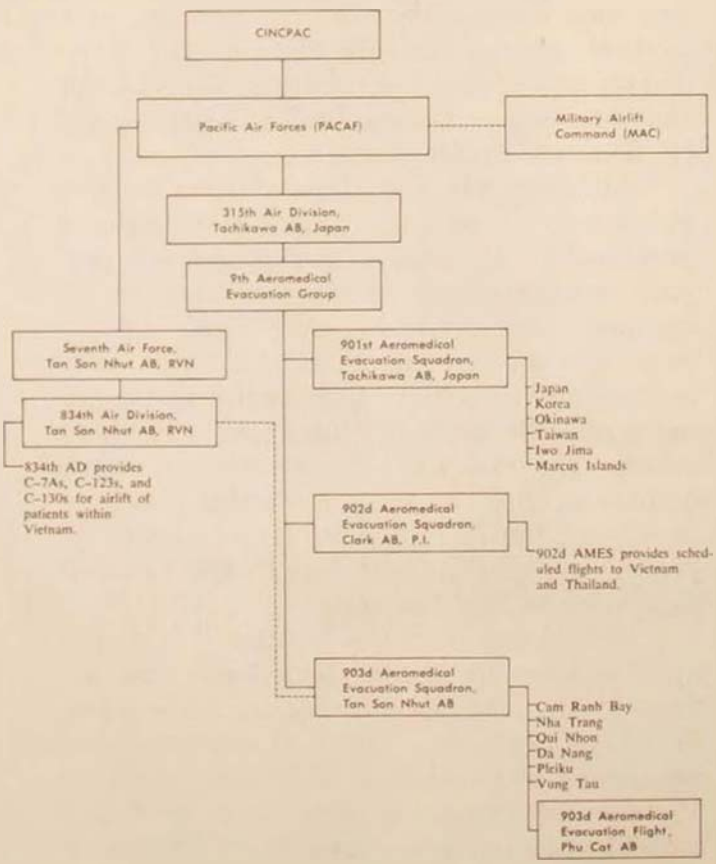
and conditions permit, the wounded are evacuated directly from the combat area by Air Force C-7A, C-123, or C-130. These missions are extremely dangerous and require a very high degree of professionalism on the part of the crew members. Casualties are airlifted to treatment points within the combat area, and here we enter the second stage of the system—tactical and intratheater aeromedical evacuation. Patients are airlifted from airfields within the combat zone to facilities outside the combat area, and between points within the theater. This is the phase of the evacuation with which PACAF is concerned.

Intratheater flights move patients within a specified overseas area or combat zone. In Southeast Asia, for example, air movement of patients within the battle area and to U.S. military hospitals in Japan, Okinawa, or the Philippines is the job of intratheater airlift. Control of intratheater flights in Southeast Asia rests with a command post at Tachikawa Air Base, Japan. Serving as primary aircraft for intratheater air evacuation, C-118s are single-purpose aircraft, used only for aeromedical flights.

The third portion of the system, strategic and intertheater aeromedical evacuation, is the responsibility of the Military Airlift Command (MAC), which provides flights from overseas areas to the United States. Regularly scheduled flights leave from Tan Son Nhut, Cam Ranh Bay, and Da Nang Air Bases in Vietnam for aerial ports at Andrews AFB, Maryland, and Travis AFB, California. The aircraft stop en route at Yokota AB, Japan, a patient transfer point. Patients destined for hospitals east of the Mississippi fly to Andrews; those for hospitals west of the Mississippi fly to Travis.

The domestic phase of the system, which moves patients from ConUS points of arrival to their final destinations, is also operated by MAC. Aeromedical evacuation units do not determine the patient's destination hospital; instead, this is the responsibility of the originating medical facility in conjunction with several regulating agencies. The first agency is the Far East Joint Medical Regulating Office (FEJMRO), located at Camp Zama, Japan. If a patient is to be hospitalized in the Far East or Southeast Asia, FEJMRO determines where he goes. Prior to a patient's leaving an overseas area, the Armed Services Medical Regulating Office (ASMRO) in Washington, D.C., determines where he will be hospitalized in the United States. When he arrives at either Andrews or Travis, the patient is moved by trunk and feeder lines to his destination hospital. Trunk flights move on schedule between seven main transfer points throughout the U.S.: Travis, Buckley, Kelly, Maxwell, McGuire, Andrews, and Scott AFB. At the transfer point nearest his destination hospital, the patient boards a feeder flight for the final leg of his journey.

The Military Airlift Command and Pacific Air Forces share responsibility for aeromedical evacuation in the Pacific. PACAF handles intratheater and in-country airlift, and MAC controls intertheater and domestic flights to hospitals in the United States.



In the States the 375th Aeromedical Airlift Wing Command Post at Scott monitors all trunk and feeder flights, with an aircraft taking off or landing every 17 minutes. A telephone "hot line" links each of the seven transfer points to the command post at Scott. Hot lines permit conference calls between any or all units. Status boards at the command post show how many patients need to be moved, what aircraft are available to move them, and the progress of each enroute patient.

determining patient destinations

Several policies and factors determine where a patient is to be hospitalized. Generally speaking, a patient who is to be hospitalized for 60 days or more will be returned to the United States. For fewer than 60 days, he will go to a hospital within the Pacific Command (PACOM). But this is not a firm policy; it is flexible enough to allow a patient to remain at a PACOM hospital up to 120 days if hospital space is available. The 60-day policy applies to all hospitals within PACOM except Vietnam, where the normal limit is 30 days.

A patient normally will not move unless bed space is available for him elsewhere. In Vietnam bed space in all hospitals—Army, Navy, and Air Force—is controlled by a joint medical regulating office at Saigon headquarters of the surgeon, U.S. Military Assistance Command, Vietnam (MACV).

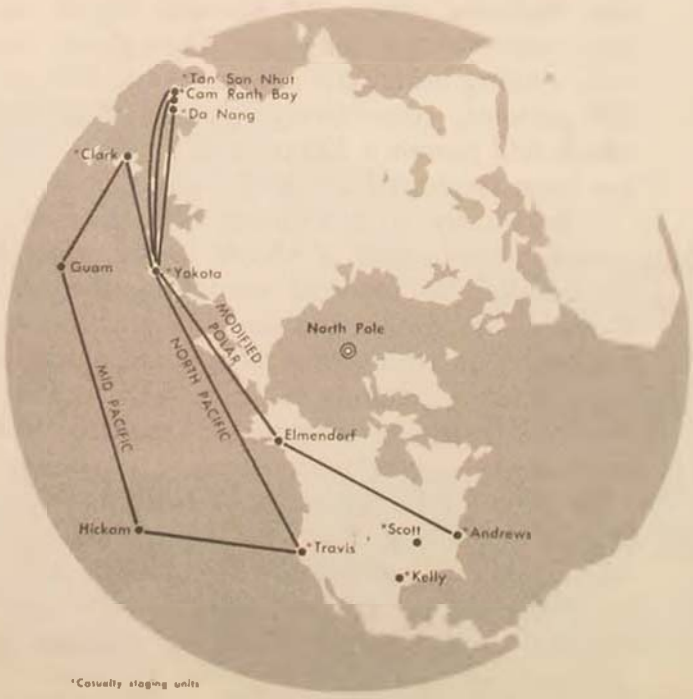
Aeromedical evacuation patients have their own "hospitals" while awaiting a flight. Casualty staging units (CSU) provide complete hospital staff and facilities for airborne patients at all transfer points and aerial ports. These casualty staging units, a part of the aeromedical evacuation system, are an integral function of the local base medical facility. However, they are physically separated from the main area so that the daily routine of local patients is not disturbed by the constant movement of aeromedical evacuation patients.

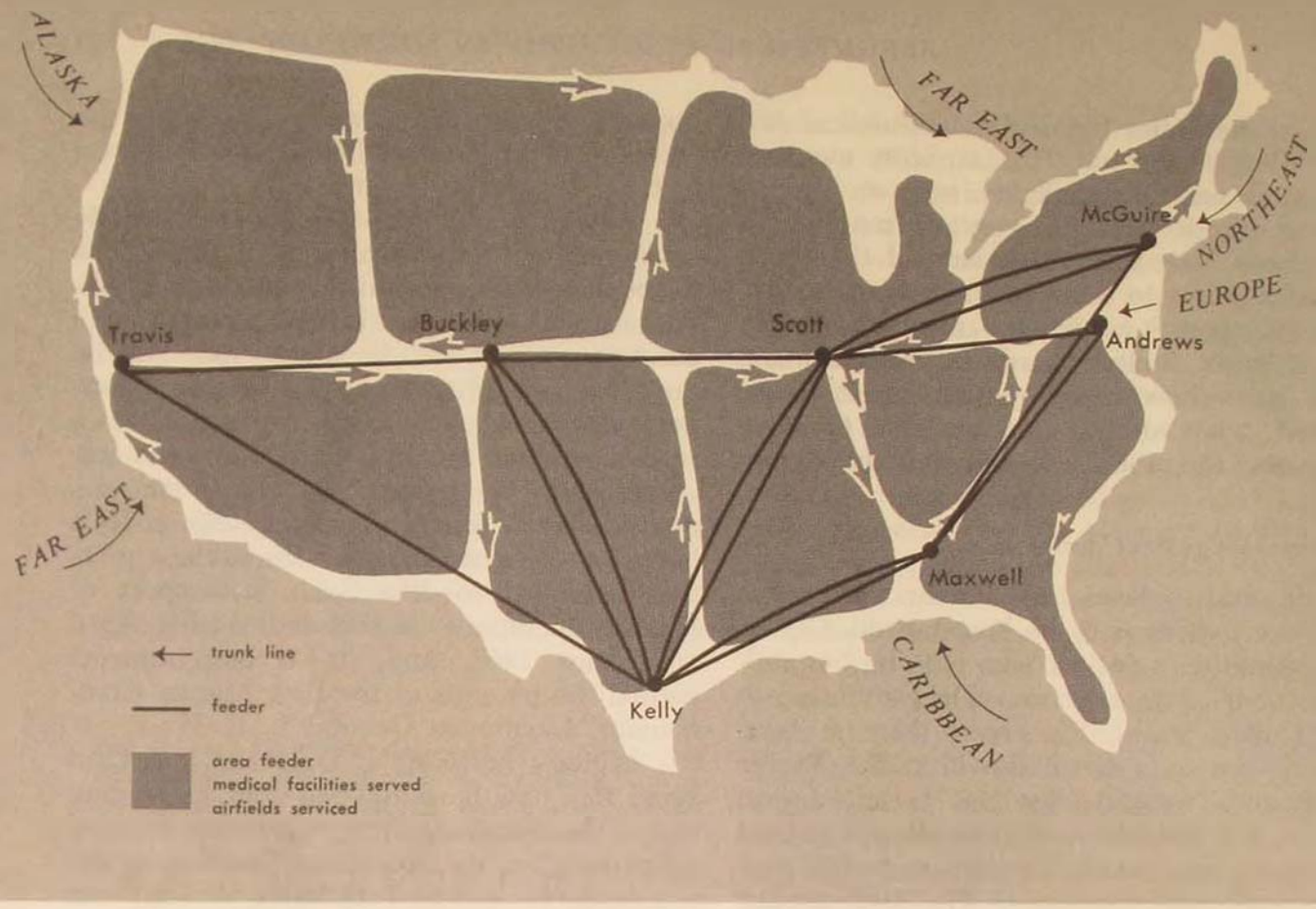
Casualty staging units accomplish several functions. First, they are collection points for patients to be moved by air. Although patients do not spend much time there (the average stay is 6 to 24 hours), they can get cleaned up, change into pajamas, and rest there for the first time a little while before continuing on to their destination hospital.

While casualty staging units are normally a function of fixed base medical facilities, this is not the case in tactical operations. Casualty staging units can operate from tentage (with accommodations for 25 beds) and can be rapidly deployed to forward airheads in support of combat operations. By providing a patient holding capability and good communications with the support base, these facilities permit efficient use of backhaul cargo aircraft for aeromedical evacuation. One of these units was deployed to Khe Sanh in support of Marine operations at Hill 881 during April and May 1967, and its accomplishments earned the plaudits of the then Marine Commander, Lieutenant General L. E. Walt.

Military hospitals at Da Nang and Cam Ranh Bay now have 100-bed casualty staging units. The Tan Son Nhut facility has 85, and Clark and Yokota have 250. (The Yokota CSU is actually located at Tachikawa, and patients are bussed to the airfield at Yokota.) At Travis

Patients are moved to the United States on C-141 Starlifters, using one of the three Pacific area evacuation routes. Wounded can be airlifted from Tan Son Nhut, Cam Ranh Bay, and Da Nang Air Bases to stateside hospitals for treatment in less than 24 hours.





The domestic phase of the evacuation system moves patients by trunk and feeder lines from arrival points to their destination hospitals. A command post at Scott AFB monitors these flights with the help of a telephone hot line interconnected to the seven transfer bases.

and Andrews, where jet overseas flights offload patients for transport throughout the U.S., staging units now accommodate 250 and 150 patients, respectively. (A new building, which will permit a 230 transient patient load, has been requested for Andrews.)

In-country air movement of patients represents a joint effort of people at the originating hospital, the medical regulating office, and the local aeromedical evacuation unit. MACV's medical regulating office also coordinates air movement of patients to other U.S. military hospitals is up to attending physicians, who operations.

Clinical information on patients is fed by phone or teletype from the MACV regulating office to the parent unit in Washington. Medical teams at ASMRO headquarters cross-check diagnoses with a list of beds available in specialty and other military hospitals. They decide where patients will go and send corroborating wires to MACV and receiving hospitals. How fast patients leave for destination hospitals is up to attending physicians, who decide priorities.

An "urgent" case will go immediately. But severity of an illness or injury does not automatically give a patient an "urgent" priority. The governing factor is timing—to save a life or forestall serious medical complications.

"Priority" patients, those who need prompt medical care not available locally, move within 24 hours. All other patients fall into the "routine" category with a time limit of 72 hours.

In Southeast Asia, all "routine" and most "priority" patients can be handled on regularly scheduled flights because of their frequency. But immediate movement of an "urgent" case

means just that. An aircraft already in the air may be diverted, or an alert aircraft may be launched for a special flight. Air, medical, and ground crews of aeromedical units are on alert around the clock and must be able to launch a flight within an hour after a call comes in.

Within Vietnam, air evac missions are flown on C-7As, C-123s, and C-130s. The greatest number of patient moves within the theater during 1966 were by C-130s. They accounted for more than 36,000 patient moves, averaging nearly 100 patients a day over a period of one year.

The biggest job in converting cargo or passenger aircraft into airborne wards is removing cargo pallets or passenger seats and installing vertical poles to support litters. How long the job takes depends, of course, on the number of seats and litters needed for a specific flight. Starlifters have been reconfigured in as little as 25 minutes.

Because of Vietnam's terrain, dense foliage and other overland hazards, moving wounded by ground transportation is almost impossible. An Army "Dust Off" helicopter makes a pickup from the battlefield. . . . Aeromedical technicians load patients onto a C-130 Hercules bound for Clark AB in the Philippines.

A flight nurse (1) holds glucose bottles while patients board a C-118 for evacuation to a staging hospital in the Pacific theater. (2) Patients move into a C-130 for a flight to Clark AB, with litters loaded five per tier. (3) Others are put on a C-123 at a forward landing strip. (4) An ambulance prepares to transfer patients to a C-141 at Da Nang Air Base. (5) A C-141 takes to the skies on an airlift mission.

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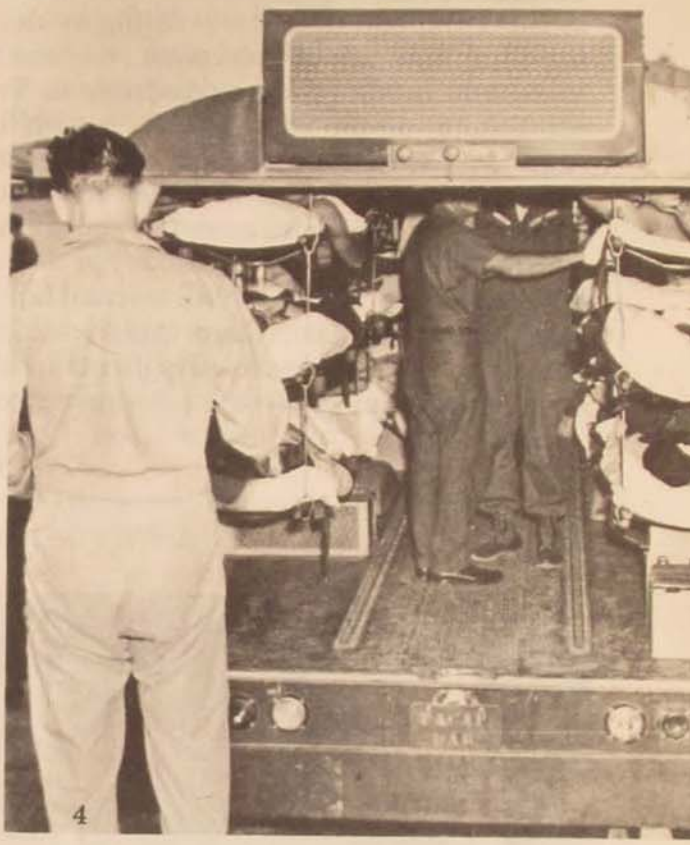

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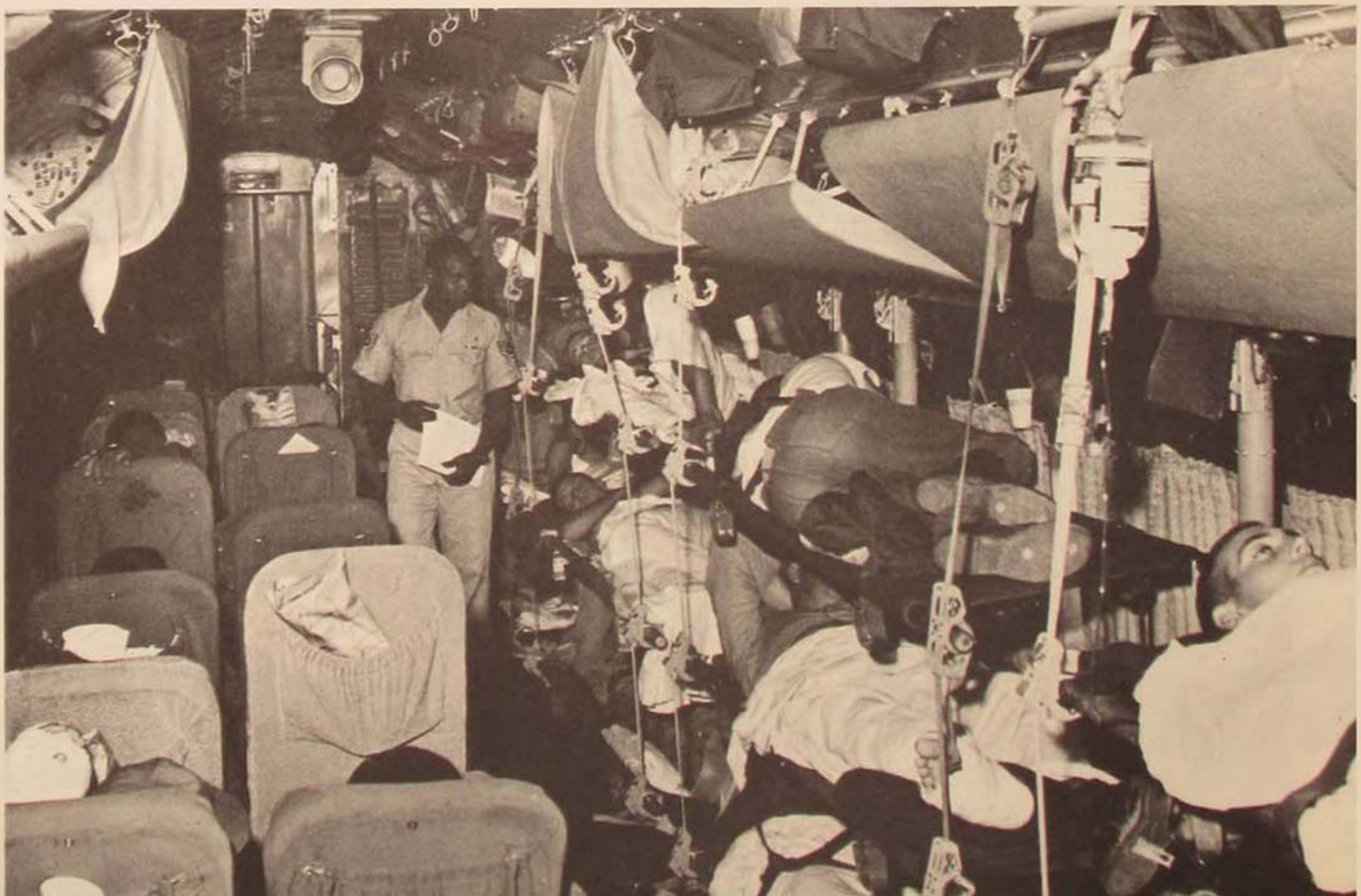
A control center at Hickam AFB, Hawaii, monitors intertheater aeromedical flights in the Pacific. In contrast with the "all-prop" C-118s and C-131s of the domestic force, long-range overseas flights are jet. The 500-mile-an-hour C-141 Starlifter, which flies all intertheater flights, will hold 80 litter patients or 124 ambulatory patients or a combination of both.

Not all MAC air evac flights originate in Vietnam. Some are scheduled from Clark AB in the Philippine Islands. MAC flights departing Clark take one of two routes: the northern route, which takes them to Andrews or Travis via Yokota, or the southern route with brief stops at Guam and Hickam. When serious burn cases are on board, flights continue on from Travis to the burn center at Brooke Army Hospital, San Antonio, Texas.

Scheduled flights within PACOM fall into two categories. First, there are the air evac flights that return recovered patients inbound to the theater and evacuate patients outbound on a routine basis. C-118s are used almost exclusively on these missions.

The second type of scheduled flight uses backhaul cargo aircraft, normally the C-130. The aircraft originates on its scheduled resupply mission and is reconfigured as an air evac flight for the backhaul. Sometimes the mission originates with a medical crew and equipment on board, or it may pick them up at the airfield where the patient movement mission originates. Aircraft used to support this type of mission operate on a scheduled resupply basis.

Unscheduled aeromedical evacuation flights pose the most problems, as they are normally diverted cargo missions reconfigured for air evacuation. Unscheduled evacuation flights fall in one of three categories: urgent, priority, or special. Efficient utilization of unscheduled missions requires maximum coordination among the aeromedical evacuation control centers (AECC's), airlift operations or airlift control centers, transport squadrons,



and the individual aircraft crews, as well as extensive coordination among the medical facilities involved.

All planes subject to diversion or rerouting are equipped with litter brackets and other equipment necessary for transporting patients. Each airframe has the physical capability of supporting an aeromedical evacuation requirement in the event it must move patients.

When a medical facility generates the requirement for an aeromedical evacuation flight, the lines of communication and coordination are essentially the same as for scheduled flights, regardless of the patient movement precedence. The main difference is the time permitted for completion of the mission.

Better than 65 percent of all aeromedical evacuation missions within Vietnam are unscheduled. Depending on casualties and the urgency of the movement, aircraft are often diverted from their primary function and reconfigured to meet this requirement.

A PACAF C-118 configured for litter and ambulatory patients can carry a desired load of 56. . . . A litter patient receives an injection from a male nurse during a flight from Vietnam to a PACOM hospital.

Preparations for the arrival of an aeromedical aircraft are just as thorough, medically and administratively, as those for its departure. Nurses and flight surgeons from the staging unit meet each aircraft for a plane-side briefing by the flight nurse and a personal check of patients who need immediate attention.

Flight-line radios can beam information on the needs of seriously ill patients to the staging unit even before the ambulances leave the aircraft. And the flight surgeon in charge may alert the main hospital to admit a patient whose condition has deteriorated in flight.

It happens infrequently, but some patients die on aeromedical aircraft. There have been six deaths on Pacific flights carrying war casualties since November 1965. When death occurs in flight or within 24 hours after arrival at a destination hospital, the senior medical attendant prepares an on-the-spot narrative report. The report and all other medical records are checked by mortality review committees at Travis, Andrews, or Scott hospitals. Autopsies are performed, the purpose of the review being to determine if aeromedical evacuation contributed to the death. As stated previously, the mortality rate is small when the total number of patients airlifted within and from Southeast Asia is compared with the mortality rates of past wars.

expert care of the patient

Before a patient boards an airplane, there are many things to be done. The load plan, for example, must be completed. All patients have designated spaces on an aeromedical aircraft. Where they go depends on their classification—litter, ambulatory, psychiatric, or non-psychiatric. Other considerations are severity of condition, need for observation, and personal comfort.

The more seriously ill patients are placed as far forward in the aircraft as possible, closer to the nurse's station. Patients who need the most attention go in lower litter spaces, as do those with large casts, to make it easier for the flight nurse to care for them. Although

use of tranquilizers has eased the problem of moving psychiatric cases, these patients still must be placed where they can be watched.

Not all patients should fly—unless, of course, local medical resources are not adequate. Physicians—Army, Navy, and Air Force—must know in what cases physiological restrictions apply. Expansion of air in body cavities, for example, is in proportion to increase in altitude. The pressure of air intracranially following a skull fracture could be hazardous. Expanding gas also can cause acute pain for the man in a recent postoperative state. And although cabin pressure at 5000 feet may be comfortable for most patients, those with anemia and heart or pulmonary problems must be watched for hypoxic symptoms.

Low humidity (3–25 percent on C-141 jets) can create difficulties for tracheostomy patients by drying mucosal surfaces and thickening tracheal secretions.

Despite bulk and weight limitations, many devices used in wards on the ground can be used just as effectively in the air. Some respirators, for example, have even been successfully miniaturized.

The "ground" doctors have help, though. Air Force flight surgeons, trained in aviation medicine, are assigned at all aeromedical departure points to assist hospital staff members.

Flight surgeons may or may not be members of the medical flight crew, but on occasion they accompany a seriously ill patient. Whenever possible, they check patients and their clinical records prior to movement by air to insure their adaptability to flight. Flight surgeons also are on hand to check patients on aircraft arriving at aeromedical transfer points.

In the air, unless a flight surgeon is on board, the flight nurse is in charge. Like the flight surgeon, she has been specially selected and trained for work on her airborne ward.

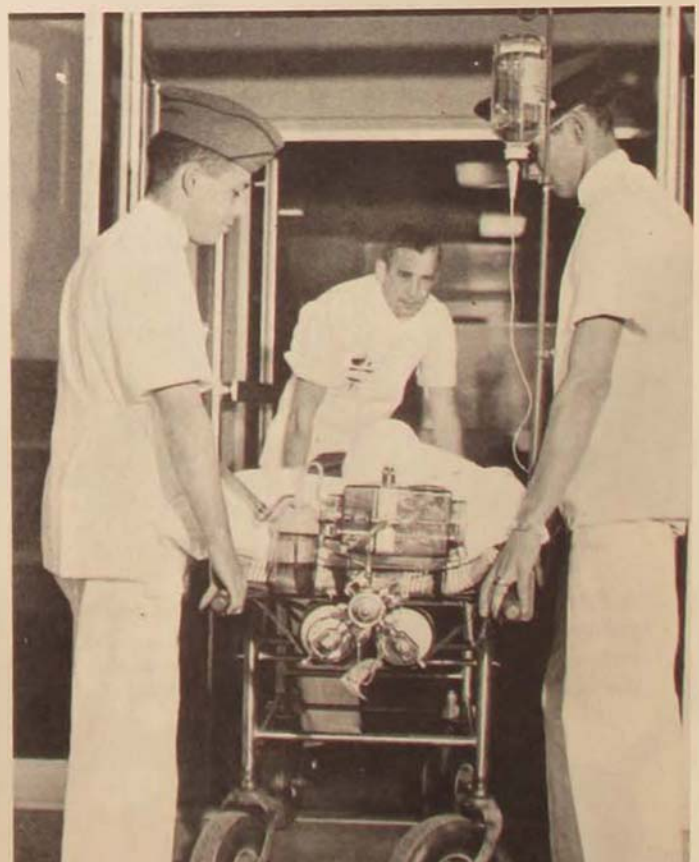
All flight nurses are graduates of a concentrated six-week course at the USAF School of Aerospace Medicine, Brooks AFB, Texas. The course covers subjects from aviation physiology and psychology to ditching and survival procedures. Physiological training also is part of the course and includes an altitude chamber flight to 43,000 feet, with exposure to rapid decompression.

The number of flight nurses on board an aircraft varies with the size of plane and patient load. Jet flights normally carry two, but domestic C-131 flights as a rule need only one.

Three or more medical technicians are on board aeromedical aircraft to help the flight nurses, the number depending on size of aircraft and patient load. The technicians also are specially trained for their airborne duties. All are graduates of Air Force medical technician programs and other courses required for those who work in aeromedical evacuation. Their training covers similar subjects but is less technical than that of the flight nurse.

Lifesaving devices

A portable respirator can be put on a litter for air movement; the oxygen tanks are used in transporting patients between the hospital and the aircraft. . . . The Stryker frame enables seriously injured patients to be turned periodically with a minimum of motion.



the system in action

To understand better the complete picture of the aeromedical evacuation system and its related activities, let us follow a hypothetical patient moving from the battlefield to a hospital in the United States.

Corporal Smith, a 25-year-old Marine, is leading his platoon on a scouting mission just south of the Demilitarized Zone in South Vietnam. His platoon is ambushed, and a heavy fire fight follows. Smith becomes a casualty, sustaining head and shoulder wounds. In the field, he is given first aid by a Medical Corpsman, placed on a litter, and moved to a medical aid station set up to handle casualties of this and similar operations.

After giving the patient emergency treatment, the aid station arranges to have him moved by Marine or Army helicopter to a Marine Collection and Clearing Company at Hue.

At Hue, Corporal Smith receives more extensive medical treatment, and physicians there determine whether he will go further in the system or be treated at a PACOM hospital. In this case, the injuries require immediate hospitalization and further treatment. Smith's name is forwarded to Da Nang, the nearest aeromedical evacuation control center.

It has been determined that Corporal Smith's injuries are of an urgent nature. He must be moved immediately. Since there are

no scheduled flights planned, a PACAF cargo aircraft is diverted or a plane launched to airlift the patient. In any event, the patient must be moved within two hours.

Corporal Smith is airlifted to Da Nang by a C-130. He is met at the airfield by a Marine ambulance and carried to the 350-bed Navy hospital about six miles away. He remains there until his injuries are evaluated and a determination is made as to where he will be hospitalized. If the attending physician determines that he will be fit for duty within 30 days, he will most likely remain at the Da Nang hospital. If his injuries are such that treatment will continue for up to 60 days, he will go to an offshore PACOM hospital.

When Corporal Smith is ready for transfer, the Navy hospital obtains a new destination from the Saigon office of the FEJMRO. In this case, Clark Hospital is chosen as the best facility for further treatment.

The hospital then advises the aeromedical evacuation office at Da Nang that the patient is ready for movement. The detachment arranges to have him moved on one of the scheduled flights from Da Nang to Clark. He is again transferred by ambulance to Da Nang and to the casualty staging unit. This air-conditioned modern medical facility is designed as a holding station for as much as 24 hours for patients awaiting transfer on aeromedical evacuation flights.

Upon arrival at the CSU, Smith is placed in a hospital bed, provided proper hospital clothing, and prepared for air evacuation. His baggage is identified and tagged, his medical records are assembled, orders are published, and a dressed litter, including mattress, is prepared for his use in flight.

Upon arrival of his scheduled aircraft, hospital personnel place him on board, and he is flown to Clark on a PACAF aircraft. At Clark his condition is again assessed and his time to recovery estimated. If he is expected to be able to return to duty before the time limit set by DOD and CINCPAC evacuation policy, he will be held within the theater and returned to his unit upon recovery.

In this case, his injuries are such that recovery time will probably exceed the CINCPAC evacuation policy, and he must be returned to the United States. Clark Hospital telephones the ASMRO in Washington and obtains the destination.

Since Corporal Smith is from Denver, Colorado, Fitzsimmons Army General Hospital is chosen. Clark Hospital then notifies the Military Airlift Command that the patient is ready for movement, and transportation is arranged on a MAC C-141 to Travis. Smith will remain at Travis until he can be placed on a scheduled flight to Denver via the MAC domestic aeromedical evacuation system.

progress for the future

The aeromedical evacuation system is continually undergoing modifications to provide better service for the sick and wounded. Standard now on aeromedical flights is an oral hygiene kit. Disposable, spongelike oral tissue cleansers are attached to short plastic handles and dipped into a two-ounce polyethylene bottle of mouthwash (also part of the kit), to eliminate bad taste in the mouth. Low humidity in aircraft accelerates the dehydration process and causes oral problems for both patients and crews.

New litters that slide out like drawers to permit easier bedside care of patients in flight were tested on aeromedical jet flights in 1966, and the Air Force hopes they will soon be standard equipment.

"Disposables" are being suggested to replace more permanent types of aeromedical equipment, such as litter pads. Scientists at the School of Aerospace Medicine are designing one that will float, to serve as survival equipment in sea ditching. Accelerated age and impact tests soon will show what the new pad will tolerate. Also important to learn is how comfortable the pad will be for a minimum of 21 hours.

Soon to come off the drawing board is a bacteriological isolation unit. (Patients with highly contagious diseases cannot now be moved by air.) Units will be self-contained, and humidity, temperature, and oxygen will be controlled from outside.

Not on the drawing board yet but defi-

nitely on the way is an airborne intensive care unit with up-to-date equipment needed for care of the seriously ill.

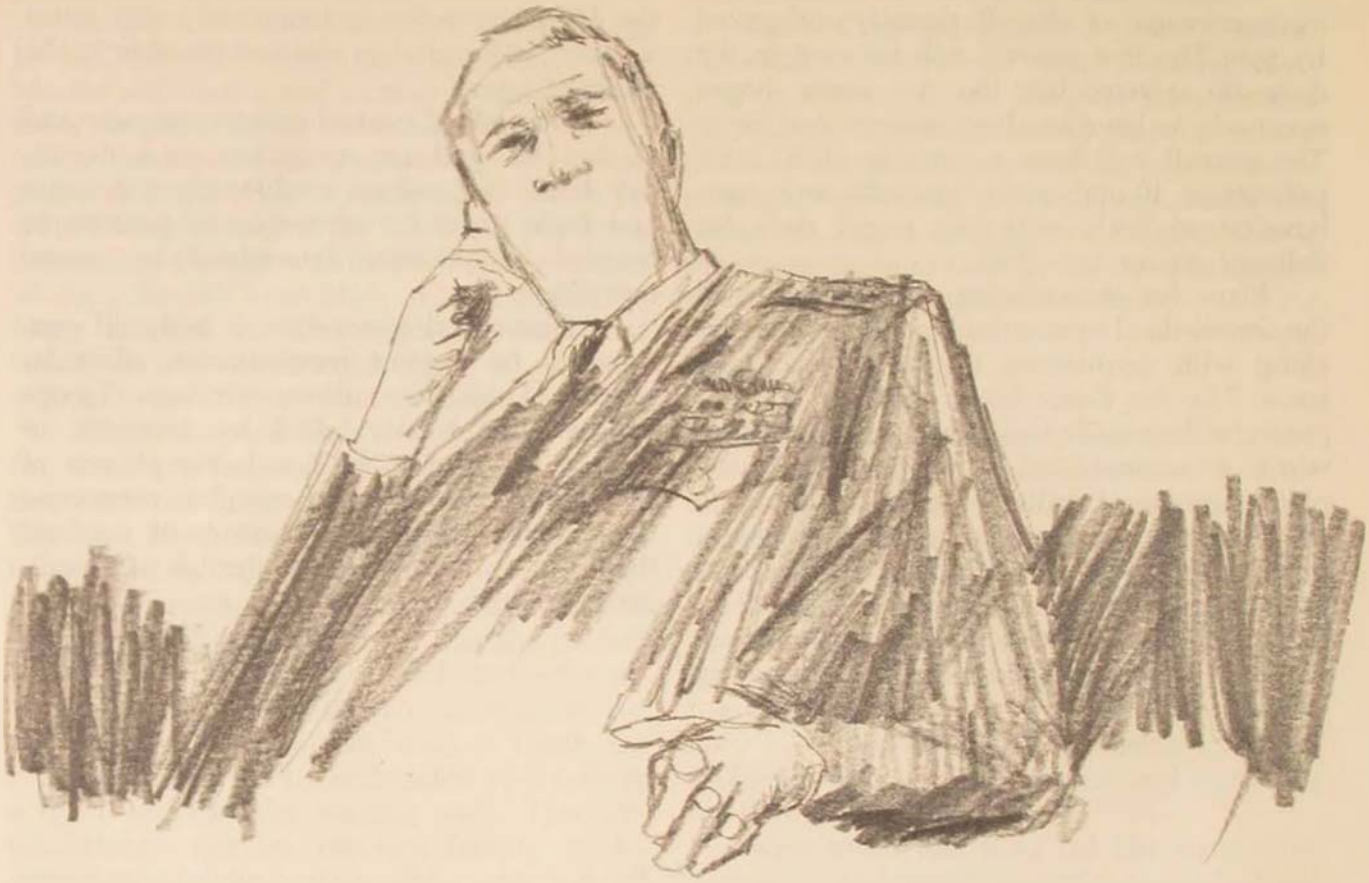
Biggest boon to patients will be the medium-range jet aircraft recently authorized by DOD. The first aircraft will be used in the domestic system, but the Air Force hopes eventually to have an all-jet aeromedical force. The aircraft will have a capacity of 30 litter patients or 40 ambulatory patients or a combination of both, with the target date for delivery set for late 1968.

Plans for streamlining administration of the aeromedical evacuation system are moving along with acquisition of the all-jet airlift force. The Air Force hopes that use of computers will simplify the "who goes where and when" of aeromedical evacuation. As in the past, planners at military hospitals, domestic and overseas, will report patients for aeromedical flights on a day-to-day basis. Reports as to diagnosis, special equipment needed in flight, priority, and other medical and personal data will go to appropriate medical regulating offices and then will be fed to computers. The result will be assignment of bed space at the hospital best equipped to meet the patient's needs. In the case of casualties returning to the U.S., computers automatically will select a specialty hospital as close as possible to the patient's home.

Aeromedical control centers overseas and in the U.S. will use computers on a day-to-day basis to produce ready-made itineraries and flight plans for movement of patients to hospital assignments determined by ASMRO computers.

Aeromedical evacuation is and will continue to be a joint humanitarian effort by people of all the military services. Troops wounded in battle, felled by accident, or stricken by disease have a better chance of surviving today—often for complete recovery—than at any time in the history of warfare, thanks to a streamlined and flexible aeromedical evacuation system.

Hq United States Air Force



VIEWS ON AEROSPACE POWER

COLONEL DONALD F. MARTIN

TODAY the Air Force is composed of diverse skills and disciplines. Tomorrow we must expect the trend toward specialization to continue, with even more shredouts required to cope effectively with the accretion of knowledge important to national defense.

Yet, is it possible that our efforts toward increased professionalism will result in the virtual elimination of professional airmen? Will this trend substitute a genus of military weapon system "operator"?—an operator whose primary concern is the manipulation of weapon systems in combat? It is, perhaps, all too possible.

Of course specialization produces a degree of expertise obtainable in no other way. We are inundated with knowledge, and there are only 24 hours in a day.

But the "force" which creates the need for our individual skills is the *Air Force*. The Air

Force, with its contribution to national defense, is our entire reason for being. General McConnell has a sign on his office door which reads:

> *The Mission of the United States Air Force Is To Fly and Fight. Don't You Ever Forget It.*

It is a motto credited to the 388th Tactical Fighter Wing, Korat, Thailand.

With specialization upon us, we cannot let the entire job of being professional airmen fall to the commander, the planner, or a select few. We must all make every effort to remain professional airmen. There is more to being an airman than wearing the Air Force blue. And there is certainly far more to being a professional airman than supporting or operating a weapon system.

The professional airman, whether logistician, comptroller, or information specialist, must have a grasp of the fundamental polemics inherent in military theory. This awareness and understanding of competing or complementary military viewpoints comprise one of the characteristics which sets the professional military man apart from those individual, narrow disciplines he employs in his daily pursuits.

While most of us do not expect to qualify as expert strategists or tacticians, many students of national defense and all professional airmen can form opinions with regard to the military instrument, based upon their individual experiences and persuasions. What follows is the statement of one airman's views on several aspects of aerospace power—views which have evolved during 25 years spent in a variety of Air Force occupations, hopefully as a professional airman. These views are added to the continuing dialogue found in the pages of *Air University Review* in the hope that they may be useful in stimulating the specialized reader to crystallize his own thinking on similar issues.

Guerrilla Warfare

Guerrilla warfare has one unique characteristic for airmen which sets it apart from all higher intensities of military conflict. Guerrillas by definition do not have air power support. If an external power supporting an insurgency were to employ air power (except perhaps for clandestine aerial resupply) to aid the insurgents, the conflict would no longer conform to the concept of guerrilla warfare. It would take on the overt aggression characteristics of a limited war. Likewise, if guerrillas themselves possessed air vehicles, the conflict would involve a level of military sophistication and directness associated with the clash of modern military forces.

In its present state of technological development, air power, with its required supporting structure, would provide a precise military "point of focus," clarity, and definition to an important part of the battlefield that would be entirely incompatible with guerrilla warfare, which capitalizes upon concealment, surprise, and lack of a front line. Thus, air power can be exploited, on a continuing basis, only by that military force within the country which is defending against the guerrillas. Moreover, if the conflict were to remain a guerrilla war, air power could not be used by the guerrillas even in the third and final phase when large pitched battles may be expected, as at Dien Bien Phu. While the French there may have recognized their air monopoly for the application of military force against the Vietminh, the inept manner in which they employed their quantitatively and qualitatively inadequate Air Force could not reverse their hopeless position. Those mistakes are not being repeated.

The military/political environment obtaining in Southeast Asia today is different in important respects from that which existed in the Indochina war of the early 1950s. One significant difference lies in the availability now of superior air power in quantity.

Several years ago air power in Vietnam was limited by constraints placed upon its composition and employment deriving from the 1954 Geneva accords. One such constraint prevented utilization of our more effective aircraft, including jets, and another prohibited combat by aircraft manned by USAF crews.

Widespread and continuing violations of the Geneva accords by the Communists made it militarily and politically important in

1963–64 for the United States to bring into play our most appropriate air delivery vehicles, in quantity, armed with more effective conventional weapons, managed in a manner to increase effectiveness and decrease command redundancy, and employed in support of ground forces so as to (a) place the Viet Cong on the defensive by spoiling operations and then (b) find, fix, and neutralize them.

In Vietnam tactical air power has proven to be the most efficient casualty-producing means on a man-for-man basis. However, its greatest potential in guerrilla conflicts is when nationalist/allied forces are on the offense, rather than the defense.

While air power has been decisive in defensive operations by reason of its quick response and concentration of firepower, it can and should take a much greater toll of guerrillas in offensive operations. With ground forces in the role of finding, concentrating, and fixing the VC, close air support becomes a most effective means of eliminating guerrillas, usually without the necessity for ground forces physically overwhelming enemy defensive positions and strong points except in mop-up actions.

As counter tactics, the guerrilla options are either to infiltrate the attacking government troops and try to maintain very close but distinct frontal contact with them, or to break contact and try to flee. The comparative attractiveness of these two defensive tactics is markedly influenced by the disparity in numerical strength, firepower, and aggressiveness between the guerrillas and the government forces, and the ability to close the guerrillas' escape routes.

An evaluation of the desirability, or even necessity, of employing parallel air force command and operational control structures appears to require a review of certain fundamentals of air power which have become quite clear to the professional airman over the course of the past fifty-odd years. In the air over Vietnam today operate aircraft of the Vietnamese Air Force and of the U.S. Army, Marine Corps, Navy, and Air Force. Some of the missions performed by air vehicles in counterguerrilla warfare are close air support, direct (but not close) air support, interdiction, escort, armed reconnaissance, airborne forward air controller, combat liaison/observation, airborne/airland assault, and airborne/airland resupply. Although it is sometimes overlooked, a single type of air vehicle may perform several different missions effectively.

Requirements for support of air vehicles include ordnance (for offensive air vehicles), crews, ground servicing and maintenance personnel/facilities, POL, communications systems (including communications interface between "users" and "providers"), navigational aids, and command and control systems. These are requisite to the employment of air power irrespective of which service may own, direct, or operate particular air vehicles.

Similarly, the versatile nature of vehicles constructed to function in the atmosphere, coupled with the three-dimensional medium in which they operate, makes it virtually inevitable that air vehicles belonging to one service will essentially duplicate (with varying degrees of effectiveness in the performance of singular design parameters) the capabilities of air vehicles belonging to other services.

Finally, the physical characteristics of the medium in which air power functions produce the same effects upon all air vehicles. Inherent advantages and limitations imposed upon air power under combat conditions are unalterably the same for all services. For example, the loss of air vehicles to ground fire over the target is influenced by the type, deployment, intensity, and accuracy of the ground fire, as well as the number of simultaneously attacking air vehicles, their physical characteristics as a target, speed, method of attack, and the intensity and accuracy of integral counterfire.

It would seem that the absence of an "air war" in a guerrilla environment obscures certain fundamentals applicable to the employment of air power at higher intensities of conflict (e.g., achieving air superiority, isolation of the battlefield, and classic interdiction), with the result that fragmentation of air resources and use of obsolescent air vehicles are permitted, even encouraged, due to the lack of opposing air power. However, it could be dangerous indeed to base future Air Force composition and structure on the U.S. experience in Southeast Asia, which is the product of political constraints that may not again obtain.

In any event, the capability of air forces to fight at higher intensities of conflict should in no way be degraded to accommodate increased effectiveness in purely guerrilla struggles. If the need is great enough, then separate air vehicles optimized for guerrilla warfare in various geographical environments should be created; they could be "written off" or taken out of play at higher intensities of conflict.

Limited War

Proceeding up the ladder of "escalation" (as it is popularly known) from guerrilla warfare, one encounters limited war. There may be several rungs on the ladder between guerrilla and limited war,[1] but for purposes of this article it is enough to distinguish between those lower-intensity conflicts wherein the insurgents have no air capability, the defenders having a monopoly, and those higher-intensity

conflicts* wherein both adversaries are expected to employ air—at least initially until the air war is won and one nation possesses the capability to penetrate any portion of the opponent's territory with acceptable attrition.

The decisive nature of such military advantage has been amply illustrated in recent years by the Middle East conflicts of 1956 and 1967, which saw the destruction of the Arab air forces in a matter of hours, with all that such loss implied for continued Arab resistance.

Limited wars of substantial duration are wars of attrition in the classic sense. They may be "limited" only in the sense that certain weapons are not employed, certain targets are avoided, or the conflict is confined to certain political entities or geographical areas. All wars of recent times have been limited in the respect that total annihilation of the opponent and "stone upon stone" destruction were not carried out.

Some six years ago, attention was focused on the North Atlantic Treaty Organization and the then new strategy of conventional defense and "negotiating pauses." The "trip wire" strategy, which the "flexible response" replaced, had been designed to act as a trigger for "massive retaliation" should aggression by sizable forces be directed against NATO —particularly West Germany—even if the aggression were committed with conventional weapons.

The Kennedy Administration was opposed to this all-or-nothing choice, feeling it to be too restrictive. President Kennedy wanted many "options," or alternatives, for many possible eventualities. Of particular concern was the policy that the United States must not be bound to making a nuclear response to a conventional attack. A virtual blueprint for the new Administration's military policy was found in General Maxwell Taylor's *The Uncertain Trumpet*.[2]

The possibility of a limited conventional war in Europe arose, to the consternation of the West Europeans. The basis for their concern was understandable. Two tenets of conventional war were particularly alarming and distasteful: (a) that a successful offense should be based upon numerical superiority on the order of three to one over the defense, and (b) that a successful conventional defense must be constructed in depth. Collapse of the Maginot Line, virtually intact, supported the latter tenet.[3]

Being constructed for purposes of defense rather than offense, NATO ground forces were numerically inferior to those of the U.S.S.R. and the Eastern bloc.* This, on the surface, gave rise to the expectation that the only possible nonnuclear response to a massive attack would be a well-conceived retrograde maneuver designed to slow, stall, and contain the attack—at least until the political leaders of the attacking force could be made to come to their senses, realize the enormity of their act, and appreciate the fact that the consequences of continuing the aggression would be U.S. use of nuclear weapons, with all the implications which this would have for both sides.

So far, so good. Yet there were those in West Germany (and other Western European nations) who were unhappy with the options available to NATO at this juncture, particularly if the Communists did not elect to return to the prehostilities boundary with NATO. If the attackers held their ground and refused to divest themselves of territory already taken, numerically inferior NATO forces lacked the superior conventional strength in-being to counterattack successfully and retake the lost territory. Worse, if tactical nuclear weapons were then employed against the attackers, "the bomb" would fall on West Germany, since that would be the location of the most threatening part of the enemy forces. Not entirely without reason, some argued that conventional defenses in NATO, based upon numerical inferiority, would be far more costly and destructive to the defending nations than to employ tactical nuclear weapons at the outset of aggres-

*Treatment of the air war in the north is intentionally omitted. While effectiveness of air strikes there may be legitimately examined to a limited extent, such operations are so closely attuned to political considerations as to make objective and meaningful evaluation of purely military considerations virtually impossible at this time.

*The importance of the numerical/qualitative disparity was significantly reduced in Secretary McNamara's budget presentation before Congress in 1964.[4]

sion, hoping that the shock effect would restore sanity. Or, failing that, they argued that atomic destruction of the aggressor's forces would then take place on his homeland rather than wait until he had occupied NATO territory and then use nuclear weapons in an area populated by friend and foe alike in an equivocal effort to dislodge him. Regardless of the true merits of the competing points of view, they engendered nationalistic feelings on the Continent.

The new U.S. military policy also held implications for our Asian commitments. Since the possibility of involvement with Communist China's military forces in Southeast Asia cannot be ruled out at this writing, that policy will be very cursorily treated with these few observations. Anticipating involvement in an ever larger ground war on the Asian mainland should be expected to raise immediate questions of calling up the reserves,* raising draft quotas, imposing price and wage controls, and rationing—or use of nuclear weapons—all of which are politically sensitive issues in any situation wherein an urgent, fearsome threat to *U.S.* security is not completely apparent or generally agreed to.

With regard to conventional limited war, particularly a greatly expanded ground war on the Asian mainland, it would be difficult to foretell *at the outset* if the U.S. people would willingly pay the price required of a long-drawn-out classic war of attrition. Over a period of time, pressure could conceivably build to employ our most effective weapons.

General War

Admittedly, attempting to define "general war" is to enter a semantic morass.[5] Yet our national military budget is structured around strategic forces, which connote general war, and general-purpose forces, which would seem to connote all lesser intensities of conflict. Moreover, I am persuaded that only the use of nuclear weapons and employment of some portion of the strategic forces would ultimately be classified as a "general" war because, regardless of the apparent success of an opponent's conventional efforts on the battlefield, the "loser" *need not* submit without employing, or threatening to employ, its nuclear capability in an effort to reverse or modify the outcome.

In bringing strategic nuclear forces into play, a nation may have a variety of options for employment, depending upon the size and diversification of the nuclear force. Alternatives range from the initial destruction of a single target, usually depicted as a city, to the exchange of complete arsenals under a countervalue targeting concept.

The counterforce concept of war, even at the highest intensities of conflict, has as its objective destruction of the opposing military force to the degree necessary to achieve unquestioned military ascendancy, if not absolute military dominance, and the acceptance by the opponent of terms for cessation of hostilities in consonance with national objectives.[6] In an environment in which major powers with differing political objectives possess sufficient nuclear weapons to assure inflicting an unacceptable level of damage from a second-strike posture, viability in nuclear weaponry is dependent upon a capability for the utmost discrimination in the application of nuclear force. For example, if a particular crisis warrants resort to nuclear weapons to achieve military or political advantage, they should normally be applied against selected targets in such a discriminating fashion that the urban/industrial base remains largely undamaged. Under these conditions the opponent may be made to realize that his nation and people, as a socio-economic entity, are very much alive although they may have lost substantial military forces. If enemy leaders are aware that their country is largely unharmed, it would be difficult indeed for them to reach a decision to launch a countervalue (city-busting) attack, with the full realization that in so doing they would be exposing to annihilation by their opponent's remaining forces[7] the very life of the nation they were seeking to protect.

In nuclear warfare, care must be contin-

*Quite apart from the issue of calling up the reserves in response to Chinese Communist intervention with military forces, the question has been raised by Congress and news media with regard to the war in South Vietnam should the need for further increases in military manpower rise significantly.

ually exercised to assure that there remains as wide a difference as possible between the desired response, dictated by realistic political objectives, and the unwanted irrational resort to indiscriminate destruction. One should always seek to make the desired response far more attractive to the opponent than his futile resort to certain national suicide.

Discrimination in the application of nuclear weapons places a premium upon accuracy and small yields for most military targets. So often one forgets that a 1-kiloton bomb exerts 1000 pounds per square inch overpressure outward for some 150 feet from the center of the explosion. Few targets would seem to require more than 1000 psi to effect their destruction. The central problem in the discriminating application of nuclear weapons, then, is not in packaging 1 kt in a warhead or bomb. Rather, it is in acquiring, identifying, penetrating to, and placing the warhead accurately upon the target.

For these reasons, as well as the quantitative/qualitative requirements of offensive vehicles and defensive systems, the newest members of the "nuclear club" do not possess the variety of alternatives for employment that are available to the major nuclear powers. "More bang for a buck" was, and is, a truism. Larger megaton weapons are far more economical and possess far less utility.

A nation with only a few nuclear weapons obviously must plan to employ them against significant area targets (cities), since such weapons are ideal for creating gross devastation. Moreover, the targeting of purely military forces may be expected to require numbers of weapons greatly exceeding those available to the new and small nuclear force.

On balance, however, it would seem that a nuclear capability limited by size and composition to counter-city employment could only protect against a similarly conceived counter-city attack. Perhaps more important, such a restricted nuclear capability for assured destruction could give a false sense of security to its possessor. For example, if the larger nuclear power did not "cooperate" by attacking the small power's urban/industrial base, the smaller power might find employment of its nuclear force against the attacker's cities a totally irrational act entirely unsuited to the situation. In such a case, the availability of some degree of counterforce capability would become critical to the smaller power—or accommodation to the opponent's demands would appear to be far more attractive than "national destruction."

Today the U.S. has the strategic "edge," if not overwhelming superiority, and some measure of "damage limiting" capability. It could possess a far more discriminating counterforce capability if it deemed the need urgent to national security.

Military Superiority

Some basic tenets of military power are presently open to question. One involves the utility of military superiority.[8]

Oddly enough, U.S. strategic predominance has had a beneficial effect upon the international demeanor of the world's second-most-powerful nation. Something of a détente would appear to exist, at least for the moment, between the U.S. and the U.S.S.R. Yet that same U.S. military power has not, thus far, clearly demonstrated a comparable ability to influence decisively the external conduct of the Democratic Republic of Vietnam [North Vietnam] (DRV) and Communist China.

Based upon the present U.S. experience in Southeast Asia, it could be concluded that the influence of total force superiority is minimal at the lower intensities of conflict and that its influence tends to increase as the intensity of conflict increases.[9]

The value of the air power contribution to overall military superiority in Southeast Asia continues to be debated. The Viet Cong have no air power. Communist China does not as yet have a large deliverable nuclear capability. Despite the advantages this situation would seem to offer, U.S. air power is alleged by some not to have had the desired influence upon the Southeast Asia conflict. It has been said that air power has been given every opportunity to display its decisiveness—and has failed to deliver.

If total force superiority, including unquestioned air superiority, cannot effectively elicit the desired response from our opponents, then the utility of that military superiority, of itself, would seem to be limited to deterring direct attack against the U.S. proper. Alternatively, perhaps the lesson may be that *latent* military superiority is of questionable utility in dealing with the lower intensities of conflict. Such a conclusion comes hard indeed, even if it is the well-reasoned product of the real-world political environment. Bringing total military superiority to bear in conflicts with limited objectives cannot be accomplished without risk; however, our military defeat is not an option available to our opponents at the lower intensities of conflict. Nor is our acquiescence to a less-than-favorable negotiated settlement a remote possibility for our opponents, if we do not wish to submit to it.

Military Strategy for the Future

Fear of nuclear weapons—regardless of size and manner of employment—and the corollary fear of uncontrolled or uncontrollable escalation represent the single largest factor which will, realistically, influence our future military strategy. For this reason, maintenance of a distinct margin of nuclear superiority should remain the foundation of our future military strategy.

As an inherent aspect of total force superiority, emphasis should be placed on acquiring the technology required for a military capability in space. To date we have displayed only passive space systems: communication, navigation, meteorology, geodesy, reconnaissance, and space-vehicle cataloguing seem well established.

There is also some agreement within the professional military that the world needs or may shortly need a space system to inspect and neutralize, if necessary, hostile, noncooperating space vehicles.

Hopefully, the passive nature of our space program may influence Russian efforts and behavior in space. If this comes to pass, it could be beneficial to both sides. However, just as our unilateral decision to stop nuclear testing was made capital of by the U.S.S.R., which subsequently broke the moratorium, we could not unilaterally restrict our military space efforts to the development and employment of passive or purely defensive weapons without some risk to our security. As a personal view, it would appear to be in consonance with the recent space treaty if the United States were to perform the research necessary to development of a military space capability, against the possibility of the need arising, while stopping short of actually producing any system not permissible under the treaty.

For perhaps the indefinite future, the United States should expect to furnish the bulk of the strategic defense of the free world. Our allies should continue to be asked to furnish stepped-up contributions of conventional forces for the lower intensities of conflict, as in Southeast Asia. Even if this were to come about, it would seem that the U.S. experience in Southeast Asia demands a substantial increase in U.S. general-purpose forces for land, sea, and air.

Based upon the past, it would seem that as the intensity level of conflict decreases, direct involvement of U.S. forces should correspondingly diminish until, at the level of true guerrilla warfare, the U.S. contribution should be principally materiel and the training of indigenous forces.[10] Conversely, as the intensity of conflict increases, so must direct participation of greater numbers of U.S. forces. Finally, at the highest level of conflict, general war, the defense of the free world must continue to depend, for the near term at least, almost entirely upon U.S. forces in-being. Thus, viewing the spectrum of conflict from cold war through guerrilla and limited war to general war, we see an ascending order of relative U.S. commitment to the total free world effort—*as well as an ascending order of threat to U.S. national security.*

When addressing the problem of future military strategy to achieve national objectives, writers obscure an important issue by their conflicting conceptual articles on "victory," "win," "overkill," "mutual deterrence," "finite

deterrence," "flexible response," the "oceanic theory," and the like. Irrespective of the particular political environment in which the military is called into play, and despite political or policy constraints upon military operations, the U.S. must continue in the future to build toward a capability to defeat potential opponents decisively.

Any lesser goal, such as attempting to judge the composition and force posture of a military establishment necessary merely to "deny the enemy his objective" from a position of "stability" or "parity" could become extremely dangerous.

If the ultimate national objective is to be content with perpetuating a stalemate, that objective *may* be achieved—but it could prove deficient, and then all would be lost. On the other hand, striving for unmistakable superiority may not produce an unbeatable, or certain, defense—but such an objective would seem to have a far better chance of achieving the lesser state of stalemate.

On Balance

Capabilities of the individual services to carry out the military strategies for various intensities of conflict are obviously equivocal in many instances. However, certain generalities may be made with reasonably high confidence.

The prospects of general nuclear war eventuating in the near term are minimal, due in part to unquestioned U.S. nuclear offensive capability and in part to the inevitable gross devastation that would result from use of the higher-yield weapons in an environment virtually devoid of highly effective active and passive defenses.

At the lowest intensity of overt military conflict, guerrilla war, the experience, tactics, and doctrine exist within each service for engaging collectively in potentially effective insurgency and counterinsurgency. While this know-how may be imparted to local forces, and U.S. industrial capacity is unquestionably capable of supplying the materiel needs of several guerrilla conflicts simultaneously, commitment of U.S. ground forces in quantity poses a more difficult problem. There are finite limits on the number of U.S. troops that could prudently be deployed in support of counterinsurgency operations.

With regard to limited conventional war along the lines of classic wars of attrition, the capability of U.S. forces obviously is dramatically influenced by the opponent, the area of the world involved, and the course of conflict during the buildup phase. Keeping the ocean lines of communication open against the 25-odd Chinese Communist submarines presents an entirely different prospect from that of keeping them open in the face of 400 to 500 Soviet subs.

Likewise, ground force requirements to defend NATO are easier to accommodate than similar requirements to defend effectively against large-scale use of Chinese Communist forces in Asia. The outcome of an air war between U.S. forces and the Chinese Communists can be predicted with high confidence, while the outcome of a conventional air war involving the U.S.S.R. is equivocal at best. Yet it seems improbable indeed that serious conventional conflict between the U.S. and U.S.S.R. could take place in the near term without the introduction of nuclear weapons.

The outcome of most wars cannot be predicted with certainty. The course and termination of armed conflict are the result of the interaction of many influences, some of which cannot be reliably tested in peacetime.

It is likely that at least some careful calculations prior to the recent Arab-Israeli war showed the well-armed, quantitatively superior Arab bloc as far stronger than the forces of Israel. Yet the skilled employment of tactical forces in the conflict proved otherwise. Perhaps the greatest benefit for professional airmen to be derived from study of that war is the re-emphasis it gives to the importance of basic doctrine for effective employment of air forces.

The decisive nature of aerospace power, when skillfully employed, is a visible lesson from past and present. The import of those experiences lies unrecognized or neglected only at great peril for our nation and the free world. Thus, it behooves the Air Force to con-

tinue to shape its thinking on the future use of its forces with the objective of winning military decisions—notwithstanding the likelihood of termination of conflicts in other ways.

Office of the Secretary of the Air Force

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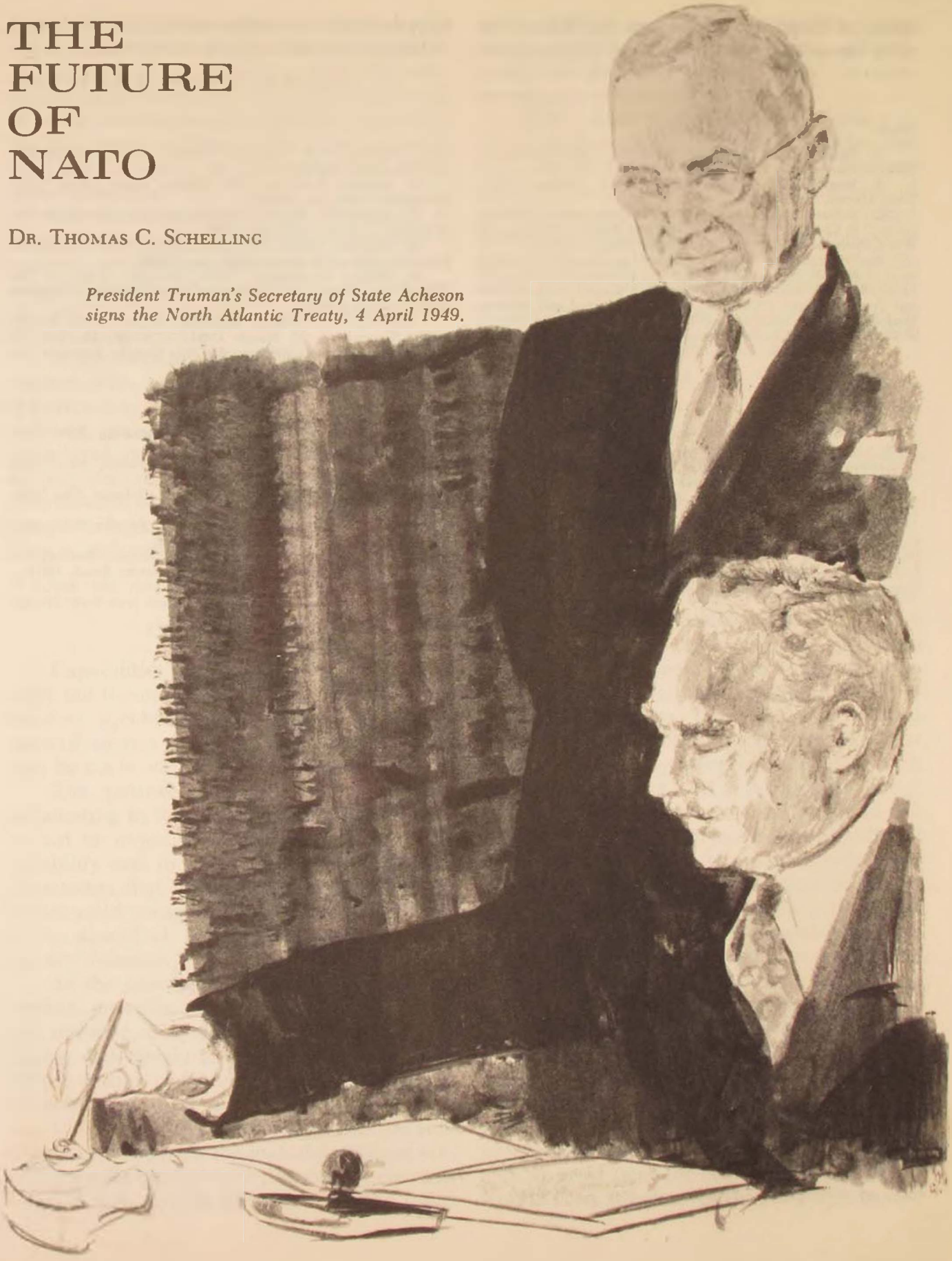
THE FUTURE OF NATO

DR. THOMAS C. SCHELLING



President Truman's Secretary of State Acheson signs the North Atlantic Treaty, 4 April 1949.

UNTIL this year, there was a strong tradition about how to begin a speech on the North Atlantic Treaty Organization. The accepted form ran something like this: "NATO finds itself today in greater disarray than ever before in the six years—eight years, ten years, twelve years (whatever the year in which the speech was being given)—since it was established." An alternative version was: "NATO is in deeper crisis today than ever before since it was established in 1949." On the one hand, *disarray;* on the other, *crisis.*

Actually, this year they aren't making either statement about NATO. I read recently a speech I received in the mail from an old friend, Harlan Cleveland, who is our Ambassador to NATO. It was a buoyant speech. He's a buoyant man, but not so buoyant that he could give that kind of a speech about NATO unless he felt that way. And I asked myself, "Why is it that this year is not a gloomy year for NATO?"

One possibility is that when you've accomplished a successful move from, say, Paris to Brussels, you have such a sense of accomplishment that you forget that you didn't want to move originally. Another is that the war in Southeast Asia diverts attention from all the NATO problems. Possibly it is that General de Gaulle was an enormous preoccupation as long as he could threaten to be beastly, but once he's actually been beastly he doesn't hold much over us any more. And part of the explanation may be that NATO is like the man who had been hitting himself on the head with a hammer for so long that it felt good when he quit. NATO was banging its head hard for several years until, about a year ago, it stopped; and the relief is spectacular.

In any case, things are quiet, if not encouraging. And there is probably a certain recognition that no matter what General de Gaulle says, and no matter what changes take place in the world, it is almost as hard to discontinue an organization as to initiate one. NATO, therefore, won't really go out of business on the 20th anniversary because there isn't that much initiative in the world. So NATO has a future, whether it likes it or not.

There are those who say it isn't really NATO any more: with France out, in any effective operational sense, how can it be NATO? One thing we may have learned in the last year is that France's being in or out does not make quite all that difference. But this depends a little on what NATO is—whether it is essentially a military force, a basis for political collaboration, a commitment to each other's security, or a cultural institution carrying on the Marshall Plan.

I am not going to talk about NATO's future over the next two, three, or four years. It is more interesting to think about what NATO was when it started almost twenty years ago. That is a long time—almost as long as it takes a baby to grow up and reach voting age. The world has changed since then. If NATO is to go on for another two decades in one form or another, we ought to think about the decades rather than the few years just ahead.

What was NATO to begin with? It was not really a military organization. It was not a defense force. NATO initially was a scheme whereby the United States got itself obliged to defend Europe, with nuclear weapons if necessary. NATO was a technique for getting the United States committed to participation in the defense of Europe. This fact shows up clearly in the testimony that went into the Senate ratification of the North Atlantic Treaty and the Congressional authorization for stationing, indefinitely, American troops abroad in peacetime. The Administration's argument was not that six American divisions by themselves could defend Europe. The argument

The second of the General Thomas D. White Lectures was presented at Air University on the evening of 18 October 1967, continuing the general subject of the North Atlantic Treaty Organization. Dr. Thomas C. Schelling, Professor of Economics at Harvard University, gave his audience the benefit of broad firsthand acquaintance with European problems, and here his message has been adapted for the readers of Air University Review.

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was not that six American divisions added to indigenous European forces would make a decisive difference between weakness and strength in the defense of Europe. The argument instead was that six American divisions would make clear to the Soviet Union that if there were a war in Europe the United States would be in it, whether it wanted to be or not.

Six divisions located in defensive positions cannot look the other way, cannot gracefully evacuate, cannot die unnoticed; and one way to make clear to the Soviet Union that if Europe is attacked the United States cannot stand idly by is to put troops there that will be actively engaged. It has even been facetiously remarked that it was not just 250,000 troops that mattered but their wives and children, too. If the object is to show the Soviet Union that it cannot attack Europe without involving the United States, civilians may be almost as useful as troops.

This is the principle that we have seen all along operating in Berlin. We have had in Berlin some seven thousand American troops; together with the French and British the number was about twelve thousand. What can seven thousand troops do, surrounded by twenty or more Soviet divisions? What they can do is to die—to die suddenly and dramatically. There is no place to go, no escape. By threatening to die in a manner that could not go unnoticed, a handful of American troops has made Berlin, for twenty years, one of the most impregnable military bastions that the world has known.

This kind of "trigger" is what NATO was originally. Notice that, in contrast to most military alliances in recent history, NATO was not, in spite of what we have always declared, really a mutual-defense or reciprocal-defense arrangement. NATO was an arrangement whereby the United States got itself committed to the defense of West Europe.

The example of Norway is interesting. Norway is indeed strategically important. But the reason why it was important that Norway be in NATO was not that Norway could make either a military or a geographic contribution to the Treaty; it was that the United States wanted to be obliged to treat Norway as part of a North Atlantic area that we were committed to defend, so that the Russians would know we were obliged, and so that Norway would then not be fair game for Russian aggression.

Two events gave rise to NATO. The first was a simple one. The British, in February 1947, said they could not finance the Greek government any longer in its war against Communist guerrillas. This announcement crystallized what later came to be known as the Truman Doctrine and the Marshall Plan. I doubt whether NATO could have existed without the Marshall Plan. The Marshall Plan created an institution, a tradition, a set of work habits among nations, that made NATO as an organization possible. The second event was the blockade of Berlin and the ensuing 18-month airlift, which convinced Americans and Europeans that the Russians were not only potentially but actually a menace.

These two events gave rise to NATO the treaty and NATO the cooperative association. What gave rise to NATO as a defense program was the Korean War. That war occurred because the United States did not know how to articulate its intentions—possibly because it did not know its own intentions. The Secretary of State, you may recall, had spoken of a United States strategic defense perimeter that excluded South Korea. He then said that for other reasons we were obliged to defend South Korea. The manner of his saying this may have seemed to damn with faint praise our obligation to defend Korea; and North Korea launched an attack that I think would not have been launched had it been clear what the United States would do.

It was hard for them to know what we would do, since we probably didn't know ourselves. Had we attempted to articulate what our response to the Korean War would be, it would have been exceedingly difficult to make a threat that might deter the Soviet Union. Because the one thing we probably could not have said—because we did not anticipate it—was that we would quadruple our defense budget. This was the era of defense budgets that were crawling down toward about 13 billion dollars per year. A year or two earlier

the Joint Chiefs of Staff had felt they needed the preposterously large figure of 22 billion dollars for defense; Secretary of Defense Forrestal says in his diaries that he thought that would bankrupt America and play into the Russian hands but that we needed at least 16 or 17 billion dollars. Under his successor, Louis Johnson, the figure was getting down toward 13 billion. With the Korean War it boomed quickly to 65 billion dollars. No great harm, no great strain: the economy reacted with vigor and elasticity. But who could have told the Russians that the Korean War would launch an arms race in which our defense budget would never fall below 50 billion dollars per year and that this would happen only a few months after we were talking about 15 billion or so as the upper limit? It was this boost in the defense budget that really led to the conception of NATO as not merely a U.S obligation to defend Europe but a major military program for the armament and defense of Europe.

The Truman Doctrine stated the basic premise on which American foreign policy was to rest: that the northern half of the globe was divided into two parts, one part Communist and one part threatened by Communism. The Communist part was credited with a discipline that the "free" part lacked, had a drive toward expansion without scruple as to means, a goal of total world conquest, a willingness to risk violence and engage in war if necessary, and a political capacity for imposing on conquered areas a regime that could neither be overthrown nor separated from the Soviet bloc. The Soviet bloc was credited with a capacity for never losing what once it gained, so that, even if its foreign adventures alternately succeeded and failed, it would win when it succeeded and hold its own when it failed.

As so commonly happens, the menace was oversimplified. Unity in the Communist world was taken for granted while disunity in the Western world had to be continually, and never successfully, striven against. Soviet threats were credited absolutely while the "credibility" of the American counterthreat was perpetually debated. Nationalism was expected to be smothered by Communist ideology throughout the Soviet bloc while in the West an appealing successor to European nationalism was always an aspiration, never a reality. Soviet army strength appeared so large in relation to the uniformed manpower of the Western countries as to cause a sense of almost hopeless inferiority that no rational population count was ever able to dispel. And Communist China was seen to be a militant extension, eastward and southward, of a bloc centrally directed from Moscow and adding enormously in manpower and territory to a single monolithic menace.

THE WORLD is different now, and looks different, from the way it was and the way it looked in the early 1950s. Most important of all, we have learned that coexistence without major war is possible. We are now more than two-thirds through the decade of the 1960s. a decade at the beginning of which a noted scientific author proclaimed it a "mathematical certainty" that nuclear weapons, even if only by some kind of accident, would blow up the world within ten years. Twenty years without nuclear war is no guarantee that we can extend it to 120 or even to the next 20; it is enough, though, to replace despair with hope and to give reason for believing that at least the major nuclear powers have acquired some experience and some confidence which will make the job easier during the second 20.

We have learned that the Communist world of the twentieth century is no more immune than a "capitalist world" (or a "royalist world") to schism, invective, territorial disputes, ideological hostility, rivalry, resentment, and even the acknowledged possibility of military engagement. We were slow in the United States, terribly slow, to recognize the Sino-Soviet split for what it was, probably because we wrongly believed it couldn't happen, partly because we may have let our own propaganda talk us into believing in a monolithic image of the Soviet bloc as constitutionally insusceptible to internal division. Even yet we may not have shaken off altogether an evaluation of China that credits it with the full potential support of Soviet nuclear strength.

We have learned, too, that the underdeveloped world is extraordinarily difficult to influence, to manipulate, or to control—by Americans with all their money and armaments or by Russians with all their money and armaments. It is nearly a decade since the entire Middle East seemed almost in the clutches of the Soviet Union, but the Russians find a Nasser as hard to clutch as we do. The stunning change in the politics of Indonesia during the past two years contradicted the forecasts of the most knowledgeable American experts and proved that Communist political manipulation is capable of failing even on the very brink of success. And we have only recently recovered from a brief panic at the thought that a few hundred Chinese or Cubans with a few truckloads of machine guns and radio transmitters would, with cheap and subtle violence, subvert and then control central Africa and Central America.

Most extraordinary of all is the discovery —a discovery important to social science as well as to foreign policy—that the countries that had Communist regimes imposed on them by Soviet force and subversion could become less, not more, ideologically Communist with the passage of time. They can become less, not more, tightly integrated into the Soviet bloc with the passage of time. And they can raise a generation under Communist rule that attests the durability of national identity and cultural continuity in a way that ought to enrage an old Bolshevik as much as it puzzles the Western scholar. The crushing of Budapest in 1956 was more like the beginning than like the end of an evolutionary process, a process that shows that even in a Communist world both internal politics and foreign relations have a dynamic character that neither a Communist nor a non-Communist social theorist can fully understand, predict, or control.

What has been happening in Eastern Europe is documented by so many scholars, journalists, and travelers, whose interests range from business management to scientific meetings, from poetry and editorials to the way people talk privately and in public, from the role of the party or the police to the role of the professional bureaucrat, that one has to accept their testimony as significant. What appears to be happening in Eastern Europe contradicts the expectations of some of the best social scientists in the West, who did not believe ten years ago that the process of "liberalization" or "modernization" could go so far, or that the vitality of national and regional cultures could flourish so.

Communism in its doctrinaire form has been something short of an economic success, and it is becoming harder and harder to sweep the evidence under the rug. I was recently behind the Iron Curtain talking to economists —well-educated, sophisticated professionals familiar with Western economics—and the conversation sounded like conversations with Western European economists in 1948, '49, '50. There are all the usual problems of overcontrolled economies, bureaucratic rent controls, exchange rates out of line, excessive attempts at wage uniformity, great inefficiency and some bureaucratic demoralization resulting from a 20-year or 15-year experiment in doing by ideology what the market does better. And, just as many developing countries learned a decade ago after flirting with socialism, some of the Eastern European countries are discovering that, whatever else there is to say about Marxism-Leninism, it does not have the key to the running of a country's economy.

They are facing a new problem, too, in Eastern Europe: reconciling the Communist Party with the government bureaucracy. This could happen only in a one-party country; in a multiparty system the parties compete and have no authority. In a country in which the party is the ultimate authority, something eventually occurs that we called, in this country thirty years ago, the "managerial revolution"—the development of a professional class, a bureaucratic class, composed of people more identified with the job they do from day to day than with the ideology and philosophy that goes with it. There is a tendency for party leadership to become older in years and less in touch with what is going on. One of the questions that has surfaced in Yugoslavia, and is widely discussed and about to surface in other countries, is what the role of the party is

going to be if it is not to become a collection of superannuated revolutionaries. Foreign relations tend to be handled more by party than by diplomatic establishments; but for the internal running of the countries, there is emerging what is almost a "two-party system," the party and the government functionaries.

We have learned some things, too, about our side of the Iron Curtain. One is that the "nation," as a political and geographical unit, is not too small or too politically obsolete to command the loyalty and interest of its citizens. Larger "communities" may be desirable, but not to fill some vacuum of national disillusionment. In the early 1950s there were many who feared (and some theorists who hoped) that the traditionally defined sovereign nation was unsuited to the modern world and would have to be submerged in some drastically different federal or supranational system. Today the traditionally defined "nation" looks pretty viable. Militarily, of course, many proud countries are too weak to stand alone against a major adversary, or a bloc of major adversaries; but the twentieth century is no different from the nineteenth in that respect. Economically there is much to gain through the merging of markets and the elimination of barriers to trade, capital flow, and the movement of people; but doing so now seems compatible with a modest diminution of "sovereignty."

A consequence is that "regionalism" may be losing its appeal, and properly losing it, as a basic mode of organization. Regionalism was expressly allowed for in the United Nations Charter, and for a decade it was a great hope for European unity. The idea has been applied, somewhat sporadically, to Asia, Africa, and Latin America. The idea was that geographical propinquity gives countries a great deal in common, that neighborliness is the stuff of which federation is forged, and that a country's geographical location determines its interests and responsibilities towards other countries. For land warfare that undoubtedly still is true; but in the age of jet travel, supertankers, satellite-relayed communications, and the increasing similarity of consumption patterns among the developing countries, the idea that Germany and the Netherlands, France and Italy, or Japan and Korea should form a "community" because they are close together on a conventional map may be becoming an obsolete idea. When it is suggested that Britain should join "the continent," in the present age one should ask, "Which continent?"

The same question is at least as pertinent to Japan, which so often has to be considered, geography notwithstanding, as part of the European continent or "Atlantic Community." This is not to deny that history, tradition, and culture provide some regional basis for collaboration in common institutions or that geography does determine some joint economic interests. It does suggest, though, that we should be careful in applying nineteenth-century economic geography to political groupings in the late twentieth century.

There is another development—one that used to be wished for without much hope but is now looked at askance by our European friends. That is rapport between the United States and the Soviet Union. We had the nuclear test ban in 1963, but that was not a convincing display of Soviet-American common interest: the two countries got into the test ban by a process of worldwide pressure and propaganda debate, rather than recognition of a common security interest. Eight or ten years ago, if you had gone to a conference almost anywhere around the world, delegates from various countries would have asked, "Why cannot the United States and the Soviet Union get together and keep nuclear weapons from spreading?" Now if you go to a conference almost anywhere around the world, but particularly in Western Europe, the question is, "Why must the United States and the Soviet Union get together to deny the spread of nuclear technology?"

Several things have happened. One is that most European countries no longer see a clear and present danger of Soviet military aggression. They can afford the luxury of being concerned with things that were suppressed by higher-priority problems ten years ago. Most of what has exercised NATO for the past four or five years has not been how to meet the

menace of Soviet military aggression; it has been internal to NATO—each country thinking about its role within the alliance, its future, and its diplomatic status. Those who think that America and the Soviet Union may be getting together undoubtedly have some pretty good evidence. The Nuclear Non-Proliferation Treaty—the draft treaty as it now stands—is not something that the two countries were pushed into by the pressure of world opinion. It is something that these two countries finally arrived at in spite of accumulating world opinion against it. Preserving what is left of the nuclear monopoly may not look good to many countries of the world, but it is a dramatic reminder that we and the Russians do have at least some interests in common.

I think it has been noticed, too, that in spite of the war in Vietnam Soviet-American relations are remarkably cordial. The kind of vituperation that was customary before, say, the Cuban missile crisis just does not go on between the two countries now. The treatment of American visitors to scientific and other conferences in the Soviet Union is more friendly and relaxed than it ever was. The Russians like to say that there can be no progress on disarmament and arms control as long as the war in Vietnam lasts; but they seem almost to be saying that this is a temporary disruption of the normal business of getting on in a cooperative way. This is noticed by our European partners, who are becoming strangely jealous at the breakdown in the polarization of East-West rivalry.

There is a special sign of this jealousy. Much is said these days about a technological gap between the United States and Europe. It is hard to know what is meant by a technological gap, but the idea seems to be that we have more and better technology than they have. There are some who go further and say that the United States, through a conscious and deliberate policy, sometimes in collusion with the Soviet Union, is trying to deny modern technology to our European partners to keep them in a subservient position economically and technologically. This is a bitter situation to have come up between us and the Europeans.

I do not think the problem is one of technological "gap." There surely is a wealth gap —we are richer than they are. Twenty years ago there was the notion of a "dollar gap"; it did not materialize as a persistent trend in world economics, but as a possibility it was a logically sound notion. Now what seems to be the gap is essentially the higher per capita gross national product of the United States compared with the European GNP. Whatever role one imputes to education, technology, native skills, special resources, etc., it turns out that countries that have saved and invested in capital equipment over the past fifty years more than other countries are bound to be richer. It is probably simpler to call it a wealth gap than a technology gap.

If anyone insists on putting it in terms of technology, the gap in technology between, say, Sweden and Portugal is greater than the gap between the average European country and the average state in this country. We have technological gaps within this country, too; Congress is exercised about the technology gap between the Harvard-MIT area in Massachusetts and Middle Western states that are not becoming computer centers.

Why is it that the technology gap gets so much attention? I think it is because the Europeans resent American wealth as well as leadership and particularly resent this effort by us and the Soviet Union to deny them nuclear technology. This relates closely to the nuclear weapon issue in Europe, which is the hammer that was hitting *us* on the head for several years. In the nuclear debate we allowed nuclear weapons to acquire almost the status of a "sixth freedom," the birthright of a nation—the thing possession of which meant it had reached national manhood or advanced technological status. I think that's over now. We tried for several years to reconcile two notions: that Germany should have at least some capability to fire nuclear weapons, in spite of the wishes of other NATO countries, and that Germany should not have precisely that capability. And it turned out that as long as the debate remained legalistic, these were wholly unreconcilable notions. For some reason, and I suspect it was fatigue as much as anything

else, this argument has died out.

My own feeling is that Germany would be wise to recognize that while nuclear weapons might give prestige to Germany, Germany would also give prestige to nuclear weapons. Germany is one country in the world that without nuclear weapons can claim to be technologically advanced, industrially dynamic, important, and in no need of nuclear weapons just to prove that it is a real country. I tried to argue a year ago, in speaking with Germans, that the real prestige item among the smaller countries of the world was not going to be nuclear weapons but troops that would actually fight, with officers and noncoms that could lead them. Since the brief war in June of this year in the Middle East, I have the impression that this has been borne out. I cannot imagine that possession of nuclear weapons would have obtained for Israel the prestige that an army of disciplined, highly motivated human beings can provide; and I suspect that the Germans would be wise to rest their prestige upon having the best army in Europe rather than worrying about nuclear weapons.

LET ME sum up. The original clear and present danger isn't there, and it is futile to suppose that European countries will be as exercised about NATO military force in the years to come as they were in the 1950s. They are evidently going to go on worrying much more about their own internal problems than about external danger. I believe, too, it is futile for NATO to try to enhance its position by going into cultural and economic fields; defense organizations are conservative organizations and amply preoccupied with the business of defense without becoming economic and social councils.

We have now almost twenty years of U.S. investment in NATO, represented by men and equipment in Europe, testifying to the importance of Europe. In spite of our preoccupation with Southeast Asia, I do not see how there can be any question but that Europe is the part of the world that most matters to us, as well as to the Soviet Union.

It is only five years since the missile crisis in Cuba, six since the Berlin wall went up. The Russians now seem reasonably well behaved, but we cannot guarantee that they will be six years from now. It would be enormously difficult, maybe impossible, to recreate NATO if we suddenly needed it; and even those who think that for the moment we hardly need it ought to realize that as insurance against sudden need in the future we should take NATO seriously.

In my evaluation, the essential element goes back to what NATO was in 1949 and 1950: the U.S. commitment to the worth and importance of Western Europe as expressed in a physical capability to help—even in a physical inability to avoid being engaged—in the defense of Europe if Europe has to be defended.

If all goes well, NATO is not going to have the vitality we would like. NATO gets its vitality from a clear and present danger from the East or from bitter division within the alliance. So if all goes well, NATO will languish. The important thing, and it is hard, is to maintain some kind of steadfast commitment, of military presence, over there, not because the asymmetry between us and Europe requires us to protect them and not them us but because that is where the frontier is and we are all part of the Western world. We must not become so bemused with modern transport that we think we can pull the troops back easily and get them there in a hurry in a crisis. It takes more than transport to get them there in a crisis; it takes resolve and new decisions.

We would be wise not to allow uncertainty or misinterpretation by the U.S.S.R. of what the United States would do if the Russians should attempt to take military advantage of some European military weakness. We would be wise to keep in mind that not long before North Korea attacked South Korea the United States withdrew troops from South Korea and very likely inadvertently signaled something about its intentions in a way that proved costly, not only for us but for our enemies.

Cambridge, Massachusetts

ISOLATIONIST CRITICS OF AMERICAN FOREIGN POLICY

A Historical Perspective

Dr. Paul S. Holbo

THOSE who are responsible for the national security of the United States consider it essential that this country maintain its international commitments and its leading role in world affairs. A majority of Americans, according to the polls, support such policies and might approve more aggressive measures in the Vietnam war. Yet antiwar protesters also make themselves heard; the polls suggest that a substantial minority of the population would avoid "another Vietnam"; and there is relentless criticism of foreign aid programs.

Both those who defend the general course of American foreign policy and the protesters themselves would be well advised to recognize that there has been a tradition in the United States of opposition to foreign involvement and war. Such views of the country's foreign policy can be characterized as isolationism, if that term is understood properly. No formal

definition has much validity because the features of isolationism are not always the same. But isolationism's typical forms and persistent characteristics can be seen in historical perspective.

Since 1941 there have been derogatory overtones to the term "isolationism," which conjures up memories of Senators Henry Cabot Lodge, Robert M. La Follette, and the other members of the "Battalion of Death" who helped to defeat Woodrow Wilson's League of Nations in 1919. Or it recalls the efforts made in the 1930s to keep the United States from joining the struggle against Hitler's Germany and Tojo's Japan.[1]

Even those persons who cannot remember, or who do not know much about, the controversies over foreign policy of the late 1930s react almost instinctively against the term "isolationism." For over two decades American schoolchildren have been learning that isolationism is bad. Because of the connotations of the word, it is applied more cautiously today than in the past, which is altogether proper. More important, there has been an increased awareness since 1941 that the United States was not an isolationist nation throughout its history. The fact is that Americans from the Founding Fathers through Theodore Roosevelt generally recognized the importance of Europe to their country and were sometimes adept manipulators of the European balance of power.[2]

There has always been isolationism in the United States, however, and sometimes it proved a good policy. President John Adams, who distrusted England and France equally, attempted with success around 1800 to free his country from European entanglements. Secretary of State John Quincy Adams insisted in 1823 that the United States should maintain an independent course in foreign policy, an idea that contributed to the making of the Monroe Doctrine. President Abraham Lincoln sensibly filed away a memorandum from Secretary of State William H. Seward suggesting that the United States become involved in a war with England, France, and Spain as a means of reuniting the Union. "Only one war at a time," the President reminded his able if aggressive Secretary of State. And in 1885, to mention only one more example of wise isolationism, the Cleveland administration rejected the General Act of the Berlin Conference on the Congo, to which the Arthur administration had sent delegates, because it might have involved the United States in the colonial partition of Africa.[3]

It is not so easy to make a case for the benefits of twentieth century isolationism.[4] In the 1920s, for instance, there was an ostrich-like reaction against the First World War. The nation did not withdraw altogether from the world arena after 1920, but even those Americans who still worried about the rest of the world failed to concern themselves with the problems of European security and rising Asian nationalism. Instead they concentrated on plans for international organization and arms limitation and on legal means to avoid war. It is not properly understood that these activities were often isolationism in disguise.

There was, for example, an isolationist aspect to support in the United States for the League of Nations. Many enthusiasts favored the League as a way to keep the peace without involving the United States in the struggles of the world. This outcome would, indeed, have been the millennium; but neither the Republicans nor the Democrats were quite prepared to bring it about.

The Washington Arms Limitation Conference of 1921–22, which was supposed to be a substitute for the League, for alliances, and for armaments, aroused American enthusiasm. The isolationists of that day seemed to believe that prohibiting preparedness would promote peace. "War," said Republican Senator Hiram Johnson of California, "may be banished from the earth more nearly by disarmament than by any other agency or in any other manner." Just before the Washington Conference convened on Armistice Day, 1921, several thousand women marched down Pennsylvania Avenue in Washington, D.C., carrying banners denouncing war. "Scrap the battleship," their placards read, "and the Pacific problems will settle themselves." Throughout the 1920s and early 1930s, American diplomats, with their naval aides carrying slide rules to calcu-

late "ratios" of warships, tried to scrap the battleship, the cruiser, the carrier, the destroyer, and the submarine.[5] They were still at it when the Japanese walked out of the London Naval Disarmament Conference and the League of Nations in 1935.

There was also a scheme for outlawing war, promoted by many of the peace workers, who were numerous in the 1920s, and by a Chicago lawyer named Salmon O. Levinson. If war was legal, Levinson and his followers wanted to declare it illegal; if war was nonlegal, as many authorities contended, they still wanted to declare it illegal. The Kellogg-Briand Pact, which was an outgrowth of the idea of outlawry, provided for the renunciation of war.[6] War in self-defense was still permissible, whereupon undeclared wars became fashionable. Manchuria in 1931 was just the first of a series.

There is a lesson to be learned from the history of the 1920s, for three of the essential characteristics of American isolationism are apparent: excessive faith in international organization; a belief that peace can be attained through the limitation of armaments; and a tendency to seek legalistic solutions. These characteristics were to recur in later times. Only a few Americans, including Secretary of State Henry L. Stimson, thought of international affairs in terms of diplomacy with power.

After 1928 there was less stress on international organization as a way of avoiding foreign conflicts. The League was already a dead issue, and the World Court would soon be abandoned by its presumed friends. But the idea of disarmament, now in the form of nonarmament, and legalistic means of avoiding intervention became more popular than ever with the onset of the Great Depression. Altogether the 1930s were to comprise the peak period of American isolationism.

The New Deal itself contributed substantially to the isolationist sentiment in the United States during this decade. The outgoing Secretary of State, Henry L. Stimson, urged that sanctions be imposed against Japan for its aggressions in Manchuria and that the United States consult with the European powers on world problems. He had no luck in persuading either his own chief, President Herbert Hoover, or the incoming president, Franklin D. Roosevelt, to adopt these policies, though Roosevelt toyed with the suggestions briefly.[7] In 1933 Roosevelt vaguely promised the League of Nations that the United States would not interfere with actions taken to preserve peace. There was an outcry in Congress at even this timid proposal, and Roosevelt quickly retreated. He also gave up his idea of appointing an ambassador to the League of Nations. In the same year he scuttled the London Economic Conference.[8] The United States, under the New Deal, would go it alone in economic and political affairs.

For more than a decade before the New Deal, novelists, playwrights, poets, and scholars had been establishing the mood for the isolationism of the 1930s. Such persuasive writers as John Dos Passos, E. E. Cummings, Maxwell Anderson, and Ernest Hemingway chronicled the absurdities and degradation of the World War. Some historians and political scientists contributed to the same attitude by arguing that Russia and France, not Germany, had been responsible for the war; and they made much of the secret, imperialistic agreements between the victorious Allies.

But it was the depression that provided the great impetus for the efforts during the 1930s to isolate the United States from international troubles. Americans commonly traced the origins of the depression to the Great War and mistakenly attributed United States intervention to "warmongering" bankers and businessmen, who were currently in low esteem. Certain spokesmen for conservatism, such as the Chicago *Tribune*, applauded the isolationist foreign policy of the Roosevelt administration. But the supporters of the New Deal and other liberals and progressives were the leaders in exposing the "causes of war" and pointed the direction to "permanent peace."

One such man was Senator Gerald P. Nye, progressive Republican and representative of the socialistic North Dakota Nonpartisan League, who headed the Special Senate Committee Investigating the Munitions Industry. The committee had been set up as a result

of persistent demands by the pacifist Women's International League for Peace and Freedom, led by Dorothy Detzer. This and other pacifist groups had called for investigation and regulation of the international munitions traffic, which they blamed for causing war.

The so-called Nye Committee met for two years, from 1934 to 1936, with the general endorsement of President Roosevelt. Senator Nye demonstrated that President Wilson had not been candid in 1919 when he stated that he was unaware of the Allies' secret wartime treaties; the committee charged, too, that American armaments-makers had made huge profits during the First World War and disclosed that the munitions industry had allegedly helped to break up the Geneva Disarmament Conference of 1927. The committee did not claim that economic interests had caused the war or led the United States into the war, but this was the popular view.[9] The legislative result was the Neutrality Laws, a legalistic solution for keeping the United States out of future wars by forbidding the sale of strategic commodities, the lending of money, and travel by Americans during wartime.

Another influential man who thought a great deal about the domestic and foreign problems of the United States at this time was the historian Charles A. Beard. He described his ideas in a series of books and articles, notably *The Open Door at Home*, written in 1934, and *The Devil Theory of War*, which appeared several years later. Beard, too, was a liberal, determined that reform should not be shunted overseas again as it had been in 1917 when so many progressives marched off to war with Wilson. He felt that there was too much to be done at home to let "giddy minds" involve the United States in "foreign quarrels." Thus he recommended that the United States renounce all "engines of war and diplomacy," restrict and control foreign trade, reduce its merchant marine, convert the Navy to a coastal defense force, and evacuate the Philippines; then the United States could undertake a kind of super New Deal on the model of the Tennessee Valley Authority. Professor Samuel Eliot Morison quipped a few years later that it was Beard's early retirement from Columbia University to his dairy farm in Connecticut that led him to propose such a program. Isolation, said Morison, breeds isolation.[10] But many Americans thought much as Beard did during the 1930s.

Other elements added to American isolationism in this decade. Agitators of left and right preached the doctrine. These included Father Charles Coughlin, Senator Huey Long, Dr. Francis Townsend, the Reverend Gerald L. K. Smith, and Congressman William Lemke.[11] Various ethnic elements added distinctive flavors: a few Scandinavian and Irish-Americans, some German-Americans, and after 1935 Italo-Americans.[12] Some of these individuals and groups continued to be active up to and even during the Second World War. But the real core of the isolationist movement lay in Congress with the staunchest supporters of the New Deal, such as Senators Burton K. Wheeler, George Norris, Homer T. Bone, Henrik Shipstead, Ernest Lundeen, Gerald Nye, "Young Bob" La Follette, and others whom President Roosevelt often relied on for votes.

Beginning in the late 1930s, however, the progressives who opposed intervention in foreign wars were joined by a number of conservative businessmen and others who opposed President Roosevelt's domestic program, and by a new, largely younger group of liberals. The businessmen included General Robert E. Wood, William Regnery, Edward Rickenbacker, Colonel Robert R. McCormick, and Joseph P. Kennedy. The liberals included young Chester Bowles, Robert Hutchins, and William Benton as well as the veteran reformers John T. Flynn and Oswald Garrison Villard. R. Sargent Shriver and other college students helped to form the America First Committee, which brought together the isolationists of left and right.[13] Colonel Charles A. Lindbergh was the most prominent spokesman of the America First Committee. One of his chief themes and one of the main principles of America First was the idea of impregnable national defense, "Fortress America," armed against the world. This was isolationism in its most concrete form. Another and

more effective argument of the committee was that the President had too much power and was leading the nation into war. Only Congress, the isolationists insisted, could declare war. Such suspicion of the President and the argument that Congress must have charge of foreign policy have been other enduring characteristics of twentieth century isolationism.

The America First Committee was an active and effective organization. It worried President Roosevelt, who often feared the isolationists more than he need have done. He usually dodged when the America Firsters challenged his programs or asked him where the United States was heading. Sometimes he retreated.[14] Yet, by the autumn of 1941 there was no doubt that the President expected the United States to go to war against the Axis, but how it would occur was unclear.

The America First Committee held its last meeting on 7 December 1941. During the colossal struggle following Pearl Harbor, isolationism was an ugly word in the United States. Pundit Walter Lippmann, among others, kept up a steady assault on the isolationists. In 1943 he accused them of having succumbed to "mirages," illusory hopes for peace, disarmament, and collective security, by which he meant excessive faith in agencies such as the League of Nations. The isolationists, he charged, had been too fearful of entangling alliances and had failed to "appreciate the long-established commitments of the United States."[15]

The Japanese attack had at last made Americans realistic about international affairs, or so it was claimed. But early during the war Americans again began to stress international organization as the main agency of permanent peace. At the Yalta Conference in February 1945, President Roosevelt told Josef Stalin, to the consternation of Winston Churchill, that the United States would not keep its forces in Europe at the end of the war.[16] As soon as the war was over, we dissolved our armed forces, so that by April 1946 they had been reduced by seven million men. Secretary of the Navy James V. Forrestal exclaimed in despair that "we are going back to [sleep] at a frightening rate."[17]

While the United States neglected its military strength after the war, it did not retreat altogether. President Harry Truman mustered the fleet in the eastern Mediterranean in 1946 and forced the Russians to withdraw from Iran. In 1947 he proclaimed the Truman Doctrine for aid to Greece and Turkey to combat Communism. Containment and the Marshall Plan of economic reconstruction ensued, to be followed by the Berlin Airlift in 1948–49 and the creation of the North Atlantic Treaty Organization in 1949.

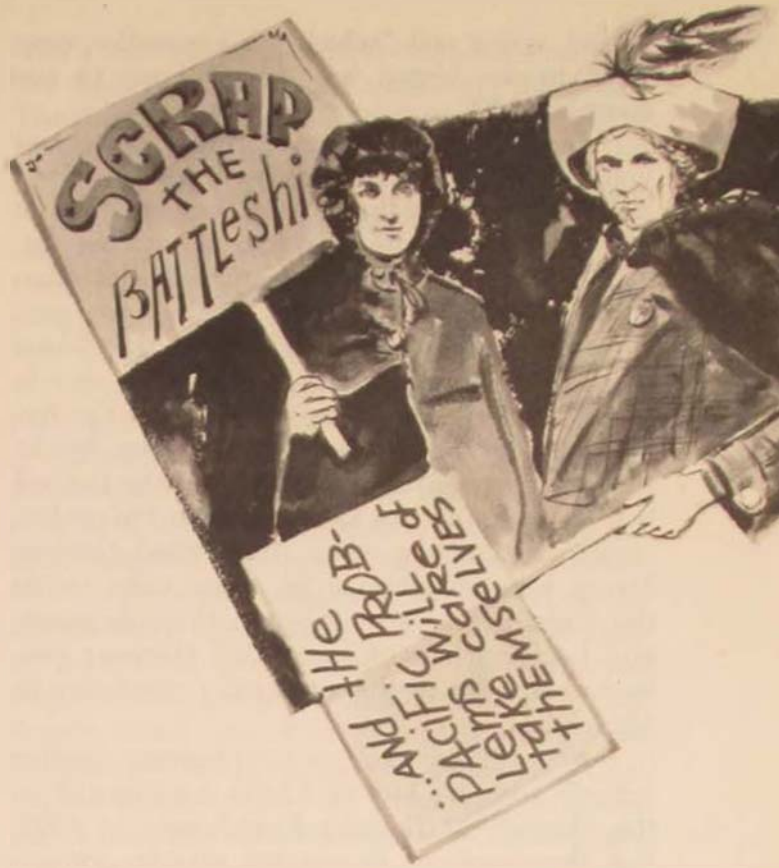
Many of the old isolationists had been retired from public life by this time; and others, notably Republican Senator Arthur Vandenberg of Michigan, were converted to hardheaded internationalism. Vandenberg advised Truman "to scare hell out of the country" to win approval of the Truman Doctrine, and the President followed his advice. Mr. Truman also sounded the tocsin of a worldwide crusade on behalf of freedom.[18]

That such language was necessary is a reflection of the persistent hold of isolationist thinking throughout the late 1940s. Polls revealed that only 49 percent of the people favored aid to Turkey, and only 56 percent favored aid to Greece. To win the support of the isolationists, advocates of the Marshall Plan had to argue that the plan would be a one-shot way of getting Europe back on its feet, so that presumably we could go our own way and not be touched for further loans.

President Truman came under fire from isolationists of both left and right. Secretary of Commerce Henry A. Wallace, the last of the liberal New Dealers in the Truman administration, spoke out against his chief's policies. He especially condemned the "Get tough with Russia" policy. "Getting tough," said Wallace, "never brought anything real and lasting. . . . We must not let our Russian policy be guided or influenced by those inside or outside the United States who want war with Russia."[19] His argument was but a variant of the familiar isolationist plaint that seditious elements were seeking to drag the United States into a foreign war.

A few days later the President wrote to his mother and sister in Missouri: "Well, I

had to fire Henry today. . . ."[20] But ex-Secretary Wallace continued to charge that the "Martial Plan," as he termed it, was an attack on the Soviet Union. And he led a revolt of liberals and fellow travelers against the President, accusing him of betraying the ideals of international cooperation laid down by Franklin Roosevelt. The lunatic-fringe and Communist elements in Wallace's Progressive party weakened his candidacy in the election of 1948, however, and Mr. Truman's surprising victory dealt a near death blow to left-wing isolationism.[21] The idea of general disarmament, which was Moscow's line through early 1950, attracted only scattered support, largely among the sign-bearing sects.



Conservative isolationism was more influential in the late 1940s. It was characterized by faith in so-called traditional foreign policies, by a distaste for the affairs of distant lands, and by pragmatic calculations, often stated in financial terms. Senator Robert A. Taft of Ohio, "Mr. Republican," supported the containment of Soviet expansionism, but he opposed stationing American troops overseas and favored extending the Monroe Doctrine to Europe instead of creating the North Atlantic Treaty Organization. During the Korean War, while General Dwight D. Eisenhower was trying to make NATO a reality, former President Herbert Hoover spoke in terms reminiscent of Lindbergh's Fortress America: "I suggest that air power and the navy is the alternative to sending American land divisions to Europe. With our gigantic productive capacity and with our economic strength we can build and sustain overwhelming air and sea forces and hold them on our home ground ready in case of attack. . . . We should not create land armies for expeditions into the quicksands of either Europe or China."[22]

Joseph P. Kennedy summed up the conservative isolationists' thinking in a widely publicized speech in Chicago in 1951. Calling for "disentanglement" from our commitments and programs, Mr. Kennedy stated: "The basic difficulty is . . . a policy that purports to reach for security by reliance on the United Nations, and on alliances with nations from Norway to Australia. It is a policy that builds on the theory that our dollars can buy many things that are not purchasable—the will to resist, the will to re-arm, the will to fight in another man's cause." We should save our strength, he added, for no other country would create a Marshall Plan for us.[23]

Walter Lippmann criticized both the Truman administration and its critics. The President's mistake, he said, was in adopting the "Wilsonian system of ideas," a crusading doctrine "generating great popular fervor" and creating the impression that all wars are wars to end wars. This once-and-forever ideology, Lippmann argued in his book *Isolation and Alliances* (1952), had been widely influential. He conceded that this Wilsonian ideology appealed to the emotions and was the easy way to win the approval of Congress. But he warned that there would be a reaction against the crusading spirit when the American people discovered that there was to be no end of crusades. The making of a new order, he

added, was a task "which our generation may hope to see begun but cannot hope to see completed."[24]

Lippmann's warning of future weariness was sensible; but the letdown he predicted did not come, largely because the Communists repeatedly aroused us and stirred our energies. The Berlin blockade, the Czechoslovakian coup, and the Korean War made NATO possible and gave it vitality. The news that Klaus Fuchs had delivered American nuclear secrets to the Soviet Union speeded work on the hydrogen bomb. And the United States began to rearm for conventional war. Yet the limited war that occurred in Korea was hard to understand, particularly when the United Nations forces became trapped in truce talks while the Communists strengthened their defenses, and because fear of expanding the war prevented a strike at the aggressors' sanctuary in Manchuria.

A reaction against the Korean "police action" and the loss of China contributed to the election of Dwight Eisenhower in 1952. But the mood of the nation was to contain Communism wherever it became a danger, not to isolate the United States from the rest of the world. Democratic critics and self-styled realists objected to Secretary of State John Foster Dulles's policies of "liberation" and "massive retaliation." They found the former to be infused with a moralistic desire to end the stalemate of containment, and they charged that the latter overemphasized nuclear weapons instead of conventional armies, allegedly for the sake of economy. But the arguments that ensued had a strongly partisan flavor, and neither the administration nor its critics urged a return to isolationism.[25]

The first sign of a retreat came in 1957, as the focus of the Cold War again centered on Western Europe. George Kennan, author of the containment policy, contended that settlement of the German problem was essential for a relaxation of tension. Kennan argued that the Hungarian revolution of 1956 had proved that the Communist satellite armies were not reliable and that the likelihood of a Soviet invasion of Western Europe was overrated. He also pointed out that the implications of ballistic missiles for the defense of Europe had not been considered fully. The solution that he suggested was disengagement —"a general withdrawal of American, British, and Russian armed power from the heart of the Continent"—and the neutralization of Germany, which might then be united. Kennan proposed in addition the creation of a nuclear-free zone in Europe.[26]

Soviet Premier Nikita Khrushchev liked the idealistic scheme, and Poland was soon promoting its improved version of disengagement in the Rapacki Plan. But former Secretary of State Dean Acheson protested strenuously against the whole idea. He revealed that Mr. Kennan had proposed disengagement previously, as early as 1949, and that the Truman administration had rejected it at that time. Mr. Acheson scored the "new isolationism" of Kennan and other advocates of disengagement, calling it "utterly fallacious" and dangerous "because the harder course which it calls on us to forego has been so successful." The struggle of two World Wars, great world leadership, and vast national effort has ended, Acheson lamented, "by bringing back the old yearnings and errors under a new name. 'Disengagement,' it is called now; but it is the same futile—and lethal—attempt to crawl back into the cocoon of history."[27] When Mr. Acheson and others finished their scathing commentaries on the new isolationism, the illusions of a diplomatic détente faded away and the hard real world again appeared.

There were further yearnings for isolationism during the last Eisenhower years and the thousand days of John F. Kennedy. These took the form of appeals to end the "international arms race" or for a cessation of nuclear tests. Unfortunately the Soviet Union engaged in what the Kennedy administration termed "nuclear blackmail" on the issue of Berlin and punctuated its appeals for "general and complete disarmament" without international inspection by setting off in 1961 twenty-one atmospheric explosions, ranging up to fifty megatons or more. The tiny claques of nuclear pacifists meanwhile continued to voice their "Better Red Than Dead" slogan.

It is not easy at this time to account for

the small but perceptible increase of criticism of American foreign policy in the early 1960s. One factor in the situation seems to have been an overreaction against the excesses of "McCarthyism." Among certain liberals, at least among the pseudosophisticated, anything anti-Communist became suspect. Charges also were voiced that American policy was based on a mistaken conception of monolithic Communist unity, despite the fact that the Kennedy administration repeatedly spoke of the fractures in the Communist bloc.[28] There was in addition a vogue of guilt-ridden fascination with the anticolonialist nationalism of certain newly emerging countries and with Castroite Cuba and Communist China. The feeling that an affluent—some said hopelessly decadent—United States was neglecting its own social problems added to the unease, especially among idealistic younger people who had no memory of the Korean War or even of the international crises of the mid-1950s. Certain other persons of pacifist or neo-isolationist inclination suffered from a nuclear-devastation mentality. Faced with the horrors of nuclear war, they asked, what choice could a sane man make? Their answers to the question, while emphatically humane, tended towards vast oversimplification. Catchall peace organizations, such as Turn Towards Peace and the National Committee for a Sane Nuclear Policy (SANE), were formed as umbrellas for the new-isolationist spectrum. The number of adherents was small, but they were passionate and outspoken.

The events of the Cuban missile crisis of 1962 shattered illusory hopes for a new world order. President Kennedy stood firm against the Russian thrust, all the while keeping diplomatic channels open. The President felt that it was necessary to have a showdown with the Soviet Union, though not to humiliate the adversary, and to combine firmness with flexibility.[29]

Ironically, when the crisis was past, the new isolationists criticized the President more sharply than the Soviet Union did. Several peace organizations castigated what they termed the "Kennedy system," calling it a "warfare state." They contended that Khrushchev's motives were unimpeachable and that the Soviet missiles in Cuba were harmless. The director of SANE also asserted, at a rally in New York City on the Sunday following the crisis, that the peace movement had prevented war![30] Few Americans were impressed by the claim. Professor H. Stuart Hughes, running for senator in Massachusetts on a platform of disarmament and disengagement, received only fifty thousand votes. And just one candidate anywhere in the country was elected on SANE's platform.

Exulting in its victory over Khrushchev, the Kennedy administration relaxed its pressure on Cuba and negotiated the limited nuclear test-ban treaty with the Soviet Union. The treaty was reminiscent of several of the international agreements of the 1920s in both its superficial pretensions and its restricted scope; even hard-line anti-Communists in the Senate voted for ratification of the treaty on the grounds of its military insignificance. But zealous agents of the New Frontier proclaimed that a détente with the Soviet Union might now be possible, while books appeared claiming that the Cold War at last was over.[31]

Most New Frontiersmen who were closer to the center of power worried about the disarray in NATO and the mounting conflict in South Vietnam. President Kennedy himself had been intensely concerned about Southeast Asia almost from the moment he took office in January 1961. Later that year, after careful consultations, he ordered a substantial increase in the American military commitment to South Vietnam, a decision that fit his persistent prior emphasis on conventional military preparedness and counterinsurgency warfare.[32] By the time of his death in 1963, large numbers of American troops were engaged in combat in Vietnam.

The crisis there nevertheless received little attention from Americans, perhaps because Cuba, the Congo, and Berlin were more dramatic or because the political situation in South Vietnam was so complex. American domestic issues, particularly involving civil rights, also absorbed the attention of persons who might otherwise have become alarmed over foreign policy. During the Presidential

campaign of 1964 the two candidates appeared to stand for abstract principles of restraint or of victory, which again diverted attention from the concrete problem. Consequently it was not until 1965 that the majority of Americans really became aware of the war, by which time it was undoubtedly too late to affect the course of American policy. There probably was never any substantial inclination among the public to do so anyhow, despite some unhappiness over the costs and nature of the war.

After February 1965, though, there was an outburst of antiwar protests, rallies and marches, and "teach-ins," more substantial than anything of the kind that had occurred since 1948 if by no means rivaling the isolationist activities of the 1930s. It is not possible in the space of this article to evaluate the views of the new critics, who have received such widespread attention. It is nevertheless useful to know that many of their views fit into the tradition of American isolationism. Of course by no means all of the new isolationists would necessarily agree with the isolationists of an older generation; but the patterns of their thought are remarkably similar, and their ideas often identical.

One can, for example, find numerous antecedents in the history of twentieth century isolationism for each of the charges voiced against American policy since 1965: that the President was unnecessarily involving the country in foreign war, allegedly in a futile struggle undertaken against the popular will; that the United States should avoid land warfare abroad; that the civilization or culture of the country where the battle was being waged had traditions that were irreconcilable with American values; that the United States has neglected to rely on international organization to restore peace; that America was supporting a decadent, corrupt foreign government; that we were breaking international law by our activities; that we were suppressing a native nationalist movement, or engaging in another crusade, or searching for absolute victory; that we were dominated by military-industrial thinking; and that we were creating domestic divisions and ignoring problems at home.[33] It also appears that the objections to escalation of the war, or to the bombing of North Vietnam, are derived *in part* from the extreme fear of war that has long been characteristic of the isolationist mind and that has been especially prominent during the atomic era.[34]

This is not to say that the views of the critics should not be heard merely because they have often been heard before. Nor does it mean that all their arguments are necessarily wrong now. But modern history does not stand convincingly on their side.[35]

Eugene, Oregon

Notes

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7. Elting E. Morison, *Turmoil and Tradition: A Study of the Life and Times of Henry L. Stimson* (New York: Atheneum, 1964), chaps. 21, 23, 24.

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9. Divine, *The Reluctant Belligerent*, p. 9. Wayne S. Cole, *Senator Gerald P. Nye and American Foreign Relations* (Minneapolis: University of Minnesota Press, 1962), pp. 67-121.

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(New York: Macmillan, 1939). Samuel Eliot Morison, "History Through a Beard," chap. 15 in *By Land and By Sea* (New York: Alfred A. Knopf, 1953), pp. 328–45.

11. Arthur M. Schlesinger, Jr., *The Politics of Upheaval*, Vol. III in *The Age of Roosevelt* (Boston: Houghton Mifflin, 1960), pp. 15-125.

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13. Wayne S. Cole, *America First: The Battle Against Intervention, 1940-1941* (Madison: University of Wisconsin Press, 1953). On Mr. Shriver, see *New York Times*, 7 March 1961.

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27. Dean Acheson, "The Illusion of Disengagement," *Foreign Affairs*, XXXVI (April 1958), 371-82. Khrushchev's appraisal appears in *New York Times*, 3 June 1957, and in Ross, *The Cold War*, pp. 50-52.

28. Edmund Stillman and William Pfaff, in *Power and Impotence: The Failure of America's Foreign Policy* (New York: Vintage Books, 1966), pp. 131-83, exemplify such thinking and describe an alleged rigidly ideological American foreign policy.

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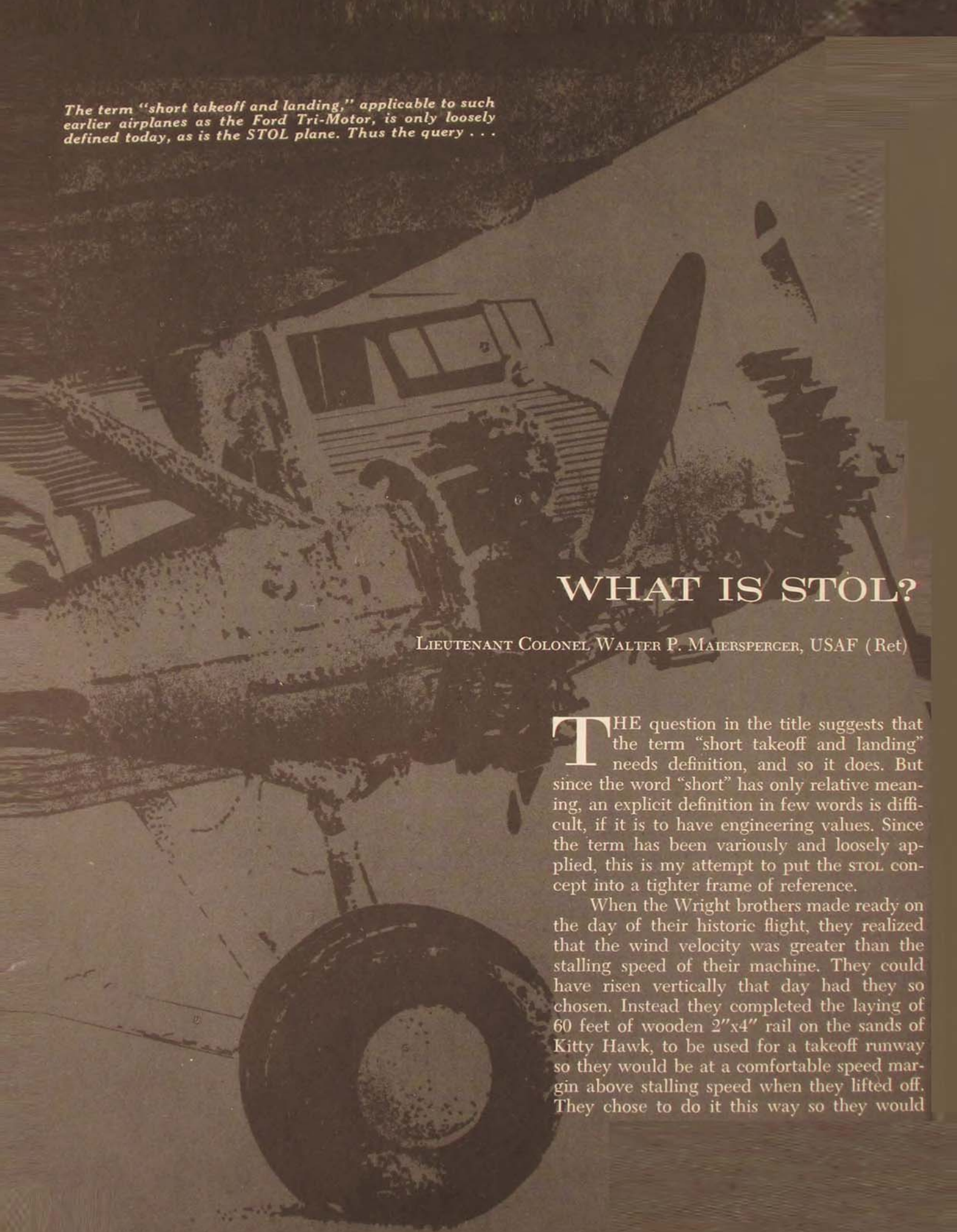

The term "short takeoff and landing," applicable to such earlier airplanes as the Ford Tri-Motor, is only loosely defined today, as is the STOL plane. Thus the query . . .

WHAT IS STOL?

LIEUTENANT COLONEL WALTER P. MAIERSPERGER, USAF (Ret)

THE question in the title suggests that the term "short takeoff and landing" needs definition, and so it does. But since the word "short" has only relative meaning, an explicit definition in few words is difficult, if it is to have engineering values. Since the term has been variously and loosely applied, this is my attempt to put the STOL concept into a tighter frame of reference.

When the Wright brothers made ready on the day of their historic flight, they realized that the wind velocity was greater than the stalling speed of their machine. They could have risen vertically that day had they so chosen. Instead they completed the laying of 60 feet of wooden 2″x4″ rail on the sands of Kitty Hawk, to be used for a takeoff runway so they would be at a comfortable speed margin above stalling speed when they lifted off. They chose to do it this way so they would

have additional control over their machine in the air.

Ever since, the rules of safe conventional flight have defined a necessary airspeed margin over and above the power-off stalling speed of the airplane. At first, the low power-to-weight ratio caused the early flyers to realize that any attempt to climb at too steep an angle would cause the machine to lose speed and settle back onto the ground. Aerodynamically speaking, the high angle of attack produced so much additional induced drag that the total drag was greater than the thrust available, so the machine slowed and then settled down.

After World War I, engines were more powerful but still none too reliable. To be safe, a climb-out after takeoff had to be made at sufficient speed so that, if the engine quit, the airplane could be nosed over and a glide established at an airspeed high enough above the stalling speed to permit a successful flare, or transition, for landing to be made. If the climb-out was too steep, or if the engine quit too close to the ground, the climbing speed would be too low to permit nosing over into a good gliding speed, and a crash would follow. Thus the conventional flight rule was established that a safe climb-out speed is the stalling speed plus the margin for a safe gliding speed (to permit a landing flare to be made) plus the margin needed to nose into the glide.

These early pilots normally made their landings power-off so as to obtain the necessary practice for the frequent occasions when a real-life emergency power-off landing had to be made. The pilot always cautioned himself never to try to stretch the glide by raising the nose, as this would cause a loss in airspeed and preclude his ability to execute a proper landing flare. It was recognized as being more dangerous to stall at a low height and hit the ground than to sail straight ahead into whatever obstruction presented itself at proper gliding speed. The stretched glide, the slow glide, was called the "graveyard" glide.

As commercial aerial transportation developed, flight operating rules were codified by government regulating agencies, and proper climbing and gliding speeds were established by formulas. The Federal Aviation Regulations specify the proper climb-out and approach speeds as a percentage of airspeed margin above the power-off stalling speed of the airplane for the condition under examination. For multiengine airplanes, conditions governing performance with at least one engine inoperative are specified. For example, at the correct climb-out speed (i.e., margin above power-off stalling speed) with one engine inoperative, the airplane must demonstrate a certain rate of climb or angle of climb. Airfields from which the airplane is licensed to operate must be long enough to allow the airplane time to reach the specified climb-out speed, or it must be shown that the takeoff can be aborted and the airplane can be stopped without going off the end of the runway.

All these traditions and regulations for safe flight are now known as the conventional mode of flight, which the term CTOL (conventional takeoff and landing) now designates.

The invention of the helicopter brought into being a new mode of flight, vertical takeoff and landing (VTOL). Quickly it was realized that the safest way to operate this aircraft was very nearly the conventional airplane way. For safest operation, the vertical climb is limited to a few feet above the surface, quickly followed by acceleration to climb-out speed; and in the landing approach, deceleration from approach speed back to hover is also done close to the earth's surface. There is little basic difference between safe airplane and safe helicopter practice.

Instead of a dread of stalling, as in fixed-wing airplanes, the dread in helicopters is to lose rotor rpm. This happens when gliding power-off at too low a forward speed to keep the rotor going fast enough to store the requisite energy for the flare. The cure is the same as in recovering from a graveyard glide in an airplane: dive to regain proper airspeed and proper rotor rpm.

What can happen when the helicopter makes a straight vertical climb or descent, with no forward airspeed? In such operations the pilot gambles that the engine will not fail during certain portions of the vertical flight. If engine failure occurs close to the ground,

the helicopter simply pancakes back onto the ground without damage. If the failure occurs above a certain height, the helicopter in falling can gain forward speed and maintain rotor speed sufficient to execute a landing flare. At intermediate heights, engine failure will result in a crash because of insufficient height to achieve the proper forward speed to maintain the rotor rpm to complete the landing flare.

There is a combination of height and airspeed from which a helicopter can lose its engine and enter safe autorotational flight. Such a curve is plotted for each model of helicopter. In pilot's terminology, it is known as the "dead man's curve," not too different from the "graveyard glide" terminology of airplane flight. The helicopter manufacturer naturally prefers that this curve be known as the height-velocity curve. Whatever it is called, the condition of less height or less forward speed than called for on the curve is not considered safe by conventional flight standards and is avoided as much as possible in helicopter operations.

Multiengine helicopters reduce the area under the curve in proportion to the number of engines they carry, their overall power-to-weight ratio, and other factors. Ideally, there is a requirement to produce a multiengine helicopter that can suffer the loss of one engine and continue forward flight without having to enter a controlled descent. For central city operations and for low weather minimums, this is really the only safe way. Meanwhile, vertical flight in helicopters more than a few feet off the ground is practiced mostly in commercial or military "crane" operations, not in passenger transportation. Government regulations governing climb-out and approach conditions for transport helicopters contain provisions regarding engine-out conditions and heliport size, generally similar to those which apply to airplane operations. The minimum-size heliport is one on which the operator can demonstrate a safe return to the ground following engine failure. The minimum heliport varies according to the model helicopter in use and the environmental conditions prevailing at the site. It is interesting to note that one source indicates the minimum heliport should be 700 feet in length, assuming a vertical climb to 35 feet at time of engine failure.

When VTOL airplane developments started, following the successful development of gas turbine engines during World War II, there was a big hue and cry from the helicopter proponents that such an airplane was unsafe because it could not autorotate. This undeniable "special case" logic forced the VTOL airplane proponents to install a sufficient number of engines in their designs and connect them in such a way that the loss of any one engine in vertical flight would not prove fatal. Also, one of the VTOL designs that seems most ideal for short-haul transportation, the tilt wing, has transition characteristics that reduce its power requirements drastically almost as soon as transition from vertical to horizontal flight is started. In other words, the time interval during which a single engine failure could have serious consequences is reduced to a very few seconds. In any case, the dangers inherent in the VTOL mode of flight were and are fully recognized, having been learned from twenty years of helicopter experience.

No sooner did the VTOL airplane prospects appear promising than a new rash of proponents of another kind of airplane appeared. These voices argued (and no one denied it) that a VTOL airplane was not only less efficient than a conventional airplane but also less efficient than something they proceeded to call an STOL airplane. To this day the STOL term and the STOL airplane remain undefined except in a very general sense.

Be assured by STOL proponents that STOL does not mean the World War I airplane, or even a Ford Tri-Motor or a Bellanca, all of which most certainly made short takeoffs and landings. All sorts of airplanes can be found that were designed to take off over a 50-foot obstacle in less than 3000 feet, 1500 feet, 800 feet, and even 500 feet. These distance requirements are all to be found in various government specifications seeking to identify a particular design as STOL. But none of the older designs qualify. In fact, few of the commercial designs that are advertised as STOL designs meet government requirements. What is the nature of this paradox?

Government STOL specifications usually exclude the older designs and the newer commercial designs by combining an airspeed requirement with a given takeoff requirement in such a way that they cannot qualify. In other words, the government STOL specifications require a speed range—a ratio of top speed to power-on stalling speed—plus a takeoff requirement that necessitates a special design. What kind of a design is it?

To begin with, the STOL airplane requires far more power than a CTOL airplane, and so it is less efficient and more expensive. Since it cannot VTOL, it is not directly comparable in mission capability to either the VTOL airplane or the helicopter, although it is constantly compared to them. What else is distinctive about the design? When takeoff and landing performance is computed for the STOL design, one discovers that a new reference airspeed may be in use. Not power-off stalling speed but power-on stalling speed may be the reference. Also, the margins above power-off stalling speed for climb-out and approach are reduced. An examination of this STOL mode of flight reveals a serious compromise of both CTOL and VTOL flight traditions. I shall discuss here only the longitudinal aspects. In practice, lateral, directional, and cross-coupling and thrust-coupling effects provide additional complications. Assuming all these are brought under control (though in practice they have not been yet), how do STOL operations compare with traditional flight along the longitudinal axis?

In STOL takeoff and landing operations, lift is produced by the direct or indirect application of thrust to augment the lift produced by the forward motion of the wings of the plane. In its usual form, the lift obtained from power is produced by the action of the propeller slipstream on highly flapped wings. It could take other forms. Jet lift engines could produce direct lift to augment the lift of the wings. The point is that the takeoff or landing is made at an airspeed less than the traditional margin of airspeed above power-off stalling speed.

In a single-engine airplane STOL takeoff, if the engine is lost during takeoff the airplane cannot enter a safe gliding speed unless it has reached a considerable altitude. A multi-engine airplane making an STOL climb will start settling immediately after an engine failure. The perilous difficulty of an airplane operating in the STOL mode of flight is that the only way it can regain lift is to reach a higher airspeed. It cannot do this by lowering its nose, hoping thereby to reduce its induced drag and accelerate, for instead the result will be loss of aerodynamic lift and consequent faster settling. If the airplane raises its nose, it will create more induced drag, slow down even more, and settle faster. In either case contact with the ground is inevitable unless the plane is high enough to dive and thereby regain a conventional speed margin above the stall.

In the landing condition, the same predicament exists. The STOL landing is made at speeds below the normal gliding speed. In some recent military STOL designs, the approach was to be made at speeds 20 knots below the power-off stalling speed of the airplane. The rate of descent was to be held to design limits of around 10 feet per second by the use of engine power. In this particular design, the wing was totally immersed in the propeller slipstream, which gave the necessary lift when power was applied. Unfortunately, such lift vectoring also produces an associated thrust vector, which tends to speed up the plane. To prevent this, the flaps came down more than 90 degrees. Thus thrust was neutralized in the landing configuration to the degree that the airplane had a total drag greater than the thrust available from both engines. The airplane had a negative rate of climb with full-down flaps under the full power of both engines. During an approach to landing it is obvious that the airplane could not execute a missed approach, even with both engines operating, unless the missed approach procedure was started at sufficient height to raise the flaps to their best lift-over-drag ratio, possibly at some slight sacrifice in altitude. If the airplane lost an engine during the approach (and if only the pitch axis is considered), it would immediately sink at a rate exceeding its landing-gear design vertical sink

speed. Its only chance to recover would be to regain conventional gliding speed by lowering its nose and raising its flaps. At low altitudes this would only result in hitting the ground harder.

Aircraft companies that advertise STOL airplanes take a more conservative approach. They do not base their performance figures on climb-out and approach speeds below power-off stalling speed, but usually they reduce the conventional margins by 30 to 50 percent. Since this is not a government-validated performance criterion, some manufacturers publish two sets of takeoff and landing performance figures, one labeled as government-approved certification figures, the other labeled "STOL" performance. One company, to its credit, even publishes the margin above stall at which the charts are calculated. The latest trend among STOL manufacturers is to maintain a conventional margin above stalling speed during the approach for landing and to reduce the glide distance from the 50-foot obstacle to the point of flare by depending on a so-called Beta control of the propeller. This is a variable pitch control between the normal cruise settings and full reverse pitch which allows the turbine engine to be maintained at a high power rpm setting, while at the same time adjusting the propeller pitch to produce either positive or negative thrust. In this way the angle of descent can be regulated while maintaining a full margin of speed over the stall. It is obviously a far safer procedure than reducing stall margins because neither an engine failure nor a sudden gust can appreciably affect the pilot's control over the airplane. Full reverse pitch and power are applied after the flare is completed, to stop the airplane. The total landing distance over an obstacle may be increased by this technique, but nonetheless this is the technique preferred by the manufacturers and the one they are selling their customers. The point about Beta control is that in itself it is a recognition on the part of the STOL manufacturers that high lift devices and reduced margins above the stall may be advantageous theoretically, but Beta control is safer.

With this background, how can STOL be defined? One definition of STOL might be "that mode of flight in which part of the lift is induced by power." Since this definition would also satisfy the powered flight of any airplane at high angles of attack, it is obviously too broad. My suggested definition is to the point:

> The STOL mode of flight is one during which an airplane taking off or landing is operated at climb-out and approach speeds lower than the conventionally accepted margins of airspeed above the power-off stalling speed of the airplane.

Where does my definition of STOL leave the several airplanes being manufactured and advertised as STOL airplanes? It leaves them as excellent airplanes when operated CTOL, that is, with recognized safe certificated margins above the stall. They are a class of airplanes which, to be certified at takeoff and approach speeds lower than traditional CTOL margins, must approach the full measure of reserve power and control necessary for VTOL certification. It remains to be seen whether this can be done without making the STOL airplane just as expensive as the VTOL.

When the STOL adopts conventional margins of control, the title question, "What is STOL?" can be answered: Safe STOL is short CTOL.

McLean, Virginia

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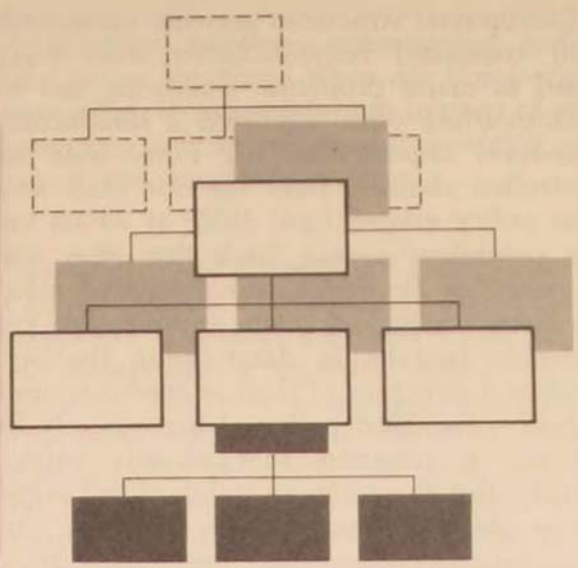


STANDARDIZATION: PREREQUISITE FOR EQUITABLE MANPOWER DISTRIBUTION

MAJOR GENERAL BERTRAM C. HARRISON

The Air Force urgently needs imaginative, perceptive management programs and techniques to insure that we get the absolute maximum value out of our resources. This is particularly important right now and in the days ahead when our operations in Southeast Asia place mounting demands on our human and material resources.[1]

GENERAL JOHN P. MCCONNELL

ONE EFFORT toward fulfilling the need expressed by General McConnell is the USAF Management Engineering Program. This program is primarily concerned with the equitable distribution of the Air Force's manpower resources. The principal method for accomplishing this task is through the development and application of work center manpower standards. These standards relate actual and programmed workload to man-hours expended in such a way as to provide a common basis for determining manpower requirements throughout the Air Force.

Recently the Air Staff has acted to remove a major obstacle to rapid development of these sorely needed manpower standards. This obstacle has been inadequate standardization in terms of the diverse organizational structures and operating procedures prevailing throughout much of the Air Force. Seldom have two bases in two different commands been organized in the same way, nor have similar base functions been operated alike. Consequently it has been extremely difficult for the management engineers to develop standards that could be applied across command lines in an equitable manner. The purpose of this article is to present the background and effects of this problem and review the Air Staff efforts to solve it.

background

During World War II the lack of standard

organizational structures and the existence of split command responsibilities were recognized as major problems. Following the war Headquarters USAF instituted a standardized base-level organization Air Force-wide and controlled changes from the Air Staff level. This policy existed until 1955, at which time the pendulum swung back the other way. A policy of flexibility was instituted which permitted individual major commanders considerable latitude in determining the organizational structure of their subordinate units. Actually, the 1955 policy change merely formalized a situation that already existed: namely, that the policy of standardized organization had not been working for some time. Numerous deviations had been made to accommodate varying missions, concepts of operation, deployment, and similar factors, thus making it a standardized organization in name only.

The new policy of flexibility existing after 1955 provided a climate for organizational experimentation. Frequent changes were made, and wide variations existed in the structure and terminology of similar units.

By 1962 the pendulum had again swung back to Headquarters USAF control. One of the primary reasons for the policy reversal was an April 1961 letter from the recently appointed Secretary of Defense, Robert S. McNamara, in which he stated: "We should avoid using different terms to mean the same thing." About the same time the Chief of Staff, General Curtis E. LeMay, is quoted as having said, "I want a standardized Air Force." Late in 1961 a USAF Inspector General report had directed Air Staff attention to organizational variances and ineffectiveness in USAF organizational planning and control. The end result of all these actions was a 1962 directive to the major commands, calling for functional standardization wherever feasible and returning to Headquarters USAF significant control over organizational structure Air Force-wide.[2]

the problem

Since the organizational structure within a function has a significant effect on layers of supervision to be authorized in a manpower standard, it is necessary that the structure be essentially the same for like bases. Further, if organizational elements are known by different names, perform different tasks, or even the same tasks in different ways, then the job of establishing a manning standard for the function on an Air Force-wide basis becomes extremely difficult. The management engineering technicians at different bases would be observing all kinds of "nonstandard" work, and the resulting standard times would be useless. Once a standard has been established and implemented for a function, it is imperative that local commanders and supervisors continue to maintain its integrity throughout its life cycle; or, stated more simply, once standardization has been achieved, it must be maintained. To do less is to invite manning problems within the function—manning problems which are difficult and expensive to correct.

the solution

As Director of Manpower and Organization at Headquarters USAF, I have been working closely with the other Air Staff directorates for some time now in support of more standardization. Headquarters USAF Operating Instruction No. 25-4, applicable to the entire Air Staff, contains this caution:

> Common manning standards cannot be achieved until like-type operations in the field are standardized. The manpower standard for one work center would not necessarily be accurate for a similar work center that differs in organization, processes, equipment, etc.[3]

In addition to our actions within the Air Staff to achieve standardization, we have continued to enlist the support of commanders and supervisors at all levels. In a recent *Air Force Policy Letter for Commanders*, the subject was approached in this manner:

> . . . standardization wherever possible must be stressed and insisted upon; not because of blind obsession for uniformity, but for the positive benefits that standardization provides. It permits selection and use of the best proce-

> dures and methods. It permits the development and use of engineered performance standards having wide applicability—which in turn enlarges the scope for comparison of one activity with another. It simplifies the identification of problem areas and their underlying causes.[4]

The standardization drive seems to be working. Air Force Manual 26-2, *Organization Policy and Guidance,* contains many standard structures for functions such as accounting and finance, maintenance, supply, personnel, etc. The manual also reaffirms that one of the Air Force's organizational objectives is to "standardize to the extent consistent with effective and efficient mission accomplishment." The manual then lists five specific benefits to be derived from standardization: (1) promoting organizational stability; (2) facilitating Air Force-wide management improvements; (3) facilitating the development of standards and performance comparisons; (4) lessening orientation time when personnel are transferred from one unit to another; and (5) improving communications by enabling all Air Force personnel to attach the same meaning to a given organizational term.[5] That these are worthwhile benefits goes without saying.

All this is not to say that the Air Staff has a corner on the brain supply. Far from it. A multitude of good ideas is available throughout the Air Force, just waiting to be tapped. But to realize the full benefits of any sound improvement, it must be processed upward for eventual application to all similar units. Isolated instances of unilateral deviation from established norms which are neither reported nor evaluated are next to useless and frequently cause trouble. In this regard, command management engineering teams are uniquely suited to assist in testing, evaluating, and processing desired local deviations to standardized Air Force organizations and will take action to extend them Air Force-wide if warranted. When in doubt or in need of assistance, one should call on his servicing manpower and organization office.

FROM THIS brief discussion it can be seen that a major obstacle to producing valid Air Force manpower standards has been a lack of standardization among bases and within functions. Units and functions with similar missions and equipment have seldom shared a common organizational structure, nor have they used the same methods and procedures to accomplish identical tasks. This basic lack of "commonality" has thwarted attempts by the management engineers to develop manpower standards that could be applied on an Air Force-wide basis. As a direct consequence, the equitability and validity of our functional manpower needs have often been open to question.

Fortunately, this major weakness seems to have been identified in sufficient time to permit corrective action by the Air Staff. Standardized organizational structures have been developed and implemented for several large functions, thereby permitting the application of Air Force manpower standards. Equal manning for equal workloads throughout the Air Force has been assured for many functions. In this age of centralized control and cost-effectiveness methodology, no other approach can seriously be entertained. Clearly, standardization is a prerequisite for the equitable distribution of our scarce manpower resource.

Hq United States Air Force

Notes

1. General John P. McConnell, Chief of Staff, United States Air Force, address before the Management Analysis Symposium, Bolling AFB, D.C., 15 February 1966, quoted in USAF Fact Sheet, *Systems & Logistics Management,* No. 4-66 (April 1966).

2. Historical references were adapted from a speech by Colonel John R. Kern, Hq USAF, before the World-Wide Management Engineering Conference, Orlando AFB, Florida, 13–15 January 1965.

3. Hq USAF, Headquarters Operating Instruction No. 25-4, *Staff Responsibilities in the USAF Management Engineering Program,* 23 December 1964, p. 3.

4. Major General Bertram C. Harrison, "Management Engineering—Prerequisites for Effectiveness," *Supplement to the Air Force Policy Letter for Commanders,* No. 8-1966 (August 1966), p. 11.

5. Air Force Manual 26-2, *Organization Policy and Guidance,* 11 December 1964, p. 4.

DESIGN, CONSTRUCTION, AND OPERATION OF MISSILE FACILITIES

ROMAN A. METZ

THE DESIGN, construction, and operation of missile real property and real property installed equipment established several records: they were the first Air Force facilities designed to protect against the effects of nuclear weapons; the first major program to employ the concept of concurrency; the first mass installation of sophisticated systems by advertised construction contracts; the first mating of off-the-shelf real property installed equipment with sophisticated missile hardware; and the first time the Civil Engineer participated in the direct support to a weapon system.

Real property (RP) includes any right, title, or interest in land, buildings, fixed improvements, utility, and other permanent addition to land.

Real property installed equipment (RPIE) is defined as those items of government-owned accessory equipment, apparatus, and fixtures which aid in the function of real property and are permanently attached to, integrated into, built in or on government-owned or -leased property, including air-conditioning systems and equipment.

The role of the **Air Force Civil Engineer** is to design, construct, operate, and maintain that RP/RPIE necessary for the operation and maintenance of any weapon system and for the shelter of men, materiel, and equipment.

The evolution of missiles and missile facilities was an excellent example of the tremendous rate of growth in pure science and technology in the early 1950s. Although the effectiveness of the atom bomb was dramatically demonstrated in terminating the hostilities of World War II, the degree of its effectiveness and the reliability of its design remained to be established. Early testing began necessarily with small weapons in the kiloton range, to verify bomb design and to ascertain the magnitude. Protective construction against the effects associated with nuclear weapons involves a specialized field of engineering which was developed by integrating the sciences of seismology, geophysics, and dynamics and related civil, structural, electrical, mechanical, and other engineering disciplines. Preliminary studies in the design of protective construction were predicated on the results of the early tests. As testing techniques and instrumentation were improved, higher-yield weapons were developed with significantly longer durations, which negated much of the early design. Structural components rather than complete structures were then dynamically loaded in simulated tests using Primacord. In this way confidence was established in the design's capability to withstand effects of higher overpressure levels.

With the advent of Sputnik in the fall of 1957, the urgent need for operational missiles dictated expeditious action. Finally selected as the most feasible method of providing operational missiles at the earliest possible date was the concept of concurrency, whereby missiles and missile components were designed, developed, and fabricated concurrently with the design and construction of supporting facilities. To the structural engineer, the greatest challenge is in the unusually high design loads, dynamically applied. Normally, loading is expressed in pounds per square foot. In protective construction, the same numerical loading in pounds per square inch may be required. These great loadings also influence foundation design in protective structures.

Conventional structures are free standing, bearing only on the ground through foundations, footings, or piling. With dynamic load-

ing, underground structures like missile silos can bear against the soil in any direction. In fact, the tremendous energy generated by design overpressures must be resisted not only by the maximum allowable deflection of a structure but by that of the surrounding soil/rock as well. Since there is no uniform soil/rock in nature, variations encountered at the different sites complicate the analysis of soil interaction with structures. The interrelationship between structures and soil/rock is typical of the extra effort required in designing protective construction.

Conventional facilities are designed to withstand a G-force of unity, plus a small fraction of a G-force for earthquake areas. Hardened facilities must be designed for many G-forces. The selected shock spectrum depends on the size of the weapon, the overpressure, the type of soil/rock, and the materials of construction. Not only must the structures be designed to survive severe conditions, the sophisticated electrical, mechanical, communications, and electronic equipment must also be protected.

The magnitude of shock platforms and the design shock spectrums used for missile facilities were unprecedented. Consider a fully loaded missile, two large diesel generators complete with an electrical distribution system, an air-conditioning system with standby chillers, large fuel, water, and pneumatic tanks, control systems, black boxes, and numerous other equipment installed in an eight-story structure about 45 feet in diameter. Now consider the structure, mounted on a special trailer, traveling down a very rough road at high speed. The ensuing motion is indicative of the displacement, velocity, and accelerations encountered not only in a single degree of motion but in multiple degrees of motion as well. In a conventional structure the deflection of a beam is so small that, for all practical purposes, the floor it supports is considered level. In protective construction it is sometimes necessary to use very large beams as springs. That the earth and entire structures under design conditions literally move many inches is hard to comprehend.

Prime power for a weapon system as numerous and as widely dispersed as Minuteman presents many problems, not only in the original design but in operation and maintenance as well. Dozens of power sources are involved, each tailoring its respective power transmission to suit the area served and the prevailing weather conditions. Power transmission systems vary from the bare minimum systems in remote, sparsely settled areas to good systems in areas which have reasonably high demands. Blinking lights and frequent power outages during storm periods are accepted in remote areas because it is not economical for power companies to double the number of poles and add other desirable appurtenances. Under these circumstances, the government could not economically contract for power other than what was available at each site. Missile power systems had to be designed accordingly. Some sources had Delta-Y power connections and some had Y-Y power connections. Although either power source is acceptable, power sensing controls to start prime diesel power upon commercial power failure had to be mated into the connected systems.

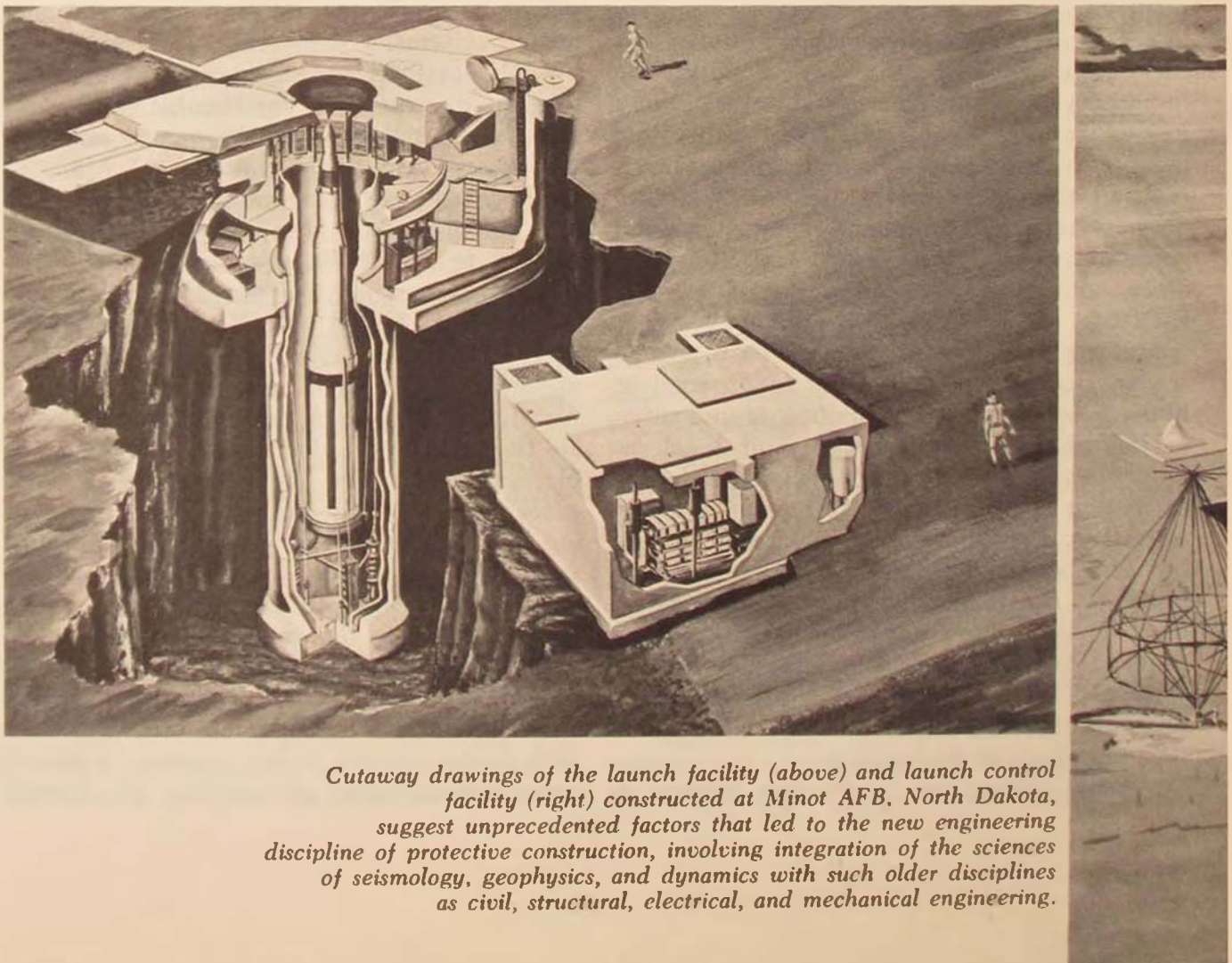
Missile facilities are comprised of many integrated structural, mechanical, and electrical systems that house the missile and provide power, environment, and fuel. Many of these systems are hazardous because of either the fluids used or the operating pressures needed to actuate massive silo doors. First-generation missiles like the Atlas series and Titan I were fueled with RP-4 (a jet type of fuel) and liquid oxygen, stored and handled under cryogenic conditions. Large, high-pressure hydraulic systems were required to actuate the massive silo doors, elevators, operating platforms, etc. The large amounts of inert gases required to fuel and defuel missiles during launch exercises were stored at high pressure. Leakage and escape of inert gases present no problem in the open but can be hazardous to life in the confined space of a silo should the ventilating system malfunction or fail.

The potential danger of a mishap to a fully loaded missile during exercise or launch necessitated special precautions. The launch

control centers were designed to resist not only the effects of nuclear weapons but also the effects of an accidentally ignited missile loaded with fuel in a silo, since the amount of fuel which first-generation missiles burn in four minutes is about equal to that a modern jet liner burns in a cross-country flight. In addition, intercontinental ballistic missiles are not air breathers and have to carry their own oxidizer, another potential hazard.

Hazards inherent in the construction, installation, and checkout of missile facilities required special safety programs. Special knowledge required to safely construct the exotic systems on a massive scale was obtained by contracts with specialists in the respective fields. Once this knowledge was available, it had to be disseminated to and assimilated by not only the contractors and their workmen but government inspectors and engineers and finally by the operating personnel. Precautions had to be taken. For instance, in the fabrication of valves, fittings, piping, tanks, etc., for handling liquid and gaseous oxygen, it was necessary to establish clean rooms and cleanliness standards exceeding those for hospital operating rooms and pharmaceutical manufacturers. Cleanliness had to be enforced in the field, too. During installation and checkout of oxygen systems, pipe fitters wore white coats, and the entire area was maintained at a degree of cleanliness never before attained for conventional construction. The hypergolic fuels of Titan II, although not as dangerous as liquid oxygen, required special handling because of the inherent danger of toxicity and of spontaneous combustion.

ALMOST every engineering discipline used in the design and construction of



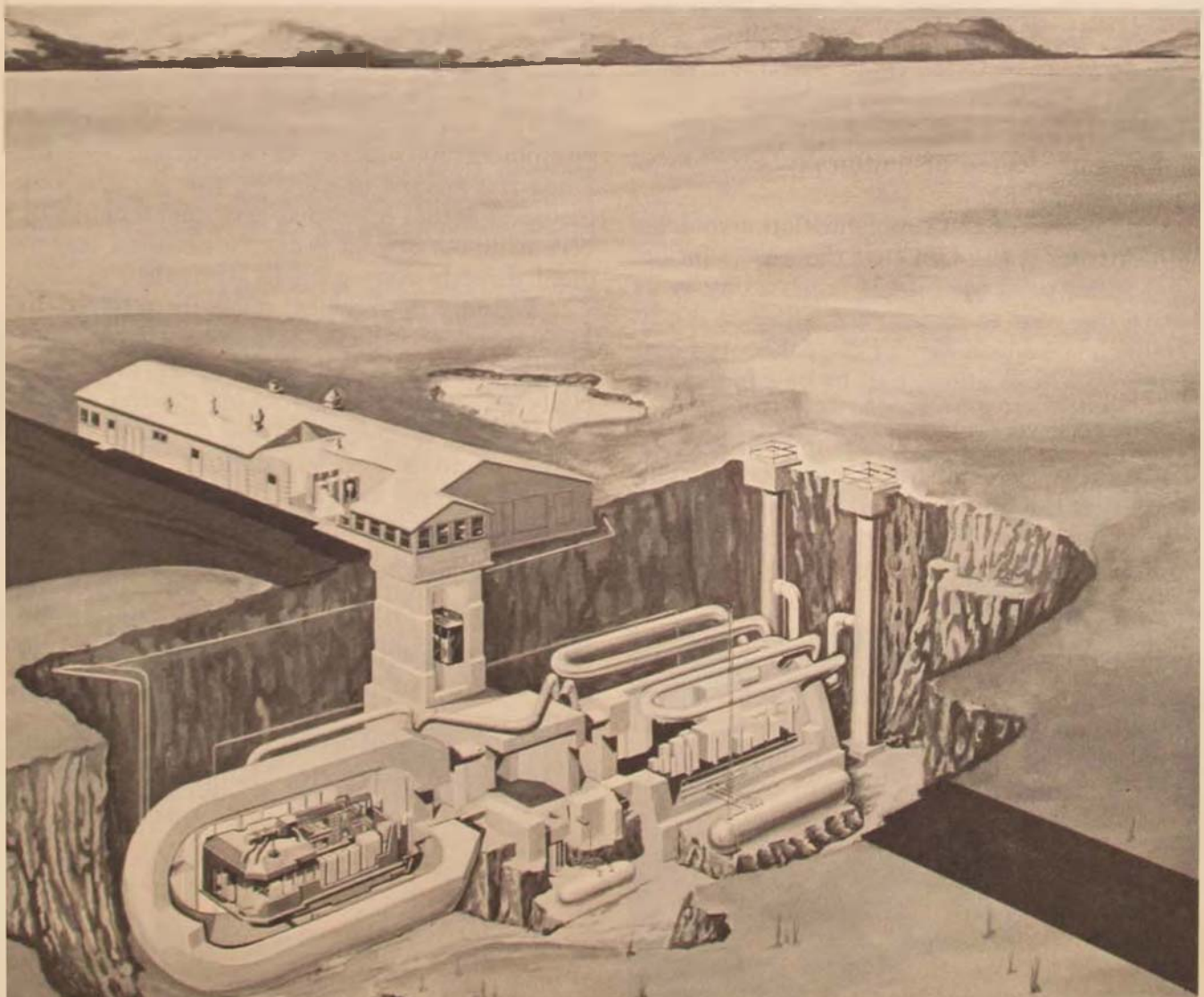
Cutaway drawings of the launch facility (above) and launch control facility (right) constructed at Minot AFB, North Dakota, suggest unprecedented factors that led to the new engineering discipline of protective construction, involving integration of the sciences of seismology, geophysics, and dynamics with such older disciplines as civil, structural, electrical, and mechanical engineering.

missile facilities required the integration of at least one other engineering discipline. Orienting the many agency offices, designers, contractors, and inspectors involved in the programs with the dynamic characteristics of protective construction was no little accomplishment. The standard government procedure for constructing facilities is the formal advertised contract method, designed to encourage maximum competition, resulting in lowest cost. Any RP/RPIE construction and supply items that can be adequately described by plans and/or specifications are subject to this practice.

For uniformity and standardization of operating procedures and repair parts, many component parts of missile support equipment were purchased in advance by the government for an entire wing under separately advertised contracts and then furnished to the construction contractor or the installation and checkout contractor for installation. Less important components were included in and furnished and installed under the construction contract.

In the expedited construction of a single conventional facility, it is not uncommon for designers to be two weeks ahead of construction crews. Under the concept of concurrency, the partially constructed missile facilities had to be changed as dictated by breakthroughs in missile development. Whereas usually only one facility is involved in conventional construction, up to 200 identical facilities were involved in any one missile construction contract. The concept of concurrency was necessarily expensive, but it was a price that had to be paid for earliest possible missiles.

The number of people proficient in the design, construction, and handling of exotic and complicated missile facility systems was limited. Many of these systems, usually small in size, were designed and constructed almost on a proprietary basis.



Inspection has always been important in construction work, and structures peculiar to protective construction introduced new problems for the inspector. The space surrounding a shock-mounted structure inside a silo to allow for movement under design conditions is referred to as rattlespace. Construction drawings, unlike shop drawings, can show only so much detail. If equipment, pipes, conduits, etc., encroach into this rattlespace, these components could be damaged by being crushed against the concrete silo walls under design movement and the missile rendered ineffective. These oversights may seem simple and inexcusable, but we must consider the conditions under which this work was accomplished. Building tradesmen were not accustomed to working on swaying floors, so it was necessary to crib the shock-mounted platforms. If the cribbed platforms were not accurately positioned or maintained, rattlespace dimensions would have to be adjusted accordingly. The same was true if a contractor furnished an "equal" unit of significantly different shape from that designed. Although every effort was made to ensure that all missile facilities were uniform in every wing, slight variations peculiar to construction were inevitable. It is practically impossible to build dispersed facilities to the same degree of uniformity possible on a production line.

Indicative of the sophistication associated with missiles is the fact that the air-conditioning systems must operate 24 hours a day every day in the year to maintain missiles in ready-to-launch condition. Under the concept of concurrency, specifications had to be prepared in many offices. Unfortunately, all specification writers did not call for the same degree of dependability, which in the case of RPIE usually means that the unit has been manufactured for at least five years. This period allows a manufacturer to work out the bugs and develop the desired dependability.

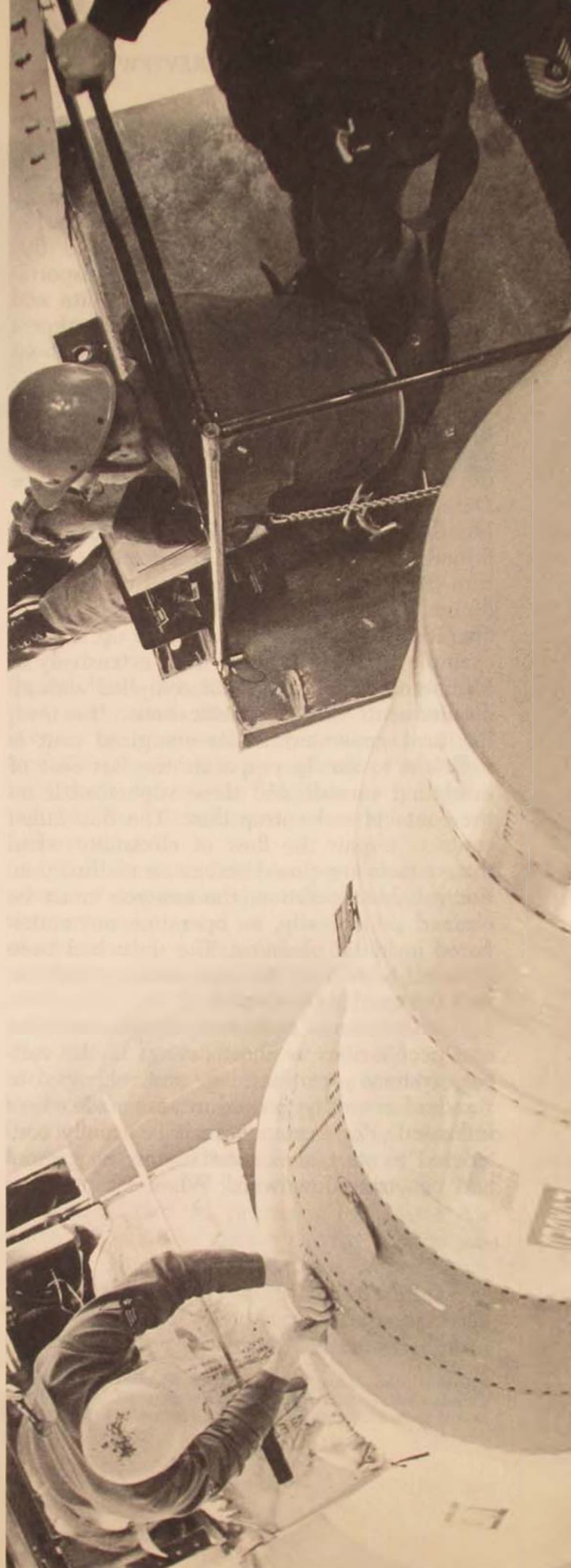
Construction materials and equipment are continually being changed to incorporate new materials and improved manufacturing procedures. In the normal development of a weapon system, testing in prototype installations would prove or reject these equipment components; but in the absence of prototype testing, quality control and reliability factors were minimized in the real property installed equipment furnished by the construction contractor. Causative factors were specification requirements and available time.

It was anticipated that the large number of like facilities would introduce mass construction methods, such as special boring equipment to excavate for silos, in the interest of economy. Apparently, the construction schedule did not permit the time necessary for development of special equipment, for much conventional construction equipment was used instead. One contractor did introduce an innovation in constructing the facilities for two wings of a first-generation missile. Soil conditions at the sites enabled him to excavate to the bottom level of the silos with large earth-moving equipment. All structures were then constructed above ground, and the soil was backfilled around them. In subsequent operation and maintenance of the facilities, however, some settling became evident.

UNDER the 375 series of Air Force regulations, the Civil Engineer is required to maintain real property/real property installed equipment in support of a weapon system. Since the advent of missiles, this support has included actual operation and maintenance of certain items of real property installed equipment directly connected to a missile.

Support of missiles, officially referred to as aerospace vehicle equipment (AVE), and missile ground equipment not RP/RPIE, officially referred to as aerospace ground equipment (AGE), is covered in the 67 series of Air Force manuals and regulations. Support of weapon systems hardware has been developed to a fine art through years of experience. Repair parts for missile AGE and AVE are requisitioned, shipped, stocked, and procured automatically by electronic data-processing equipment. Similar procedures are used to program for supply funds to procure repair parts.

RP/RPIE construction is under conventional advertised contracts. Maintenance, repair,



Maintenance men of the 321st Strategic Missile Wing check the guidance package of a Minuteman II missile in a launcher silo near Grand Forks AFB, North Dakota.

and construction are covered in the 85 series of Air Force manuals and regulations. Under the operation and maintenance (O&M) program, repair parts for diesel generators, air-conditioning systems, etc., in direct support of a missile system vie for the same dollars that are used to replace floor covering, painting, and other routine maintenance and repair work. Although missile support is assigned a high priority, the support is provided at the expense of the O&M program, which is already overtaxed. Every year more facilities are being operated and maintained with less funds and fewer people. Funds to support missile AGE are programmed through Air Force Logistics Command channels, and funds to support missile RPIE are programmed through Strategic Air Command channels. Approval of funds for AGE without approval of funds for corresponding RPIE would create chaos. Even a minor change to Minuteman, accomplished across the whole fleet, requires major funding. About a year ago Hq USAF was apprised of this disparity in programming and funding and is now in the process of identifying detailed Civil Engineer responsibility in support of missiles in appropriate Air Force manuals and regulations.

Under current regulations, engineering responsibility for RP/RPIE in support of a weapon system passes to the using command 45 days after turnover of the last facility by the contractor. Engineering responsibility includes central engineering control to ensure uniformity of installations for standard operation and maintenance and to update operation and maintenance manuals. SAC civil engineering manuals are to RP/RPIE what technical orders are to AGE and AVE. Only recently did SAC receive authority to organize a separate engineering staff to provide these special services.

In the deployment of any modern weapon system, hardness, reliability, and dispersal are prime considerations. To visit every one of the

sites of a dispersed Minuteman wing means traveling about 1400 miles by the shortest road. Dispersal compounds construction and also compounds operation and especially maintenance. SAC missile sites are 30 to 150 miles away from a support base, and this presents logistic problems in the transportation of men and materials out to a site and back. Operation and maintenance of either a Minuteman or Titan II wing require about 8,000,000 vehicle miles a year.

Since missiles and facilities were not prototyped, initial operation became, in fact, mass shakedowns. Usually, trouble did not develop at one site only. The Maintenance Data Collection System Reports and the Monthly Maintenance Summary have confirmed the consistency of American manufacture. Parts that were misapplied or of faulty design were readily identified. Under normal operation, idiosyncracies can show up. A good example is a certain relay used extensively in Minuteman wings. The unit complied with all requirements of the specifications. However, the heat generated in an energized unit is sufficient to slowly evaporate the last coat of insulating varnish, and these vapors settle on the contacts and entrap dust. The dust-laden contacts impair the flow of electricity when the contacts are closed and cause malfunction. For reliable operation, the contacts must be cleaned periodically, an operation not anticipated in initial planning. The units had been installed well over the guarantee period before the trouble developed.

Under normal operation, design oversights and peculiarities or shortcomings in the various systems are learned, and changes to standard operating procedures are made where indicated. For example, frost is usually considered to start at the surface of the ground and penetrate downward. When a continuous mass of outside air passes through a vertical concrete shaft, frost can start even at the bottom of a ten-foot shaft and penetrate in any direction during an extended period of extremely cold weather. Thus, a drain line buried below the normal frost line but three feet horizontally from the concrete shaft can and does freeze. — Diesel generators and associated electrical transfer gear did not attain design reliability without considerable adjustment and in some instances modification. Extended periods of cold weather affected the environmental control systems, which in turn affected the starting capability of the diesel engines. Accordingly, changes were made to the environmental control systems. — Under adverse weather, especially thunderstorms, certain conditions developed which precluded operation of the standby power systems as designed. Changes to the power generation systems and transfer gear were also necessary.

THE DESIGN, construction, operation, and maintenance of intercontinental ballistic missile real property/real property installed equipment represent a very important milestone in the continuing effort to maintain our country as the world's major deterrent force against aggression. The whole program was a rewarding challenge to the intellect of every participant, as much of the knowledge required for accomplishment was developed during that time period. This new knowledge was not limited to basic science and its application but included new highs in management, organization, and time phasing of construction. The missile program proved the merits of the Program Evaluation and Review Technique (PERT) and the Critical Path Method (CPM) of scheduling and monitoring production and construction.

Hq Strategic Air Command

Military Affairs Abroad

THE SOVIET PILOT AND PSYCHOLOGY

Dr. R. H. Stacy and Mrs. O. S. Fedoroff

A NEW and interesting development in the training methodology for Soviet military pilots is the emphasis being given to psychology. This psychology is by no means an elaborate theoretical psychology but rather one applied to aviation in general and flight in particular; according to the definition of psychology by Soviet practitioners, it is a strict science based on "objective laws." As we know, the application of psychology in such a field as sociology, for example, has always been viewed by Marxist theoreticians as a "reactionary and subjective-idealistic" or "bourgeois" (i.e., Western) tendency. So, too, the methods of Freudian psychoanalysis are considered "antiscientific reactionary" psychological theory. Such views are quite natural for the Marxist, since his dialectical materialism (or economic determinism) hardly leaves room—theoretically at least—for anything except economic factors in the molding of society, and he is especially quite averse to accepting the Freudian theories of the importance of the libido as a determining factor in the human consciousness. Indeed, even in the case of Soviet psychology, although the scientific basis is considered to have been provided by the studies of the famous I. P. Pavlov (the "conditioned reflex"), the methodological basis is again dialectical materialism, that antiquated and eminently unscientific detritus of nineteenth-century German idealism. Thus Soviet military psychology is always kept distinct from the Western or bourgeois variety. The latter kind is, nevertheless, carefully studied.*

This new interest in psychology as a means of improving the will power, motivation, memory, speed of reaction, and scope of attention of military pilots has been noted especially in the pages of the official monthly publication of the Soviet Air Force. This periodical, founded in 1918, used to be called *The Herald of the Air Fleet;* in 1962, in line with the intensive space activities of the Soviet Union, the name was changed to *Aviation and Cosmonautics.* (The Russians regularly use the terms "cosmonaut" and "cosmonautics" where we use "astronaut" and "astronautics.") The magazine, intended primarily for Soviet Air Force officers, has always carried a wide variety of articles ranging from rather long-winded editorials vaunting the traditions of Soviet arms, the advantages of the socialist system, and the glories of Marxism-Leninism

*See, for example, *Sovremennaya burzhuaznaya voennaya psikhologiya* ("Contemporary Bourgeois Military Psychology") by a collective of authors (Moscow: Military Publishing House, 1964).

to technical articles dealing with such matters as defectoscopy, hydroplaning, fuel filtration methods, and network planning. In conformity with the new aerospace coverage, there have been an almost complete cessation of articles on bombing and gunnery techniques (very frequent in the fifties) and a glut of articles on sputniks, spaceships, satellite communications systems, and bionics. A noteworthy development is the frequency of articles by general officers—five of them in one recent issue. The Chief Marshal of the Soviet Air Force, A. K. Vershinin, occasionally contributes editorials.

One thing that has not changed, however, is the continued emphasis on training, discipline, respect for authority, and the need—especially for the military pilot—to be in a constant state of combat readiness. (The Soviet military pilot wears a badge indicating that he is, depending on his qualifications, a Military Pilot First, Second, or Third Class.) But the authors of articles on combat training methods, although they stress uncompromising adherence to the regulations and the need for such things as practicing cockpit actions "to the point of automatism," also call attention to the fact that commanders must always use the individual approach to subordinates. (This latter term, by the way, is viewed by the Chinese Communists, who have abolished ranks in their armed forces, as further evidence of the reactionary tendency in the Soviet Union.) Commanders, these authors say, must get to know the particular shortcomings and strong points of individual pilots and must respect them as individuals. But violations are not tolerated, and there is frequent mention, by name, of officers who either have themselves been guilty of violations or have overlooked or condoned reprehensible actions on the part of subordinates. In this connection a great effort is made to inculcate in the Soviet officer a feeling of ethical and political responsibility as a representative of the "new moral man" of the Communist order as well as respect for Russian—but especially Soviet—military traditions. This respect for tradition is remarkably keen in the Guards fighter units, the elite of the Soviet Air Force.

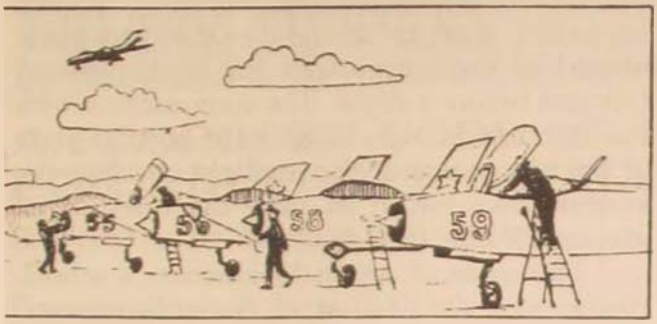
It is also interesting, by the way, that within recent months *Aviation and Cosmonautics* has inaugurated two new departments. One of these is "Your Health," dealing with such matters as excessive weight, proper rest, and in-flight PT exercises. The title of the other may be translated as "On Ethical Behavior." Under this rubric a number of instances of immoral behavior on the part of officers have been discussed (one of these involved a bigamous officer who lived it up for quite a while before the Communists, the watchdogs of Soviet morality, caught up with him).

The spate of articles on psychology began in 1966, and such articles now appear regularly under still another new department heading, "Flight and Psychology." For the most part they are intended for command and instructor personnel; but, since Soviet training doctrine also makes much of what is called "independent study" and since officers are constantly urged to broaden their scope of knowledge (presumably in their leisure time), many of the articles are designed for giving line officers the fundamentals of aviation psychology practice. What is this practice?

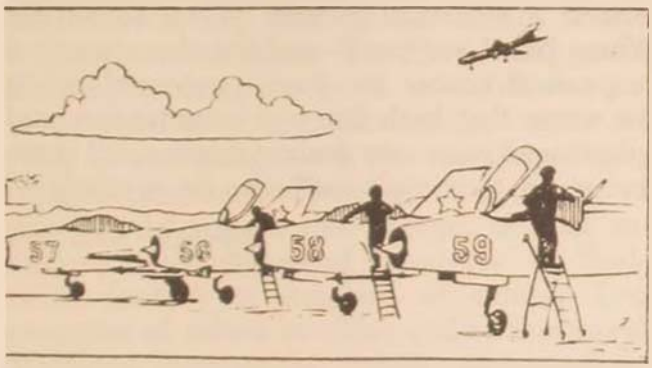
As we have mentioned, it is essentially an applied dynamic Pavlovian psychology. A good example would be the so-called technique of "autogenous psychophysiological training." Since most of us cannot, for instance, salivate at will, we must elicit this response by thinking of, say, sliced lemons. Thus a pilot undergoing ground cockpit training can learn to elicit the appropriate emotional tension when an emergency situation is simulated and then learn to dissipate this tension by autosuggestion. The term "psychophysiological," which is used very often in the literature, points up the fact that, for the Soviet psychologist, the mind or psyche is no vague self-subsisting thing but that our consciousness is a product of the physiological functions of the brain and nervous system as a whole. This point is always stressed, although there is a little more sophistication at present than at an earlier age of "vulgar materialism" when the brain was considered to secrete thought just as the liver secretes bile.

Another aspect of this applied-psychology

movement can be seen in the inauguration—also recent—of a series of simple tests designed for readers of *Aviation and Cosmonautics*. One of these is entitled "Test Your Powers of Observation." For example, the reader is asked to note how long it takes him to memorize the situation in the accompanying drawing. Then he is to turn the page and



note how long it takes him to spot any changes in the situation:



In the other series, "Test Your IQ," he is given more and more complex figures to extend in a logical sequence.

True, these are simple tests (we see similar things every day in American newspapers and magazines), and their efficacy in producing any tangible results in the work of a pilot or technician cannot, immediately at least, be very great. But it must be remembered that a basic rule in Soviet training methodology and in pedagogy generally is to proceed from the simple to the complex; this is repeated almost *ad nauseam*. Such tests do at least make the pilot conscious of the fact that he himself possesses various "systems," the functions of which can be timed, evaluated, and even improved, or that such "systems" may in the course of time, following basic training, deteriorate during routine duties. It must also be remembered that more and more of the pilots reporting for duty in line units are the so-called pilot-engineers, men with a "higher engineering education." These graduates are very strong in the physical sciences but rather weak in the sciences of man.* Their knowledge of flight psychology will apparently be supplemented through the independent study referred to. Incidentally, articles on training methods have lately been making much of this influx of pilot-engineers, pointing out the added responsibilities of commanders who now have in their units not only pilots but trained engineers, eager to keep abreast of the latest developments in technology and quick to notice any evidence of routine thinking or outmoded ideas.

A good deal of attention is paid to the handling of "negative emotions" (fear, tension, depression, etc.). Here, too, the emphasis is Pavlovian: since often these are, in effect, conditioned reflexes which have become deeply rooted for one reason or another, they must be broken down and replaced by others which are based on positive emotions. The techniques used are various: physical exercises, breathing-control exercises, and the use of "inner dialog": a pilot in a difficult situation should talk to himself, saying such things as "I *must*," "I *can* do it," "I *must* not give in." Pilots are also urged, in such situations, consciously to evoke thoughts with positive emotional coloring—memories of a successful air engagement, intercept, etc.

In the pages of *Aviation and Cosmonautics*, pilots can also read about sthenic emotions (those which raise the level of a person's vital activities and facilitate the achievement of goals) and asthenic emotions (those which act in the opposite way), about methods of training the memory, and about practicing proper distribution of attention in the cockpit.

*The Russian poet Andrei Voznesensky has supplied us with some evidence that the Soviet emphasis on mathematics, physics, and chemistry in education has, in a way, "backfired." He has stated that such studies have made students more sensitive to the appeals of abstract ideas and thus of heterodox opinions.

The articles on training psychology distinguish, for example, between the operative or short-term memory and the long-term memory. Trainees are advised to make frequent use of mnemonic devices and to find, whenever possible, cause-and-effect relationships in improving the long-term memory. It is pointed out, for example, that flight zones are better memorized not by number but by names which involve some kind of association with a pilot's personal experiences. As for the operative memory, which is maximally loaded during instrument flight, pilots are urged to practice, in accordance with diagrams, the most efficient switching of attention between the various instruments and tables needed for making a decision. Numerous diagrams have been published in the magazine, and there has been an extensive discussion on finding optimal attention-distribution patterns. Of particular concern right now is the development, through the cooperation of instrument designers and psychologists, of instrument panels for aircraft which will facilitate, by proper grouping of dials and controls, efficient and rapid scanning. In this connection it is interesting that a test pilot recently wrote the editors, reminding these instrument designers and psychologists not to ignore the suggestions of the pilots themselves!

Although, as we have mentioned, commanders are required to insist upon strict observance of the flight regulations and safety measures, they are urged to avoid undue severity and, especially the use of excessively harsh language. Here, they are told, is where a knowledge of psychology plays a decisive role. "Thus," we read in a recent issue, "it once happened that an instructor-pilot was summoned to the commander for an unpleasant talk just before a flight. The conversation with the commander so changed the mental state of the officer that at the preflight checkup the surgeon was forced to raise the question of grounding him that day."

The name of Anton Makarenko, a schoolmaster and the "father of Soviet pedagogy" who died in 1935, is still highly revered, and his tenets, elementary though they may seem, are still frequently quoted in the pages of *Aviation and Cosmonautics*. But in a recent article a lieutenant general of the Soviet Air Force put it very well—and thereby suggested a prudent course for those concerned—when he wrote that both line-unit commanders and physicians were now finding it more and more necessary to consult textbooks on psychology.

Syracuse, New York

In My Opinion

A PROPOSED CODE OF ETHICS FOR AIR FORCE OFFICERS

A Common-Sense Approach

CAPTAIN HOWARD G. JANSSEN

LEADERSHIP is the key to every act by any group of human beings; without leadership there is only anarchy. The leader directs a group toward either "good" or "bad" goals. Leadership therefore tends to stabilize a society whether or not that society views its goals at any point along the moral spectrum of good and bad. Obviously, the degree of stability determines the strength of that society, and the degree of "goodness" or "badness" denotes its standard of values. Two examples of values at either end of this moral spectrum illustrate the stability and resultant strength of the two societies: Revolutionary America and Nazi Germany.

Of the many conflicts in history, the American Revolutionary War should be recognized as one of the most notable. The probability of success under the severe conditions and imbalance of power of the time was extremely poor. Yet despite impossible odds and intolerable conditions in the struggle with the world's most experienced and professional army, General Washington led his revolutionaries to victory. At the base of this historical success must have been an intangible driving force of such intensity that fledgling America's defeat would have been impossible. I submit that this force was a peculiar brand of unwritten ethics inspired by the times. The remainder of that story is familiar to us all: the American society became the most stable of all nation-states in several centuries. But if the values in those times were "good," a striking example of "bad" values exists in more modern times.

A second example of values that inspired strength was Hitler's Germany. No one will deny that Germany temporarily became a highly stable and strong nation, gaining its goals with great success. Hitler's ethics were embodied in the following translated quotation from *Mein Kampf*, which later became the basis for many written codes of ethics adopted and followed by Nazi military and political organizations:

> He who would exist must fight; and he who does not battle in this world of eternal conflict does not earn his right to existence.[1]

Although it is another matter, the reader might ask: If Hitler's ethics were so well stated and at the base of Germany's temporary success, why did Nazi Germany meet such disaster in the end? Perhaps a partial answer can be inferred from a quote by Field Marshal Helmuth von Moltke, a nineteenth century Prussian military genius who was admired and

studied by Hitler: "Eternal peace is only a dream and one that is not the least bit attractice."[2] Hitler therefore emphasized an ethic of conflict, as opposed to peace, which led him to attempt military maneuvers far beyond realistic execution. These grandiose schemes undoubtedly contributed to finally inducing an uninspired and hopeless spirit in the German people. Thus history illustrates that a degree of military success is linked with ethics.

Ethics comprise a peculiarly interesting rationale that determines the quality of leadership in any organization. Since the leader is decisive in the military, and since a very significant expression of a state's strength lies in its military establishment, it follows that the ultimate success of that nation-state's military organization hinges on the way its leaders view and apply ethics. I maintain that ethics, as understood by military leaders, will determine how well any nation-state is able to achieve its national objectives.

Decisions and leadership are practically synonymous concepts in the military. The key to our country's survival may literally rest upon our military leaders' decisions. Since ethics must be involved in decisions, a leader can never accurately test the "rightness" or "wrongness" of his decisions unless he has a standard against which he can measure them. I contend that a body of values or code of ethics would provide him with that measurement.

My present purpose is to define a particular set of ethics applicable to the Air Force, but first I will discuss ethics as seen from the military viewpoint. My ultimate aim is to suggest a written code of ethics for Air Force officers, the adoption of which would help dispel any confusion officers might have about ethical behavior. For I contend that no officer today can afford not to know exactly where he stands in today's world of continuous conflict. I do not pretend to offer a code of ethics that will stand all tests and criticism; the proposals in this article are my own attempt to construct a code within certain limits and criteria. I am especially interested in the reaction of other Air Force officers to the need for such a code. I believe that discussion of the subject will stimulate an interest in a professional code; the more talk about the subject, the more likely it is that the Air Force will take up the subject officially.

I believe that the impact of a code of ethics for Air Force officers will have the following effects:

1. It will induce pride of belonging to the Air Force, since it will define the standards required for "membership" in the profession.
2. It will provide a guidepost of professional and personal behavior for Air Force officers; as such, it will serve as one concrete measure of an officer's efficiency.
3. It will standardize and aid in understanding the ethics demanded of an officer; with proper emphasis, the code's effects will eventually shape and raise the quality of the officer corps.
4. It will eventually help raise the desirability of the Air Force as a career, since the image of the officer should be substantially raised in the public's eye.
5. It will make unnecessary various regulations, directives, and codes for specific situations (such as the "conflict of interest" regulation, AFR 30-30).

Many people avoid the subject of ethics simply because it is usually accompanied by an aura of some "untouchable" quality for the nonacademician. Therefore, my task is to try to reduce a few key words to levels of understanding: *code*, *values* or *ethics*, and *military professionalism*. Our level of understanding of these words should be nonabstract and in terms of military thinking, which is essentially conservative and pragmatic. The military mind must be more realistic than idealistic, since it is basically pessimistic in its view of human nature; i.e., human nature is imperfect and at the root of conflict.

A key word is "code" itself; our "code" must contain the "values" or "ethics" that reflect the "military professionalism" which is our group's essence. I define a code as a written accumulation of human experiences which, in the context of a particular organization or group, are considered "good" and therefore are worthy of documenting as a reminder to the members of that organization of the

standards of conduct considered necessary to achieve organizational goals. The "values" to be found within a code are those which are unique to the purposes of that organization.

Values differ from organization to organization. Values are those subjective judgments which members of an organization consider "good" or "bad" with regard to meeting the expectations of the organization's goals. Ethics are reflected in the values chosen as acceptable by an organization and are a way of managing negative human desires and urges for the good and general welfare of that organization.

Military professionalism is distinct from all other "professionalisms" in that it emphasizes the methods of organizing and managing conflict as an instrument in the service of the nation-state in which it exists and upon which the nation depends for its existence. The ethics of military professionalism give birth to the values of the military profession, and upon these a code can be built.

Military ethics, seen in the nonabstract context I have defined, are concerned primarily with managing the negative features of human nature toward a regulated goal. The military officer must understand this concept and commit himself to it; if he does not, he will be a liability to the mission in the face of crisis or danger. Faced with danger or crisis, the officer can ill afford to reflect upon the philosophical aspects of his decisions; he requires a standard of measurement which gives him immediate confidence that his decision is "right."

To establish a basis for the decisions that are involved in the military profession of "conflict management," the officer corps has developed certain devices that tend to channel the forces of the individual psychological makeup into distinctive common patterns. The officer uses these devices to prepare himself and his men for that crucial moment when their professionalism will be put to the ultimate test. Some of these devices are the uniform, the parade, the oath of office, the salute, special honors, awards, medals, and the privilege and status that accompany rank. I contend that our profession lacks a most important device: a code of ethics. Before we can construct a code, however, we must be acquainted with the criteria used to measure any code.

Many problems are inherent in the task of constructing a code of ethics, and they can be debated forever, since there is no absolute quality about ethics. Ethics, as we have seen in the examples of Nazi Germany and Revolutionary America, are relative only to one's view of "good" or "bad." However, one must have a basis of logic for each word used in a code. My logic depends on the following three factors: *mechanics*, *suitability*, and *value insertion*.

The first, *mechanics*, means that the code must serve an immediate and practical purpose. It must not be a vague statement of morality or pious platitudes. It must be concrete, comprehensible, and nonabstract. It must be timeless and unchanging. The mechanics of the code must include a nonabsolute quality; that is, it is not a law but is more a creed or way of life. As a creed it should instill in the officer confidence that he is following the expectations and standards of the profession. Finally, the code should not indicate a higher ethical standard than that which is realistic and attainable by the individuals of high quality whom the profession seeks to attract and retain.

The second factor, *suitability*, involves the expression of the desired standard which is created from the vast range of different morals, values, ideals, hopes, and attitudes held by many people to whom the code applies. This factor is the most difficult to determine even within the restricted context of the Air Force organization, since we are dealing with many different individuals.

The third and final factor in constructing a code is *value insertion*. This criterion might be briefly described as the patriotic tone of the code. This quality largely determines how the professional member will accept the code and its premises. Since emotions are a more primitive feature of man's makeup than the intellectual training which he acquires, the proper appeal to emotion will have a more lasting impression on an individual. The emotional value imparted to an individual will

tend to linger at the "gut level," to be called upon when needed, much as a physiological reflex.

An outstanding example of a limited code of ethics is the "U.S. Fighting Man's Code of Conduct," constructed to serve the American military man, including the officer, immediately prior to or after his capture. In this code one finds the three fundamental factors of an ethical code: mechanics, suitability, and value insertion.

Having combined my definition of a code of ethics with the discussion of three criteria, I can now offer my own definition of what a code of ethics for Air Force officers should be: A written guide to the standards of personal and professional behavior expected of all U.S. Air Force officers in the management or employment of their aerospace weapons. It is ironic that the other major professions of the world have codes of ethics. In fact, many professions feel their codes are an indispensable part of their training and education. There are hundreds of codes, ranging from those for accounting and breweries to those for undertaking and warehousing. How is it, then, that we have not developed an Air Force code?

Since America is a great melting pot of ideals, hopes, and aspirations, we should know with a fair degree of certainty what the most common and desirable values are to Air Force officers, to provide a starting point for constructing a valid code of ethics. The sociologist and psychologist would probably insist, and rightly so, that we make a scientific study of the values which we consider most desirable and most common to the group. This would be an enormous undertaking, since we are dealing with complex concepts: the human mind and what things are considered "good" or acceptable. However, the undertaking has already been researched and nearly completed!

Shortly after V-J Day, the Chief of Staff convened a special board of top military leaders and civilian sociologists, to consider the feasibility of a code of ethics for Air Force officers. It was felt that many Air Force leaders had become "aware of the fact that the problems of reconversion to a peacetime force were excessively complicated by the failure of many officers to live up to a code of behavior implicit in military life."[3] The board was chaired by Brigadier General Harold Q. Huglin.

The project was later transferred to Air University, Maxwell Air Force Base, Alabama, and on 25–26 September 1948 seven selected social scientists and five military advisers met to determine the precise methods of research necessary to identify and analyze the values peculiar to the Air Force officer corps. The committee established the necessary criteria, and the project was then assigned to Chaplain (Colonel) Wallace I. Wolverton.

Wolverton's research group performed exhaustive analysis over two years, using 460 Air Force officers as subjects. Unfortunately, the project was abandoned before the team could formally evaluate its data and publish its final report, probably due to the outbreak of the Korean conflict, when many members, including Colonel Wolverton, were reassigned.

To my knowledge, this research is the most thorough and authoritative work done in the area of ethics in the Air Force. Its final results and findings must be reviewed, evaluated, and interpreted before they can be officially approved for use in constructing a code of ethics. However, I consider this research and its eleven ethical themes so important that a brief review of them is appropriate. These themes establish a common set of values upon which we can construct a code of ethics unique to the Air Force officer's profession.

1. Power Ethic: foregoing personal advantage out of consideration for the rights of other persons or groups of persons.
2. Manners Ethic: observance of decencies, in the practice of good manners, or in a respect for the sentiments of others.
3. Appetitive Ethic: foregoing sensory gratification to the extent that officers use liquor moderately, engage only in acceptable sexual relationships, and abstain from displays of violence.
4. Honesty Ethic: honesty in dealing with others and candor in admitting one's own errors and faults.
5. Self-giving Ethic: aid to others, even at cost to self; as advice, rehabilitation, correct-

ing injustices, recognizing the unrecognized merits, taking responsibility for others' faults or failures.

6. Duty Ethic: professional thoroughness (steadiness, skill, and workmanship); or initiative and originality in meeting problems.

7. Tension Ethic: decisiveness, courage or firmness in the face of uncertainties, risks, or pressures.

8. Objectivity Ethic: seeking and sharing knowledge needed for the best performance of tasks; or a scientific attitude in dealing with problems or data, as opposed to arbitrariness, prejudice, rashness, or evasion.

9. Management Ethic: providing for the best possible functioning of personnel.

10. Prophetic Ethic: taking action with a view to remoter consequences; wider implications of relationships than those immediately involved, although the latter may seem to be more urgent.

11. Heroic Ethic: taking actions or positions which reaffirm or clarify purposes, principles, or procedures.[4]

Now that we have identified some values common and desirable to the Air Force officer, we must consider our uniqueness within the military establishment. As the air arm, the Air Force still suffers from the uncertainties of growth. However, we are entering maturity, and we have been entrusted with the most massive weapons of destruction known to man. We have been named by our nation as the pioneers and explorers of space. Our countrymen have assumed that we have the necessary vision, spirit, courage, and self-discipline to explore the new frontiers beyond our earth. As we enter maturity, I believe a code of ethics should state our resolve to muster the strength and confidence necessary to meet and conquer the future. I propose the following Aerospace Officer's Code; I enjoin the reader to test it against the definitions and criteria I have outlined.

The Aerospace Officer's Code

As an Aerospace Officer in the service of my nation, my highest duty is to the American people, whose freedoms were forged from blood and sacrifice and are expressed in the Declaration of Independence and the Constitution of the United States of America. I will render unquestioned fidelity to my Commander in Chief, the President of the United States, and to the provisions expressed in my Oath of Office.

My profession demands unswerving dedication to my nation and its allies against all enemies. I will never knowingly or willingly break the high trust given to me in this mission. To do so would risk my nation's security.

My profession demands that I be highly skilled in using or supporting the instruments of aerospace warfare. I pledge myself to be always prepared to use these instruments efficiently when called upon.

I am mindful that my position and responsibilities were made possible by the sacrifices of Americans before me; I will do my utmost to live up to their courage, strength, vision, and teamwork, which underlie my freedom. I dedicate myself without reservation as a proud member of the Aerospace Team.

To these ends I pledge myself as an officer and a gentleman to observe the following American ideals:

Article I

I will display self-control and honorable conduct at all times; unquestioned loyalty, obedience, honesty, and integrity are my watchwords.

Article II

I will not be deterred in serving my country when its survival is at stake; the call to duty, unselfishness, humaneness, and genuine concern for my men, as well as all men, will guide me toward this end.

Article III

I command awesome aerospace weapons for my country. Yet this grave responsibility serves to constantly remind me that I am a humble and modest man, in peace or in war, dedicated to the principles of self-determination, freedom, and peace.

ARTICLE IV

Above all, as an Aerospace Officer whose realm of duty is both on earth and in space, I realize that I must be strong and uncompromising in my convictions, courage, and vision. I draw these strengths from the trust and confidence given to me by my nation. As an American myself, I will always trust in my men, my fellow officers, my team, and my nation's principles that permit man to choose his own way.

THROUGHOUT this article I examined the implicit question whether there is actually a need for a code of ethics. I believe I have answered the question in the affirmative. But I pose the problem with the question: Are we as Air Force officers ready to meet the challenges demanded today? We have inherited a place in American society quite unlike that which our military forebears held. We now hold the unique position of having important responsibilities in technological, economic, moral, and political roles. The American public, in spite of temporary and localized ebbs and tides of opinion, has great trust in the Air Force if for no other reason than it is the bulwark of defense in an age haunted by such expressions as "overkill" and "total annihilation." However, in spite of the Air Force officer's awesome role in history, he is not viewed by the public as a professional.

Many reports place Air Force officers near the bottom of any comparative rating scale of the various professions. In 1958 a thesis by Lieutenant Colonel Milton Frank, USAF, ranked the Air Force officer twelfth out of fourteen professions ranging from doctors and lawyers to television announcers and teachers.[5] Many Air Force officers *are* concerned about our current state of ethics and suggest in their theses and articles that we must establish some higher ethical standard than we now have.

I believe so much evidence points up not only a possible real lack of ethics but also an absence of standards expected of the officer that we cannot rationalize the question with the usual platitudes. I realize that the mere creation and adoption of a code of ethics will not change things overnight. But at least we will have defined what is expected of the Air Force officer. With a well-written code of ethics, no officer could deny what his relationship to himself, his peers, his service, or his country should be. Somehow the mere fact that ethical values committed to the written word can make them more meaningful seems to me reason enough for us to adopt a code of ethics without further delay.

In this world, where the lines between freedom and slavery have been drawn, we hold the gravest responsibility ever held by any military establishment. We cannot afford the luxury of apathy, lethargy, or confusion about what our mission is or what our professional aspirations should be. Each of us who dons the military uniform identifies himself with a special class that must demand an almost religious adherence to the highest personal and professional standards. Those who do not accept this commitment are not professional, nor are they desirable in the corps.

San Antonio, Texas

Notes

1. *Soldatengeist: Eine Deutung aus Bekenntnissen der Front* ("Spirit of Soldiery: An Interpretation of Confessions from the Front"). No author. Berlin, Germany: Nibelungen Verlag, 1941, p. 14.
2. *Ibid.*, p. 148.
3. Colonel Ladson G. Eskridge, Jr., "Ethical Judgements of a Group of Air Force Officers," unpublished research report on a project assigned by the Chief of Staff, USAF, Project Director: Colonel (Chaplain) Wallace I. Wolverton, Air University, Maxwell Air Force Base, Alabama, 1950, p. 3.
4. *Ibid.*, pp. 65–361.
5. Lieutenant Colonel Milton Frank, "The Low Prestige Attributed to the Air Force Officer Career by College Educated Adult Civilians and 'New Approach' to Raising It," unpublished master's thesis, School of Public Relations and Communications, Boston University, 1958, p. 51.

Books and Ideas

MARSHALL AS WARTIME LEADER

Dr. I. B. Holley, Jr.

AT FIRST GLANCE one might question why two such dissimilar books as *The Second World War: A Military History* and *George C. Marshall—Ordeal and Hope, 1939–1942*† should be yoked together for a joint review, but there is a rationale even if it is not immediately self-evident. Can one truly appreciate a biography-in-depth, such as Pogue's *Marshall,* without a working familiarity with the background, the grand panorama of events leading up through World War II? For those of us who lived through the war, for the generation already mature when the crisis arrived, no synthetic chronology in retrospect is necessary. For us, history is the event itself and not the written chronicle. If one can recall, all too painfully etched in memory, the commingled mood of consternation, dismay, and determination on the eighth of December 1941, that grim morning after, then almost without realizing it one has an invaluable context within which to read and understand Pogue's remarkable contribution to the literature of leadership. But what of those who do not remember the event? It is worth reminding ourselves that fully half the men in uniform today have no meaningful memory of the war. Few of today's captains were even born at the time of the Munich crisis. Yet it is precisely these young men who must recover World War II vicariously in the written word if they are to profit significantly from a biography of General George Marshall, however ably written it may be. For this reason, the publication of Collier's one-volume history of the war was welcomed: there is a crying need for such a book.

A one-volume history of World War II is welcome for yet another reason. Current events induce a myopia in all of us; today's campaign tends to become the norm. New threats, new problems, deadlier weapons, fresh heroes crowd the headlines. At a time when the armed forces of the United States find themselves stretched woefully thin, pitted against a fifth-rate (?) power in a relatively narrow though distant theater of action, it is decidedly useful to have a compact history

†Basil Collier, *The Second World War: A Military History* (New York: William Morrow and Co., 1967, $8.95), xvi and 640 pp.
Forrest C. Pogue, *George C. Marshall—Ordeal and Hope, 1939–1942* (New York: The Viking Press, 1966, $8.95), xviii and 491 pp.

in which the multiplicity of demands and the contradictory pressures of another more truly global war are drawn into focus within a single volume.

Moreover, Basil Collier's credentials for writing such a book would appear to be impeccable. No cloistered scholar he. A novelist with several volumes to his credit, he served with distinction as a squadron leader in the Royal Air Force during "their finest hour." Subsequently he was a Fighter Command historian, and more recently he has produced several volumes of military history and biography.

For many reasons, then, this reviewer approached Collier's volume with enthusiasm; here at last was the promise of just the sort of book that has long been needed, a judicious, broad-brush treatment, comprehensive but concise, taking full advantage of the indispensable but too voluminous literature, official and unofficial, that has been pouring from the presses for the past twenty years. Unfortunately, these expectations were not fulfilled. This is *not* the long-awaited book.

To begin with, the point of view of Collier's narrative is distinctly British, more particularly that of the British government. This in itself would not be detrimental if the author had faced the fact consciously and openly. Instead, the reader is left to discover the orientation for himself, largely by his unanswered queries about what the French or the Germans or others thought about any given problem. What is more, the book is marred throughout by an ill-concealed anti-American bias. Surely no fair-minded reader would resent explicit criticism of the position taken by the United States on a given issue if the case were put on its merits, pro and con, as seen from the historical perspective now possible. But Collier's bias is of a more elusive character, often more a matter of tone than of assertion. Sometimes, however, his assertions are blunt enough, so much so as to leave the reader wondering how two readers of the same sources could find such different facts in them. Surely many readers will be surprised to learn that one of the important aims of America's foreign policy in the 1920s was to "prevent her ally Britain from asserting naval supremacy throughout the world." (p. 9) One could, presumably, read such a connotation into the slogan "A Navy second to none," but should one?

In Collier's hands, even U.S. aid to Britain gets grudging treatment; the bases secured in return for 50 destroyers are described as "sacrifices." When it comes to the Japanese declaration of war, one is left with the impression that President Roosevelt and his colleagues, in failing to take the stiff line advocated by Churchill, needlessly fostered Japanese aggression. And so it goes in chapter after chapter.

Partisan bias is only one source of irritation. Another is the freewheeling prose the author employs, repeatedly insinuating more than he documents. One example will serve to illustrate this practice. German fuel production improved somewhat in 1944, Collier writes, "because the Allies made fewer attacks on oil targets as a result of bad weather and their inability to frame a program of strategic bombing to which the commanders of their heavy bomber forces could be persuaded to conform." (p. 421) There is a significant issue here, but is it legitimate history to toss off such sardonic allegations without a word of justification or supporting evidence?

Undoubtedly a large part of Collier's difficulty in this volume stems from his defective use of the available sources. A survey of his documentation offers a clue: the book appears to have been written from a thin gloss of one layer of secondary accounts, and that layer is usually a British one. This reviewer would be quite willing to concede that in some particular instance the better part of a debated issue between, say, Montgomery and Eisenhower might, on the evidence now obtainable, lie with the former. But to pass judgment almost exclusively on the basis of accounts drawn from one side of the argument, as Collier seems to do, is patently unfair and unprofessional. For example, in the chapters on the conquest of Germany, the main source is a volume in the British official history, and the American counterparts are virtually ignored. Worse yet, in the chapters on the conquest of Japan, where the operations were often over-

whelmingly American, the same sources dominate. Of 62 footnotes in Chapter 21, only about a dozen refer to a scattering of American sources, while 28 cite one volume and 18 cite another volume in the United Kingdom military series.

Collier's bibliography confirms this impression. Of some 228 titles listed, only about 72 appear to be non-British. The seven-volume Army Air Forces official history by Craven and Cate is not even listed, while French, German, Russian, and Japanese sources are limited to a handful. Most surprising of all perhaps is the neglect of Australian sources, which is disappointing from an author who has contributed to the generally excellent British official history.

On the other hand, the book does have its merits. Not surprisingly, the author is at his best when dealing with the air war on the western front. There is a good chapter on the Norwegian campaign, and the account of the shuttlecock desert war in North Africa is a model of clarity and compression, aided by a generous allotment of maps. Each of these chapters abounds in valuable insights. The relationship between the local theater and the larger global scene is appropriately emphasized, as is the relationship between air power and ground operations. However, logistical considerations in the theaters and production on the home front are inadequately treated. In sum, the difficult task of writing a one-volume history remains to be done.

BY CONTRAST, Forrest Pogue's second volume in his multivolume biography of General George C. Marshall is an entirely different kind of study. His first volume, subtitled *Education of a General,* covered Marshall's career to the time of his selection as Chief of Staff. This one is confined to the years 1939–1942.

General George C. Marshall spent most of the war years directing the effort from Washington, but he enjoyed the opportunity to visit our far-flung fronts and American servicemen there.

A multivolume biography, especially one appearing by installments, poses serious problems of organization and artistry. Although the author has endeavored to make this particular segment of his subject's life a coherent entity, readers who wish a rounded portrait of Marshall the man must read all the volumes as a single narrative. This is not to suggest, however, that one should delay reading until the whole series is published; there are plenty of riches to be mined from this book even if one must wait for the complete account.

Although this volume represents only a truncated portion of the Marshall portrait, in many respects the years that it covers were the most important period of his career. The General himself regarded the span of months from the fall of France to Pearl Harbor as his most crucial period. Valuable lessons may be learned from the later wartime years of peak production and full mobilization, but the most important insights are those to be gleaned from the period when the nation was divided, the troops were untrained, and weapons were lacking. As Marshall put it: Study the first six months, not the last six. And it is precisely the virtue of Pogue's work that he has written the kind of biography that can be studied in depth. Indeed, its most ardent readers will undoubtedly be those conscientious young officers who have discovered that the best professional education is what they dig out for themselves as they read, reflect upon, and reread books such as this.

No small part of the virtue of this book is the meticulous craftsmanship that has gone into its composition. As an Army historian in World War II and as the author of *The Supreme Command* in the Army's official history series, Pogue came to his task with years of experience and an impressive familiarity with the personalities and sources involved. Once embarked upon the biography, he spent thousands of hours interviewing literally hundreds of individuals—privates, generals, and statesmen—at home and abroad. He and a considerable staff of assistants went through a mass of official files, private diaries, published papers, and the like, in a way only possible for a subsidized enterprise such as this. But the sheer bulk of the evidence, impressive as it may be, is not the most important point. Far more significant is the approach taken. General Marshall himself set the pattern when he refused to make unilateral retrospective judgments on individuals. "I don't think it would be quite fair because the officers would have no chance to answer. . . ." (p. 443) This generous spirit, so characteristic of the man, Pogue has faithfully adopted as his own.

On controversial issues, hostile critics are given their say, and opposing views are carefully cited. Throughout there is an even-tenored refusal to resort to stridency. For some readers this may appear as a fault, muting the abrasive clash of personalities to produce an unrealistically bland assemblage of supporting characters. Serious readers, however, will gladly trade a certain loss of dramatic intensity for the fuller, fairer record afforded here.

Inevitably, in a study of the period from 1939 to 1942, the dramatic focus gravitates to the Pearl Harbor episode and the sensitive question of individual responsibility for the disaster that marked the nation's entry into the war. Here the author threads his way judiciously through the morass of evidence, the written record, the subsequent testimony, and the partisan literature which surrounds that event. It is by now an old story, told and retold; he imparts little that is entirely new, certainly no great revelations or fresh evidence of a spectacular nature. What he does offer is a clear narrative in which the mistakes and errors of judgment made by all parties, including General Marshall, are dispassionately described and assessed.

In the final analysis Pogue finds that it was circumstance rather than specific individual misjudgment that precipitated disaster. By way of example, consider this evaluation of the fact that so many failed to appreciate the significance of the crucial Japanese messages intercepted and successfully broken by the chief Army cryptanalyst: "A more serious weakness was that recipients were not permitted to keep a file of copies for comparison and careful study. The intercepts had to be returned

to the central file as soon as they were read and all but a master copy destroyed. As a result the cumulative evidence of Japanese intent was never spread out for examination at one time." (p. 198) This kind of sober analysis may be far less dramatic than sensational disclosures about individual misdeeds, but it is more meaningful to the student of command.

If one reads history to learn, it is well to remember that more is to be gleaned from the study of processes than from personalities. In any future context, entirely new and complex personalities will dart across the stage in rapid succession. But the processes or institutional factors, while changing, will change more slowly, and procedures from 1941—such as the handling of secret information—will undoubtedly continue to offer insights in 1971 and perhaps for still later generations.

Interesting and informative as the chapters on the Pearl Harbor disaster certainly are, they do not represent the real heart of this book. The soul-searing trial of George Marshall is only a single facet of what is in effect an intensive study in command, a veritable manual on the art of leadership. In the space made available by a multivolume approach, the author is able to treat in lavish detail one episode after another illustrating Marshall's techniques for exercising leadership. These range from the evidently intuitive to the shrewdly contrived. And whether one aspires to be a future Chief of Staff or must settle for some lesser role, the insights offered here will more than reward the effort expended.

Some of the subjects Pogue develops in depth can be suggested in a series of questions that every student of command will appreciate: How does one achieve a proper relationship with one's civilian superiors? When does a proper subordination require one to speak out boldly? How can one best relate to and make use of a valuable but prickly personality (such as Bernard Baruch)? What is loyalty? How can one be effectively loyal to a superior (Secretary Woodring) with whom one disagrees and whom one probably dislikes? ("I can't expect loyalty from the Army if I do not give it." p. 22) How can one appear most effectively before Congress? ("Marshall acted and talked the way they believed a leader should." p. 149) How does one deal with a mercurial President, with public critics, with the gentlemen of the press?

At another level, what is the difference between the regular enlisted soldier of peacetime and the citizen soldier of wartime, and how does one deal with them most effectively? ("Soldiers will tolerate almost anything in an officer except unfairness and ignorance." p. 111) And how does one get the best results when confronted with the countless political sensitivities of the National Guard? How does one cope with soldier and home-front morale? (In what other nation would a Chief of Staff devote precious time every day to answering personally a half-dozen letters from soldiers or their families?) How can one be sure that the best men are promoted and the unfit are eliminated? How does one go about selecting, training, and testing that inner circle of advisers upon whom one must rely when there is no time for deliberation and verification?

As the narrative unfolds, anecdote by anecdote, one learns how a planning staff proceeds, how grand strategy is hammered out amidst conflicting pressures, why maneuvers are so necessary, and why physical fitness and stamina are no less important than brains. Here, too, one learns the tricks of the trade in practical ways, such as how to conduct an inspection.

From the book as a whole, taken as a study of command, one observation emerges inescapably: Behind all the skills or devices of leadership, as practiced by George Marshall, lay a single all-important, all-pervasive attribute—integrity. This point is made repeatedly in one way or another ("a decent regard for the opinions of others; a code of the gentleman to be observed" p. 40), but it is illustrated most forcefully in the account of Marshall and the "plucking board" appointed to eliminate old and ineffective officers. So self-effacing was the Chief of Staff that he urged upon the President his willingness to submit his own name and step aside for a younger man.

But Marshall was not replaced by a younger man, and for the future of the air

arm this fact made a great deal of difference. The long struggle for a separate air force led almost inevitably to exaggerated accounts of the tensions and hostilities allegedly inhibiting the new service within the Army. In reality, Marshall was remarkably friendly to the Air Corps. True, he resisted the move for an immediate separation, but largely because he realized, correctly, that the necessary resources, especially the trained staff officers, for such a radical step simply were not available.

Probably the best measure of Marshall's genuine appreciation of air power is reflected in his protracted struggle to prevent the President and even Secretary of War Stimson from stripping the Army of its meager input of aircraft in order to supply the British. Here again Pogue keeps the problem in perspective. In retrospect, with one's view obscured by those hundred thousand aircraft produced in the peak year of 1944, one can easily forget how hard Marshall had to fight. It helps if one recalls that as late as April 1940 a House committee cut the Army's allotment of new planes for the following year to a mere 57 items. Pogue drives the point home, and incidentally underscores Marshall's appreciation of air power, in his account of how the General had to struggle to dissuade President Roosevelt from turning over to the British every other B-17 that rolled off the production line. A poor public speaker, the Chief of Staff could be eloquent when he spoke from strong conviction. And in one dramatic encounter he stunned the President into at least temporary acquiescence by grimly announcing that he had only 49 bombers in the entire United States fit for duty.

General Arnold and his enthusiastic young subordinates were, if anything, rather too successful in their pleas for air power. Pogue makes it clear that they oversold Marshall on the B-17 and its potential. For many years previously, official thinking in the War Department had regarded the Philippines as indefensible. Then late in 1940, under Marshall's lead, this policy was reversed. Doubtless the presence in the islands of such a strong personality as MacArthur and Marshall's own emotional attachment stemming from his early service there had something to do with the decision. But Pogue flatly asserts that Marshall's "overrating of the current capacity of the heavy bomber" also helped develop the notion that the islands could "play a key role in deterring further Japanese expansion toward the south." (p. 186)

The high price of this "success" in selling air power to the Chief of Staff was almost immediately apparent. General Lewis Brereton, who was selected to command the new air concentration in the Pacific outpost, was appalled to discover that his bomber force was to be built up long before adequate fighter aircraft would be available to defend it. The swift destruction of Brereton's forces by the Japanese invaders scarcely a year later would seem more than enough to have shattered Marshall's unrealistic expectations. But he did not lose faith in his aviators. Even when they squandered the time given by a nine-hour advance warning and lost half their airplanes on the ground, he continued to be a generous advocate of greater air power and further autonomy for the air arm. In passing, it should be remarked that the author sheds no new light on this long-unanswered historical question why MacArthur's aircraft were caught so flatfooted.

Despite the disasters in the Pacific, General Marshall soon gave concrete evidence of his continued belief in both air power and his airmen by his thoroughgoing reorganization of the Army in March 1942. Not only did he choose a tough and colorful flyer, General Joe McNarney, as the principal draftsman—better said "hatchetman"—of that reorganization, but the structure that emerged, the Army Air Forces, marked the real beginning of meaningful autonomy for the air arm. The author's detailed account of the skillful tactics Marshall employed to push through this massive reorganization is a textbook in itself. He tells how the coup was planned, how the opposition was circumvented, and, above all, the price the Chief of Staff had to pay in human relationships.

Certainly no single feature of Pogue's book makes a greater impression than do his reiterated accounts of the enormous pressures

—moral, social, physical—that must be borne by those in command. The anguish of the Chief of Staff when compelled to dismiss faltering officers, the shattered friendships, the recrimination of wives and families—all are poignantly described. So too are his relations with such difficult personalities as General Hugh Drum, General "Vinegar Joe" Stillwell, and, of course, General Douglas MacArthur, all of whom stand revealed in skillfully drawn sketches garnished with anecdote. There are happier sketches, such as those of Marshall's warm relations with Sir John Dill, chief British representative in Washington, and with a rising young staff officer named Eisenhower. But, friendly interludes apart, the emphasis is on the tension, the crushing burdens, under which the Chief of Staff labored as he sought to reconcile the exigent demands of an invasion of North Africa and a secondary theater in the Pacific, where the unexpected reverses at Guadalcanal threatened to absorb an incredible share of available resources.

READ THIS BOOK. Do more than read it: *Study it.* Though it is only a fragment of the Pogue portrait of General George Marshall, it is an important fragment; one sees the man, warts and all, sometimes ill-tempered, sometimes gravely mistaken, but unfailingly a man of remarkable strength of character, a true leader.

Durham, North Carolina

THE REDISCOVERY OF RENÉ FONCK

MAJOR PHILIP M. FLAMMER

FOR many years, a major gap in the otherwise overloaded field of World War I aviation history has been the conspicuous failure to tell the story of Captain René Fonck, a superb airman, the top French ace, and the ranking Allied ace as well.

The recent and dramatic upsurge of interest in World War I aviation makes this the ideal time to rectify the unfortunate oversight. Welcome news, then, is the announcement that Doubleday & Company, Inc., and the editors of the "Air Combat Classics" series have

made Fonck's memoirs available under the title, *Ace of Aces.*†

By official count, Fonck shot down 75 German airplanes; by his own tally, he had an additional 52 unconfirmed ones, enough to make him the most effective fighter pilot of the war. On 9 May 1917 he shot down six in a single day. Three months later, on 14 August, he shot down three in the space of ten seconds, and the following month (on 26 September) he had another sextuple. Yet throughout his career, first as a pilot of observation planes and then as a fighter pilot, he was never touched by an enemy bullet.

Fonck's incredible record speaks for itself. While both sides had superb airmen who were not aces and aces who were mediocre airmen, Fonck was clearly in a class by himself. As Kenneth Driggs, an early chronicler of World War I aviation, put it, "No other man, living or dead, has ever equalled this marvelous pilot in air dueling." Why, then, the long neglect? In a recent book on the French aces of World War I, for example, a respected author devoted less than two pages to Fonck and set those in a chapter about an American airman who flew for France. Another author, in a book on the same topic, made a single reference to Fonck, remarking as a passing thought that he was the one to shoot down the killer of Georges Guynemer.

To this reviewer, several explanations occur. The first lies in the overshadowing prestige accorded Guynemer before and after his death. With 54 victories, Guynemer was a living legend, with the title "Ace of Aces" before he vanished on 11 September 1917. After his death, of course, his prestige soared even higher. Tributes, books, and articles appeared by the hundreds, his last citation was duly inscribed on the walls of the Pantheon in Paris, and French air forces began the traditional ceremony of gathering each year on the anniversary of his death to hear the citation read: "Legendary hero, fallen at the full height of glory. . . ." Indeed, in some circles it was fashionable to believe that Guynemer had not died at all but had flown directly into heaven. "Surely he was a god," one otherwise careful biographer noted.

Perhaps the main reason for inundating Guynemer with honors was the fact that this frail and sickly flyer matched perfectly the popular image of what a World War I ace should be. Courage rather than cunning, *élan* or spirit rather than skill were the keys. Blind to danger, he would brave the enemy field of fire to trigger off a few shots at murderously close range. His own pain or death counted for nothing. He would willingly fight any time, any place, against any odds.

Of course Guynemer paid the price. Eight times he was shot down, more than any other ace. Also, on numerous occasions he came back from combat with his plane badly shot up. But this only added to the luster. "Guynemer the Miraculous" had an image etched in blood, some of it his own.

Guynemer's dash and daring contrasted sharply with Fonck's cold, knifelike efficiency. Fonck truly admired "our national hero" and counted him among his friends, but he believed Guynemer's method of attack to be foolish. If the overall purpose was to hurt the enemy as much as possible, there were obviously better ways of doing it.

Fonck found his guide to aerial combat in birds of prey, which he had watched and admired since childhood. They shunned chivalry; they made a cautious and patient approach, followed by a sudden swoop and swift kill. Could not these same techniques, he reasoned, be applied to air combat, where the game of survival was much the same? Fonck believed they could, and in time he adopted the clever and delicate maneuvering into the most favorable position, the sudden kill, and the refusal to fight against prohibitive odds.

To gain the advantage, Fonck went to lengths undreamed of by most airmen. He studied his opponents carefully, acquiring, as he put it, "a thorough knowledge of the strat-

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†**René Fonck, *Ace of Aces*, trans. Martin H. Sabin and Stanley M. Ulanoff, ed. Stanley M. Ulanoff ("Air Combat Classics"; Garden City, New York: Doubleday & Company, Inc., 1967, $4.95), xxv and 164 pp.**

egy of the enemy fighter, reconnaissance, and range-intelligence pilots." He also kept his senses honed to razor's edge, even to the point of avoiding completely the wartime necessities of alcohol and tobacco. Finally, he practiced self-control the same way he practiced marksmanship. "To obtain good results," he once counseled, "you must know how to control your nerves, how to have absolute self-mastery, and how to think coolly in difficult situations. I have had to duel with great Boche aces and have had the patience, while fighting, to wait for the moment my adversaries gave way to nervous irritation—the fatal mistake. . . ."

Still, Fonck's marvelous self-mastery would have let him lag in the ranks of the aces had he not been blessed with incredible aerial marksmanship. Admitting that his aim was "legendary among my comrades," he added, "My bursts are from eight to ten bullets at the maximum, and I often do not use more than three." Perhaps no other airman on either side of the lines could say with the certitude and calmness of René Fonck that two of the enemy escaped "certain death" because of the "jamming of my machine gun."

In his own story, Fonck does not seem to have resented Guynemer's glory or comparison of himself with the super hero. On the contrary, he greatly admired Guynemer and lists as one of his proudest moments his victory over one Captain Wissemann, an obscure German airman who claimed to have shot down Guynemer.* He does say that he took over his friend's title of "Ace of Aces," but then this was a title that had to be given him by others. Overall, however, the public was not generous with Fonck, and by the time he began cutting a path through the Germans, the French people had already chosen their supreme hero. Henceforth they automatically judged Fonck's exploits in Guynemer's shadow.

A second and more tragic reason for the neglect of René Fonck lies in the attitudes and ambitions of those who have exploited the aces for literary profit. For some reason, all too many aviation writers have felt compelled to emphasize the snarling dogfights, the spectacular deaths, and the flowing gore. Bullets must be "splattered by the thousands" and cockpits "awash with blood." With every adventure necessarily an epic, the writers automatically turned to Guynemer and a hundred lesser lights who "make good copy." On the other hand, since Fonck's exploits, by contrast, are relatively dull and uninteresting, he was tacitly passed over. Fonck himself obviously sensed this lack of interest. He passes off seven kills in the month of October 1917—including three in one day—with the terse comment, "During the month of October I succeeded again in some good kills but the story does not offer anything particularly exciting to recount."

The overall result of Guynemer's dominating shadow and the imaginative, journalistic approach to World War I aviation has been a conspicuous lack of good foundation material on Fonck, particularly for the serious, English-speaking student or reader. Many of those with a compelling interest in the subject do not even know that Fonck wrote his own story, which was published in Paris in 1920 under the title, *Mes Combats*. And those who have known of it have been at a loss to explain how such an important book could escape translation into English year after year.

It is safe to say that most readers, like this reviewer, will find some faults with Fonck's book. Despite the claims of the editors, Fonck was not as gifted with the pen as he was with the plane. Also, the book is lamentably short. One cannot read it without wishing that Fonck had taken the time to describe his techniques and combats in considerably more detail.

These failings, however, are minor compared to the overall worth of *Ace of Aces*. The very fact that the most accomplished airman of World War I wrote the book about his flying experiences qualifies it for wide dissemination. The fact that it fills a gap in a prime field of interest, rectifying an oversight and perhaps an injustice, marks it for an honored place on the bookshelf of every student of aviation history.

United States Air Force Academy

*There is considerable doubt as to Wissemann's claim. Fonck seems to accept it at face value, but most authorities, noting discrepancies as to time and place, pass the claim off as a bid for instant fame.

THE STORY OF THE SOVIET RED ARMY— OR AT LEAST HALF THE STORY

Dr. Kenneth R. Whiting

FULL-DRESS histories of the Soviet Armed Forces are not as plentiful as the importance of the subject would seem to warrant. D. Fedotoff White's *The Growth of the Red Army*, published by the Princeton University Press way back in 1944, was a pioneering work and is still a landmark in the field of Soviet military history. In fact, White's book held its pre-eminence until the publication of John Erickson's comprehensive volume in 1962.[1] Both of these scholarly tomes, however, leave off just as the Red Army was getting its real baptism of fire in World War II, or, as the Soviets call their part of that war, "The Great Fatherland War." In 1959 Michel Garder's *Histoire de L'Armée Soviétique* brought the story up to 1958,[2] but the lack of any citations for M. Garder's sometimes fascinating statements was enough to drive any self-respecting student of the Red Army to drink.

For those who read Russian, there has been a veritable deluge of memoirs, histories, and specialized articles dealing primarily with the Great Fatherland War. The Soviets have even produced a six-volume work, *Istoriya Velikoy Otechestvennoy Voyny Sovetskogo Soyuza, 1941–1945* ("The History of the Great Fatherland War of the Soviet Union, 1941–1945"), written by a horde of Soviet scholars and published between 1960 and 1965. This work has enabled the historian, carefully discounting Soviet biases, to get a better-rounded picture than when he was entirely dependent upon the German accounts of the war. Finally, in the last few years a Soviet journal, *Voenno-Istoricheskiy Zhurnal* ("Military-Historical Journal"), has provided much excellent material with which to fill in many gaps.

Any enumeration of all the books and articles available in English which deal either with the Great Fatherland War as a whole or with some aspect of it would run into the hundreds. They range from Raymond Garthoff's classic analysis of Soviet tactics and strategy in his *Soviet Military Doctrine* to Alexander Werth's *Russia at War, 1941–1945*, which almost uncritically accepts the Russian version of the conflict.

The development of the Soviet Armed Forces since 1945 has received far less coverage, which is understandable although regrettable. The fact is that the Russian armies have not been engaged in hostilities, with the exception of a rather inglorious escapade in Hungary in 1956, and "peacetime" armies are not as exciting to write about as those which are at war. However, the works of Garthoff, Dinerstein, Wolfe, and others in the last two decades provide excellent analyses of Soviet military doctrine, strategy, and weapons development in the postwar period.

The point I am making is this: To get a complete picture of the development of the armed forces of the Soviet Union from 1918 to the present, one has to consult a veritable library of books and articles. With the exception of Garder's slight volume, the whole story was just not available in a single book. This is the vacuum which Malcolm Mackintosh has attempted to fill with his latest book.† On the dust jacket of the book are the dates "1918–1966," which one assumes is a promise, or at least an implication, that the two decades since 1945 would finally get a more adequate historical coverage. Upon examination of the book, however, the coverage of the last two decades turns out to be skimpy, to say the least. Only fifteen percent of the book (44 of 312 pages) is devoted to the 1945–1966 period, while thirty-five percent (110 pages) goes to the two decades before 1939, already so well done by Erickson, and fifty percent (158 pages) is taken up with World

†Malcolm Mackintosh, *Juggernaut: A History of the Soviet Armed Forces* (New York: Macmillan, 1967, $6.95), 320 pp.

War II, about which there is already a plethora of accounts. In short, Mr. Mackintosh's publishers have whetted the reader's appetite with those nice dates on the dust jacket, but the contents of the book do not live up to the billing. Furthermore, like M. Garder's opus, the book is almost entirely lacking in such scholarly apparatus as citations of sources to back up the narrative (about thirty all told) and has a meager bibliography of twenty-eight items, although the author does enumerate his main sources in the preface. Much of this criticism is unfair, however, as Mr. Mackintosh makes no pretense that this is a work of original research aimed at a scholarly audience. On the contrary, it is frankly a short history of the Soviet Red Army based on the standard accounts available in Russian and English, and it should be judged as such.

Mackintosh shortchanges the Civil War, especially the momentous events of the key year 1919, but he does an excellent job in describing the war with Poland in 1920. He also points out that the bitter feuds which emerged as a result of the catastrophe before Warsaw were to have ominous repercussions in later years when Stalin and his buddies, Voroshilov and Budenny, got Tukhachevsky's head on a platter.

The great debate over the proper military doctrine for the new Red Army—in other words, what form and size it would take, what its tactics and strategy would be—is handled in a rather cavalier fashion by Mackintosh. On the other hand, he expertly describes the semi-secret Reichswehr–Red Army collaboration between 1921 and 1933 in about six pages—a masterly feat of condensation.

His account of the transition of the Red Army from a predominantly militia force (with a regular force of only 563,000) in the 1920s to a multimillion-man regular army in the late 1930s, when the industrial base to make the transformation possible had been erected, is very well done. This was the heyday of Tukhachevsky's influence on the Red Army's tactics and strategy—tactics and strategy that took advantage of the mobility engendered by the acquisition of aircraft, tanks, and motor vehicles. He was even the first commander to use airborne forces in maneuvers. But the whole program was nearly wrecked in the 1937–39 period when Stalin's paranoiac purge of Tukhachevsky and some 35,000 other high-ranking officers in the Red Army brought the whole military machine to the verge of chaos. The results of the Stalinist bloodbath showed up in the poor performance of the Red Army in the winter war with Finland (1939–40): well over a million well-armed men were stalled for months before a thinly defended Finnish line, and the Soviet losses were almost unbelievable. This bitter experience did, however, pinpoint some of the Red Army's worst shortcomings and resulted in the replacement of Voroshilov as the defense chief, an event long overdue. Mackintosh is at his best in describing the "human" element in the purges, but like all historians he is unable to explain why it happened. This is a task for the student of abnormal psychology, not for the historian.

The heart of the book, the story of the Great Fatherland War, is well written. There is plenty of material for the historian to work with, it is an exciting story, and the author does not let himself get bogged down in irrelevant detail. His own experience with the Red Army during World War II gives an immediacy to his writing; he shows a feel for the magnitude of the conflict as the enormous armies seesawed back and forth over the plains of Russia.

It is the last section of the book, the history of the Red Army since 1945, that is disappointing. The whole saga of the transformation of the enormous ground-force-dominated Red Army that emerged from World War II into the present Soviet Armed Forces, replete with sophisticated weaponry and technologically skilled personnel, is handled in an almost disdainful manner. The reader gets the impression that the author simply tacked this skimpy section onto the main body of the work to give the appearance of completeness—or at least live up to the billing on the dust jacket.

I have a great deal of sympathy for Mr. Mackintosh in his dilemma of how to get a half-century of history into a slim volume; I have tried the trick myself with less than magnificent results.[3] But in a world that is inclined to look with awful fascination at the enormous military

machine now available to the Kremlin rulers, any book that advertises itself as a description of the development of that force up to 1966 and then treats the climax of the story in the last two decades in such a slighting manner is bound to irritate a large number of readers. But for all the weeping and wailing of this one reader about the anticlimax of Mr. Mackintosh's opus, it is nevertheless a good little history of the Red Army from 1918 to 1945 and is well worth reading for that period.

Aerospace Studies Institute

Notes

1. John Erickson, *The Soviet High Command: A Military-Political History, 1918–1941* (New York: St. Martin's Press, 1962).
2. The work is now available in English (Michel Garder, *A History of the Soviet Army*, New York: Praeger, 1966), and the story has been brought down to 1964. John Erickson has inserted some notes and references in this edition.
3. Kenneth R. Whiting, *The Development of the Soviet Armed Forces, 1918–1966* (Maxwell AFB: Air University, 1966).

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AWARD

The Air University Review Awards Committee has selected "The KC-135 in Southeast Asia" by Major Frank H. McArdle, USAF, as the outstanding article in the January-February 1968 issue of the *Air University Review*.

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