



AIR UNIVERSITY REVIEW



Bring me men

NOVEMBER-DECEMBER 1968



AIR UNIVERSITY REVIEW

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BASIC PHILOSOPHICAL CONCEPTS OF THE UNITED STATES AIR FORCE ACADEMY	2
Lt. Gen. Thomas S. Moorman, USAF	
THE USAF ACADEMY ACADEMIC PROGRAM	11
Brig. Gen. Robert F. McDermott, USAF (Ret)	
THE ROLE OF THE HUMANITIES IN EDUCATING THE PROFESSIONAL OFFICER	21
Col. Jesse C. Gatlin, Jr., USAF	
THE AIR FORCE ACADEMY AND THE DEVELOPMENT OF AREA EXPERTS	26
Col. Richard F. Rosser, USAF	
THE LEADERSHIP AND MILITARY TRAINING PROGRAM	33
Brig. Gen. Robin Olds, USAF	
FRANK J. SEILER RESEARCH LABORATORY	40
Col. Gage H. Crocker, USAF	
THE UNITED STATES IN KOREA AND VIETNAM: A STUDY IN PUBLIC OPINION	49
Maj. Philip D. Caine, USAF	
KHE SANH: KEEPING AN OUTPOST ALIVE	57
Maj. Gen. Burl W. McLaughlin, USAF	
AEROSPACE DEFENSE AND NATIONAL SECURITY	78
Lt. Gen. Arthur C. Agan, USAF	
GLOBAL AIR DEFENSE THROUGH MOBILITY	84
Maj. Gen. William D. Greenfield, USAF	
SPACE: TODAY'S FRONT LINE OF DEFENSE	95
Maj. Gen. Oris B. Johnson, USAF	
WHAT IS SECURITY IN SOUTHEAST ASIA?	103
Dr. Frank N. Trager	
Books and Ideas	
KOREA IN RETROSPECT	113
Lt. Col. George W. Collins, USAF	
AIR SERVICE RELIVED	118
Royal D. Frey	
THE CONTRIBUTORS	125

the cover

*Bring me men to match my mountains,
Bring me men to match my plains,
Men with empires in their purpose,
And new eras in their brains.*

SAM WALTER FOSS, "The Coming American"

Emblematic of the spirit of the United States Air Force Academy, BRING ME MEN is graven over the arch that is an architectural feature of the main complex. The Review continues its series on Air Force commands with a long look at the Academy and a briefer consideration of Aerospace Defense Command.

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BASIC PHILOSOPHICAL CONCEPTS OF THE UNITED STATES AIR FORCE ACADEMY

LIEUTENANT GENERAL THOMAS S. MOORMAN

The mission of the United States Air Force Academy is to provide "instruction, experience and motivation to each cadet so that he will graduate with the knowledge, character, and qualities of leadership essential to his progressive development as a career officer in the United States Air Force." Inherent in the mission are the following broad objectives:

To develop in each cadet the ideals of duty, honor, and service to country.

To provide each cadet with a broad military education as a foundation for his progressive development as a professional officer.

To provide the necessary leadership training opportunities for the cadet to develop his capabilities and skills as a leader.

To provide each cadet with a broad general education leading to the award of a baccalaureate degree and an opportunity to advance academically as far and as fast as his ability and prior preparation permit.

To develop in each cadet the physical attributes and skills necessary to meet the requirements of cadet and commissioned life.



If a single word could be selected to encompass the heart of the several Academy programs, that word would be *challenge*. I think most people agree that the best way to develop a young man's potential is to *challenge* him, continuously and in increasingly difficult ways. We provide this kind of challenge—in the military field, in the academic program, in the physically demanding varsity and intramural activities, and, not least, in the psychological and moral aspects of life at the Academy.

By putting forth these constant challenges, we hope to inculcate in the cadets the strong attributes of character that they must have as leaders in today's and tomorrow's aerospace Air Force. Foremost among these attributes is responsibility. As the capacity for being responsible develops with experience, we give the cadets responsibility for running their daily lives—as much, as early, and to the maximum extent that time and maturity permit. We give them practice in making decisions and then hold them responsible for the decisions they make.

Responsible cadets must be active cadets—young men who learn by doing, not by idling. To this end we fill the cadet's day with athletics, both intramural and intercollegiate; with military training and leadership, including the running of the Cadet Wing from morning to night; and with a full academic day, during which they are subject to grading on frequent classroom discussions as well as on examinations.

Our program is constantly studied for relevancy and balance. We seek the well-rounded young man for admission to the Academy, and we continue to develop the whole man while he is here. These efforts would fail unless we showed the immediate and long-range relevancy of all the education and training. The expenditure of great effort consistently, day after day, would be difficult to justify were it not for the promise of ultimate usefulness in the military career of the cadet.

We must never forget that we are training young men to lead other men, possibly in combat. There is no more serious task. It calls for that special quality which inspires men to do

what the leader expects of them, even under conditions of extreme stress or danger. Having developed such qualities of leadership within a sound mind and body, the Academy graduate receives, almost without knowing it, a strong sense of pride in himself and his Air Force. He is confident that he can meet the challenges of the career ahead and work out solutions of which he will be proud and which will make a meaningful contribution to the defense of his country. Cadets vary in the degree to which they achieve this maturity and capability, but the testimony of Air Force commanders worldwide would seem to confirm that the Air Force Academy graduate is highly valued wherever he goes, for his qualities of leadership, responsibility, and morale and for his ability to get the job done in an efficient and competent manner.

To achieve the ultimate quality in our graduates, we must begin with the very best raw material we can assemble of our country's youth. We believe that the Academy has been quite successful in obtaining students with the mental and physical characteristics that the Air Force needs. Almost one in four (24 percent) of the Class of 1971 entrants had received recognition in the National Merit Scholarship Program: 187 were awarded letters of commendation, 3 were semifinalists, and 52 were finalists. Fifty-six percent of the class indicated that they had received scholarship offers from other institutions. In athletics, 37 percent had lettered in football, 22 percent in basketball, 16 percent in baseball and 29 percent in track. From such talent as this the Air Force Academy hopes to develop the well-rounded, whole man that the Air Force needs for its future leaders.

LET ME touch briefly on some of the philosophy which governs our learning process at the Academy. I believe it is imperative that each instructor, Air Officer Commanding (AOC), and coach at the Academy keep in mind a model of each cadet as a future military leader—a bundle of potential waiting to be developed. Any defects in the total development of this potential can be

chalked up as a failure on the part of those responsible for the cadet's education and training. When, as occasionally happens, a young man appears not suited to military life or to the demands of a service career, it is our responsibility to identify him and make absolutely sure that his lack of desire or suitability is not due to any failure on the part of Academy personnel.

Another tenet of Academy philosophy is that at least half of a man's potential lies in his pattern of uniqueness. It is this philosophical tenet which is the basis for the Academy's enrichment program, intercollegiate athletic program, and leadership training program. Each program challenges the cadet to develop his distinctive capabilities and leads the instructor, coach, and AOC to focus on the individual rather than a composite average cadet. This challenge to each cadet to use his talents, to discover himself, to exercise and expand his potential in all areas is the keystone of the Academy education and training program.

This working philosophy is derived from a number of directives which together gave guidance to the Academy from its earliest days. In March 1949, Secretary of Defense James E. Forrestal established the Service Academy Board to survey the status of undergraduate education and training for all members of the armed forces and to recommend the manner in which officer candidates should receive their basic education for a career in the armed services. Its cochairmen were Dr. Robert L. Stearns, President of the University of Colorado, and General Dwight D. Eisenhower. A clear description of the personal attributes and qualities that the Academy now seeks to instill in its cadets appears in the board's recommendations:

The Service Academies should develop in the student the moral qualities required for leadership. They should instill a high sense of duty and of self-reliance. The student should be taught in every phase of his career that each new problem is an individual responsibility. He should develop the power of decision and the ability to make his ideas and decisions understood by other men. He should develop a deep sense of honor, truthfulness,

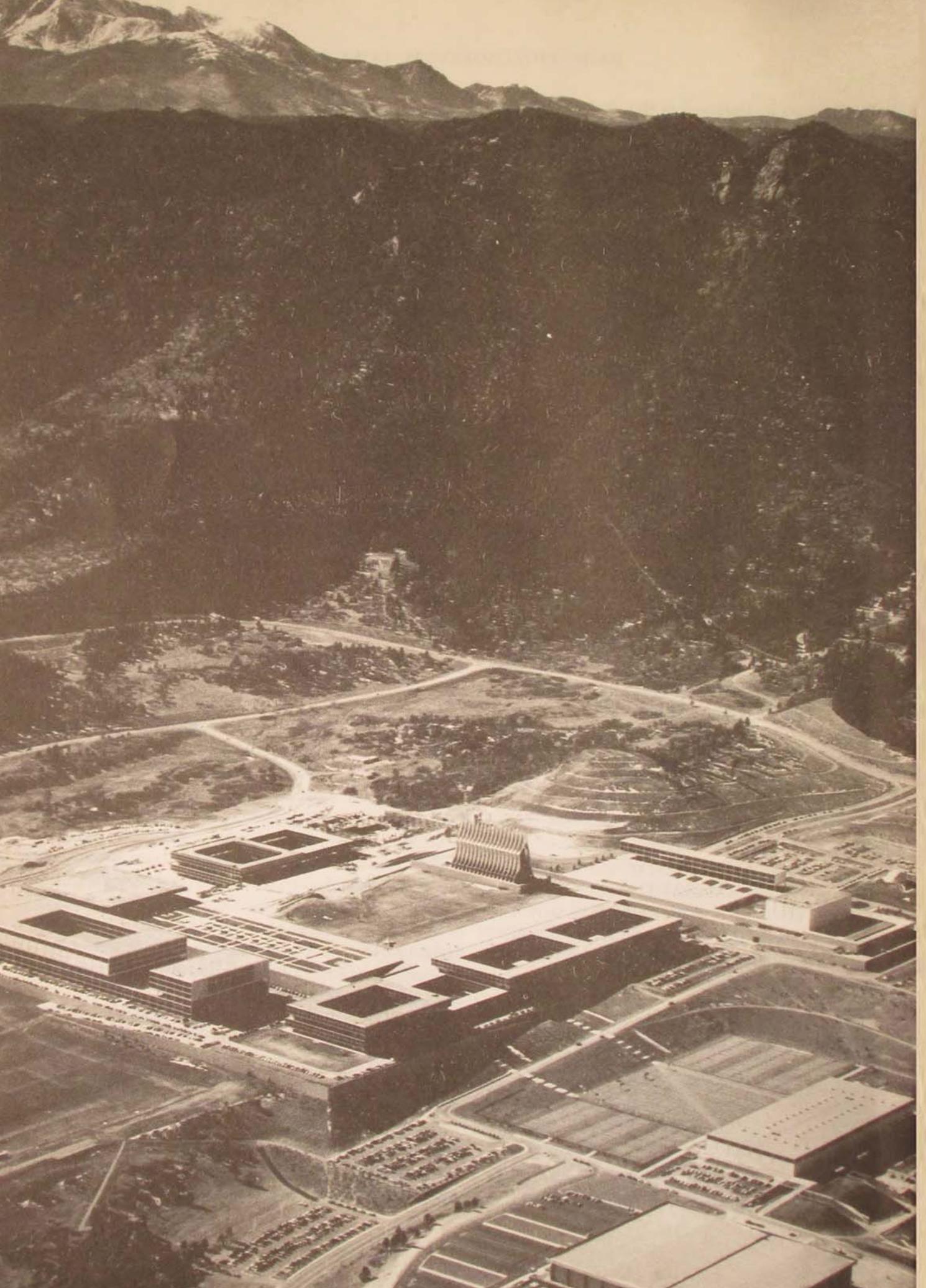
and self-respect. Students should be imbued with a high sense of professional loyalty alike to their leaders and to their subordinates. Loyalty to their country and to the cause to which it is committed must be unquestioned.

The Service Academies should develop in the student the capacity for clear analytical thought and of carrying it to a logical conclusion. The need is for initiative and, above all, for judgment and common sense. The complexity of the arts and techniques of modern war and the degree to which the conditions to be met are unforeseeable all emphasize the necessity for such qualities in a leader.

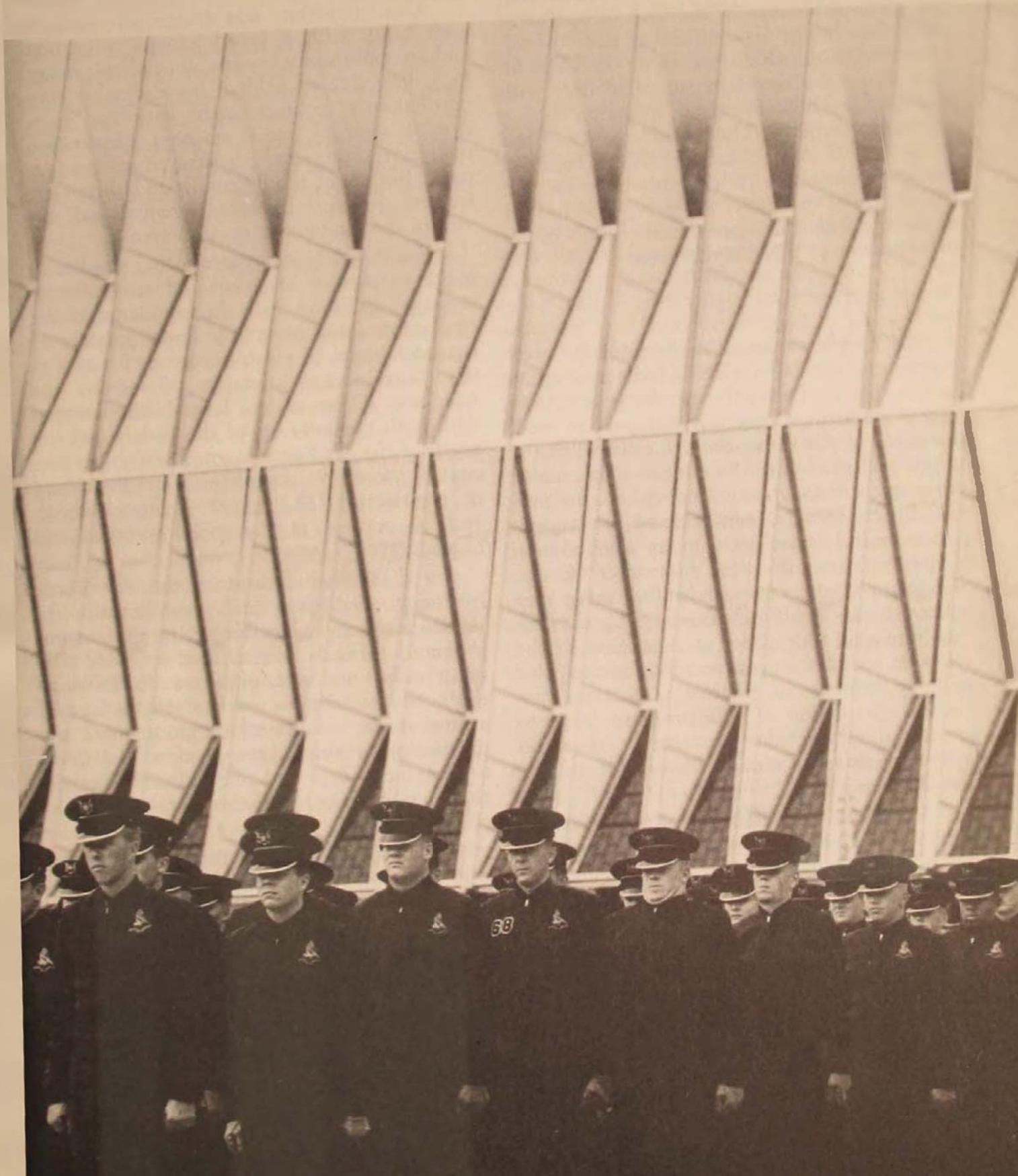
Also important to a leader are the physical attributes of health, stamina and endurance which enable him to utilize his energies effectively. Strength, coordination, agility, and military bearing are additional qualities desirable in a leader, particularly in setting an example for his men. The Service Academies should develop these attributes in the student, and in addition should teach him to train and develop physical abilities in his subordinates.

These quoted paragraphs were not addressed to technical qualifications, experience, or knowledge. Instead, the board was laying out a spectrum of personal attributes needed by an Academy graduate. This spectrum spans qualities of intellect, of character, of personal dynamism, of physical development. All the Academy's programs, indeed its very atmosphere, are aimed primarily at developing these qualities and attributes in its cadets. The three components of the Academy's program—academic, military and leadership training, and physical education—all contribute in varying degrees and emphasis to this development process. All seek the inculcation of the ideals of duty, honor, and service to country, and all are integrated and interrelated so as to achieve the objectives of the Academy's mission as effectively as possible.

As the Academy began in 1954, it was fortunate in being able to benefit from the experience and heritage of West Point and Annapolis. A good many of the officers who drew up the operating plans for the Air Force Academy were graduates of these older schools. It would be unfair to say that after analyzing their programs we accepted what seemed best and discarded the rest. We did



The rugged beauty and exhilarating atmosphere of the Colorado Rockies as well as the horizontal sweep of edifice and plane combine to form a notable setting for the building of bodies, extension of intellect, and molding of character at the Air Force Academy.



adopt much that would fit our particular situation—and for this we will ever be indebted. Other features were modified to suit our particular mission or location. The remainder of our program was originated as the situation and mission dictated. What we borrowed from our sister academies in the way of operating procedures is far less important than the ultimate mission which we share in common with them—the development of leaders with character, a high sense of integrity, and a dedicated purpose. The achievements of the graduates of Annapolis and West Point in the past constitute a rich heritage for the newer school to follow. We are proud indeed to borrow from the more senior schools in the achievement of this ultimate goal.

WITH AN all-military faculty, well trained and specially selected from among the best in the Air Force, the Academy is able to offer a curriculum carefully designed to meet the needs of the aerospace age into which the cadets will graduate. We endeavor to achieve three goals through our curriculum: to provide for the general education of the student as a man and as a citizen; to lay a foundation for professional education for career officers; and to provide some specialization in an area related to an Air Force career. The curriculum provides four years of education in the sciences, social sciences, and humanities, plus military training and physical education. Successful completion of this program leads to an accredited bachelor of science degree and a commission as second lieutenant in the Regular Air Force.

A balance in contact hours is maintained between the academic program on one hand and military training and physical education on the other. The prescribed academic curriculum totals 2375 contact hours of instruction over four 38-week school years in the classrooms and laboratories. The combined military training and physical education programs have up to 2325 contact hours of instruction, much of this work being concentrated in the summer training periods. In

terms of semester hours, the curriculum is allocated as follows:

Academics	146 semester hours
Military Training	27½ semester hours
Physical Education	14½ semester hours.

This curriculum was designed to provide each cadet with a broad general education and an opportunity to earn an academic major in a discipline or field of his choice. A core curriculum of courses in the basic and engineering sciences, social sciences, humanities, military training, and physical education prepares the cadet intellectually and physically for the responsibilities of commissioned service in the United States Air Force.

Each cadet is required to complete a major as part of his course of academic instruction. Building upon the foundation of the core curriculum, he selects approximately 41 semester hours of elective courses for one of the 29 subject-area majors offered by the Academy. These majors have been designed with both the interests of the cadets and the needs of the Air Force in mind. Fifty-five percent of the cadets complete majors in science or engineering, 15 percent in management, and 30 percent in the social sciences and humanities.

A distinctive feature of the Air Force Academy curriculum and an innovation in service academy education is the enrichment program, formally established in 1956. The program has one basic objective: to challenge each cadet to advance academically as far and as fast as he can. It takes into account the differences in ability, preparation, and interests of the cadets and offers each cadet the challenge to live up to his potential in the pursuit of excellence.

As an incentive to outstanding cadets, any who can complete a half-year of graduate-level study beyond his undergraduate major may compete for the opportunity to obtain a master's degree at a cooperating university in the seven months immediately following graduation from the Academy. At present there are five cooperative master's degree programs: astronautics with Purdue University, applied mathematics with North Carolina State Uni-

versity, management with University of California at Los Angeles, physics with Ohio State University, and history with Indiana University.

The athletic program helps fit the cadet for his demanding life at the Academy and gives him the confidence in his own physical prowess and stamina that is conducive to the more important role of leadership. There is a comprehensive physical education program in which all cadets must participate for four years. In addition, an extensive intramural program pits one cadet squadron against another in a wide variety of sports throughout the school year. Perhaps the best known part of the athletic program is varsity athletics, including football, swimming, baseball, and other sports. The recently completed field house enables the Academy to expand its program in basketball and add indoor track and ice hockey. Again, the spirit of competition in the athletic program fosters the qualities of leadership needed by the young officer today.

The other facet of the Academy curriculum is both formal and informal in nature. Designed to be of immediate assistance in developing qualities of leadership in a cadet, the military training program is both academic and practical in nature, the practical taking the form of the cadet-run wing and the field training. The military training program identifies the qualities of leadership and its problems. It offers solutions in a practical way by allowing the cadets themselves to conduct formal and informal classes to train underclassmen. This program, through meaningful assignments, helps to develop useful military skills and places responsibility for the results squarely upon the cadet himself. An orientation to service life and lessons on the customs and courtesies of the service are included in this course in order to make the cadet at home in his chosen service as soon as possible.

In addition to this academic side of the military program, the Academy Commandant assigns chosen cadets to positions of squadron, group, and wing leadership. Here, under the stress and strain of daily problems, leadership skills are polished and perfected.

The military training program is designed

not only for leadership training but for career motivation. We must insure that the finished product of four years of intensive training is not only a competent member of the Air Force but a highly motivated officer, capable of inspiring others in the service of their country. This requires a motivation on the part of the cadet which will survive the rigors of cadet life and carry over into his daily performance on active duty.

The cadet's assumption of command positions within the wing creates a feeling of loyalty to his fellow cadets and to the wing as a whole. This same loyalty is a vital aspect in the character of the officer product which the Academy graduates. It goes hand in hand with the professional quality we seek to inculcate in all our graduate officers.

Finally, our military training program is designed to stimulate the cadet to learn more about his chosen profession; to excel in every activity, whether it be professional or recreational; to expand his interests in areas related to his military profession so he will be better prepared to cope with problems of ever increasing complexity and involvement; to think creatively, while at the same time to respect time-proven solutions; and to have pride in the Academy and in the military profession, a pride that evolves from the confidence that he is prepared to meet the challenges of a demanding profession and that the profession is useful, honorable, and highly respected by those whom it serves.

PROBABLY the most important facet of the cadet's total experience at the Academy is the Cadet Honor Code. It is expressed in the simple statement, "We will not lie, cheat or steal, nor tolerate among us anyone who does." From the time late in summer when basic cadets become officially Fourth Classmen to the time when they are commissioned in the Regular Air Force, the Code permeates all cadet activities—on the playing field, in the classroom, off base and on, in official and unofficial activities. It is essential that the officer who will lead other Americans into battle be a man of honor.

A cadet is expected to have complete integrity in both word and deed; he does not quibble, nor does he use evasive statements. The Code belongs to the cadets. Maintaining its high standards is the responsibility of each man. A cadet is expected to report himself or to confront any other cadet who he believes has violated the Code and to ensure that the violation is reported. The Honor Code is a tool for self-discipline by the cadets themselves. It is not used as a regulatory device by the Academy administration.

Cadets regard the Code as only a minimum standard. In practice it is the foundation for a larger ethical code that serves the cadets as members of the Cadet Wing and as officers in the future. Academy graduates cherish always the experience of having lived under the Honor Code. To them, the ingrained habits of integrity associated with Academy life are a source of pride and a trait of character which helps them cope with the complex problems that face a career officer in the Air Force. The Honor Code is already a tradition at the Academy and forms a basic component of the Academy philosophy.

WE CONTINUE to devote our best abilities and time to making the Academy programs responsive to the needs of the Air Force and the nation. The critical situations existing in Southeast Asia and other trouble spots in the world emphasize the need for well-trained and highly dedicated junior Air Force officers. These conditions give a sense of direction and urgency to the efforts of the faculty and staff. In June 1968 the Air Force Academy graduated its tenth class. It has been a fruitful

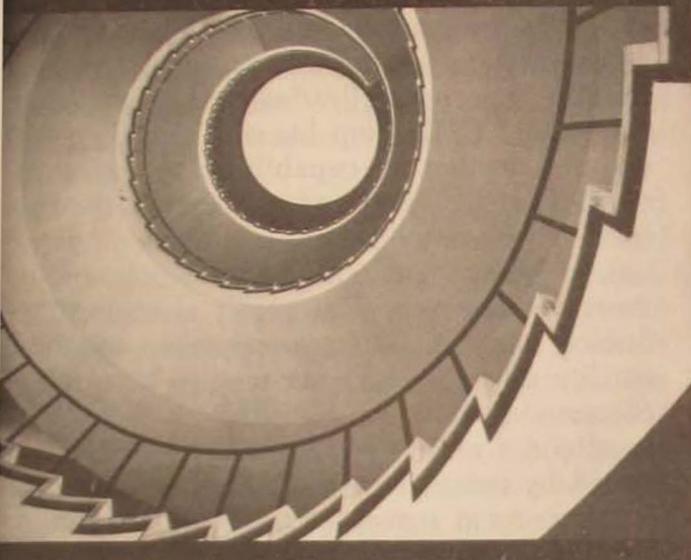
decade. Starting as a vision, the Academy has become one of America's great educational institutions. Its graduates have reflected glory on themselves, the Academy, the Air Force, and the nation. Whether the Academy staff and faculty are doing a good job will be determined in the difficult days ahead when the Academy graduates are called upon to make decisions both on the battlefield and at the conference table. We must prepare our graduates to shoulder grave responsibilities.

Secretary of the Air Force Harold E. Talbott expressed the job of our Academy in magnificent fashion in his remarks to the cadets when he dedicated the Air Force Academy on 11 July 1955:

Flying, especially military flying, makes great demands on character. A man aloft in the great wilderness of space knows a loneliness of the spirit as well as of the body. There is no hand to touch, no shoulder on which to lean for even a moment's respite. There is no one from whom to seek advice, no one to share responsibility. Only the compulsion and discipline of *duty* drives a man to the completion of his task. So it is the *man* and not the machine we must think of when we speak of air power. Thus it is to the *human element* that the Air Force Academy is dedicated and especially to the *leadership* we must have if our country is to survive.

These words are a challenge and an inspiration to us at the Academy in our constant struggle to make the Air Force Academy a great educational institution, responsive to the ever changing needs of the Air Force and the nation.

United States Air Force Academy



THE USAF ACADEMY ACADEMIC PROGRAM

BRIGADIER GENERAL
ROBERT F. McDERMOTT, USAF (Ret)

FOR over a decade the Air Force Academy has taken pride in the effectiveness with which it has fulfilled its mission of providing "instruction, experience and motivation to each cadet so that he will graduate with the knowledge, character, and qualities of leadership essential to his progressive development as a career officer in the United States Air Force." This effectiveness has been clearly evidenced by the performance of USAFA graduates in their varied service assignments, most conspicuously in Vietnam. Their record of dedication to service is one which could well serve as a goal for future Academy graduates.

Many factors have contributed to the Academy's success. Certainly the efforts, ability, and example of its personnel have been consistently outstanding. The Academy's curriculum has also played an important part in preparing our cadets for the intellectual, physical, and moral demands of an Air Force career. Unfortunately, the relationship between the Academy's curriculum, particularly the academic program, and its mission has been widely misunderstood, both within and outside the Air Force. Concern has occasionally been expressed that there may not be a proper balance between intellectual and non-intellectual emphasis in the Academy's total program; that the content of the academic program does not relate to the Academy's mission and the preparation of career officers; that the academic majors prepare graduates for civilian careers rather than military careers; and that the enrichment program puts pressures on cadets at the expense of other

Academy programs, making development of the "whole man" difficult or impossible. The Academy's record clearly negates the validity of these allegations, but their persistence indicates that the true record has not been widely or successfully publicized. A brief look at the academic program's objectives, content, and results will, in my view, do much to clarify what the Academy's faculty is attempting to achieve and how well we have accomplished our goals.

The program which the Academy has established to accomplish its objectives and mission is purposefully designed to challenge each cadet to develop his intellectual, physical, and leadership capabilities to the maximum. It is a program which requires the best from a well-rounded and competent individual, a young man who has the potential to meet the demands of a rapidly changing profession of arms. The great number and high quality of talented young men in the United States who show some measure of aspiration to attend a service academy have been established by many surveys. For example, in 1960 a five percent survey of high school students in 1353 schools throughout the country showed that the service academies as a group attracted the top male talent in the nation in terms of general academic aptitude, scientific aptitude, and leadership potential.¹ Another survey of approximately 120,000 high school juniors conducted by the National Merit Scholarship Corporation over the period 1961-63 indicated that the Air Force Academy ranked 24th as the top choice of the male students. It is significant that the Air Force Academy was the only school founded in the twentieth century listed among the top 25 ranked schools. In a later ranking (published in November 1966) of 1629 schools by 400,000 males taking the National Merit Scholarship Tests the Air Force Academy had climbed to seventh place. Furthermore, the Air Force Academy ranked sixth among the 140,000 so-called high-ability males in this total group of 400,000.

The validity of the Academy's interest in candidates with high ability is proved empirically in the performance of its graduates. This validation will be discussed at length

Brigadier General William T. Woodyard, USAF, former Permanent Professor and Head of the Department of Chemistry, USAFA, is now Dean of the Faculty. He succeeded Brigadier General Robert F. McDermott, who retired on 1 August 1968. The present article was written while General McDermott was still Dean.

The Editor

later. At this point it is sufficient to say that the Air Force Academy does attract and does enroll some of the top talent graduating from the nation's high schools each year.

The challenges which the Air Force Academy offers to match the talents of its cadets may be considered under two headings: the formal program of instruction and the cadet way of life. The latter includes such features as the honor system, the conduct system, the aptitude system, compulsory chapel attendance during the first three years, a high degree of self-governance, leadership experience through the Cadet Wing organization, and a multitude of extracurricular and recreational activities.

The formal program of education and training may be described as evenly balanced between the academic program, which totals 2375 contact hours over four years, and the military training and athletic programs, which total 2325 contact hours over four years. This indication of balance, however, is somewhat misleading for two reasons: first, study hours are not included for the recitation courses in either the academic program or the military training program; second, many of the courses in the academic program are professionally oriented to such an extent that as a group they clearly constitute what could be labeled a major in military arts and sciences.

The academic curriculum's total of 146 semester hours is closely comparable to the number of semester hours usually taken to meet the undergraduate requirements for the engineering profession; but the content differs markedly in that the military profession requires fewer hours in science and engineering and more hours in the social sciences and humanities. The Academy cadet must take a minimum of $54\frac{1}{2}$ semester hours of social science and humanities courses and $50\frac{1}{2}$ hours of basic and engineering science courses to complete his core curriculum requirements.

The Academy curriculum is also scheduled differently from that of most engineering schools. Since the cadet's schedule must accommodate some military training and physical education in addition to academic courses during the academic year, the Academy

spreads the load over four 38-week academic years, rather than the traditional 33- or 34-week academic year, in order to maintain a reasonable semester-hours-per-week load for the cadet. As a result of the longer semester, the cadet takes slightly less course work per week than his counterpart enrolled in the engineering schools at Purdue and Wisconsin, for example.

The Academy's academic curriculum consists of a core curriculum of 105 semester hours, which includes both general education and professional education courses, and electives totaling 41 semester hours, which provide an opportunity for each cadet to pursue an academic major in a limited area. Like many other institutions of higher education, the Academy has further individualized the curriculum through the offering of advanced and specialized courses in its enrichment program.

The general education portion of the academic core curriculum is designed to acquaint the student with the major areas of knowledge—the biological sciences, the physical sciences, the humanities, and the social sciences. The purpose of this part of the curriculum is the intellectual preparation of the cadet, as a man and as a citizen, through courses in the liberal arts and sciences, which are focused on the study of nature, the study of man, and the study of society. The importance of this general education has been emphasized by several advisory groups since the Academy's conception. The 1950 report of the Service Academy Board, for example, cited the reasons for a general undergraduate education for all career officers:

Professional military knowledge alone will not suffice to solve the problems of modern war. In the last war, officers of the armed services often became engaged in pursuits other than purely military which required a general educational background. Graduates of the Service Academies as they progress to positions of high responsibility in the military establishment will have an increasing range of contacts among leaders in civilian life, both at home and abroad. The complexities of modern war require large numbers of officers to undertake postgraduate studies. The Board,

The popular Academy planetarium, with its 50-foot dome, serves as a valuable teaching aid in celestial navigation and provides an entertaining method of showing the movement of the universe at any given time.



therefore, considers it essential that a graduate of a Service Academy should have a background of knowledge comparable to that possessed by graduates of our leading universities. His field of knowledge, therefore, should include the arts and sciences in addition to professional military subjects.

The professional education portion of the academic core curriculum builds upon the major areas of knowledge studied in the general education courses. Thus, basic knowledge, ideas, and modes of thought derived from a study of philosophy, psychology, history, economics, and government lay a foundation for the professionally oriented courses in military history, leadership, law, economics of national security, defense policy, geography, and international relations. Similarly, study of the basic disciplines in mathematics, chemistry, physics, and human physiology is followed by engineering courses that provide an understanding of the technological basis of Air Force weapon systems. These prerequisite engineering courses include mechanics, electricity, and engineering fundamentals followed by prescribed professionally oriented courses in electronics, aeronautics, and astronautics.

The Academy offers every cadet an opportunity to earn an academic major. Approximately 30 percent of the academic credit hours required for graduation are allocated for this purpose. The majors program is consistent with the practice of almost all institutions of higher learning in the United States, to give the student an opportunity for exploration in some limited area of study. However, the majors offered by the Academy are generally restricted to those which relate to the military profession and, for the most part, to career fields of specialization within the Air Force. The cadet voluntarily selects his own major from among 27 majors currently offered. Approximately 55 percent of the cadets pursue majors within the fields of science and engineering. The other 45 percent of the cadets pursue majors in the social sciences and humanities, including approximately 15 percent in management. The majors program not only is tailored to the needs of the Air Force but also serves to individualize the curriculum in

its response to the aptitudes, interests, and talents of the cadets.

One of our academic innovations in service academy education is the curriculum enrichment program, which was formally established in 1956. Its objective is to challenge each cadet to advance academically as far and as fast as he can. The enrichment program takes into account the differences in ability, preparation, and interest of the cadets and offers each one a challenge to live up to his potential in the pursuit and achievement of academic excellence. It is a challenge and opportunity to the mentally gifted cadet analogous to the challenge and opportunity that our intercollegiate athletic program offers to the physically gifted cadet.

Cadets participate in the enrichment program in one or more of four ways. Those who have attended a college may be granted transfer credit and replace core courses with more advanced substitutes or move core courses forward so that they may begin taking elective courses earlier in their programs. If a cadet has taken college-level courses in high school or preparatory school, he may take advanced placement tests for the award of validation credit. Some gifted cadets are given the opportunity to accelerate their study in mathematics and chemistry. Finally, a cadet who achieves a B average or better may choose to take an extra elective over and above a normal semester load. During any given semester approximately three-fourths of the cadets participate in the enrichment program in one or more of these ways, with about one-third taking overloads.

For especially well-prepared and motivated cadets, particularly those with prior college preparation, the enrichment program extends the opportunity to accelerate meeting the undergraduate requirements and to take graduate-level courses in the First Class year. Since we do not offer master's degrees at the Academy, we have worked out cooperative programs with six civilian universities. A cadet in one of these programs takes the equivalent of one full semester of graduate study while here at the Academy. These are true graduate-level courses taught by our own

faculty and are coordinated with the master's degree requirements of the cooperating graduate institutions. Following graduation from the Academy the cadets selected for these programs proceed to the civilian institutions and enroll for summer session and fall semester (or fall and winter term) courses. After completing their programs and earning their master's degrees around February following their June graduation from the Academy, they report to their first military assignments. Most of them go on to flying training, armed with an advanced academic degree and only seven or eight months behind their classmates. About 10 to 12 percent of the graduates each year are selected for participation in one of these programs.

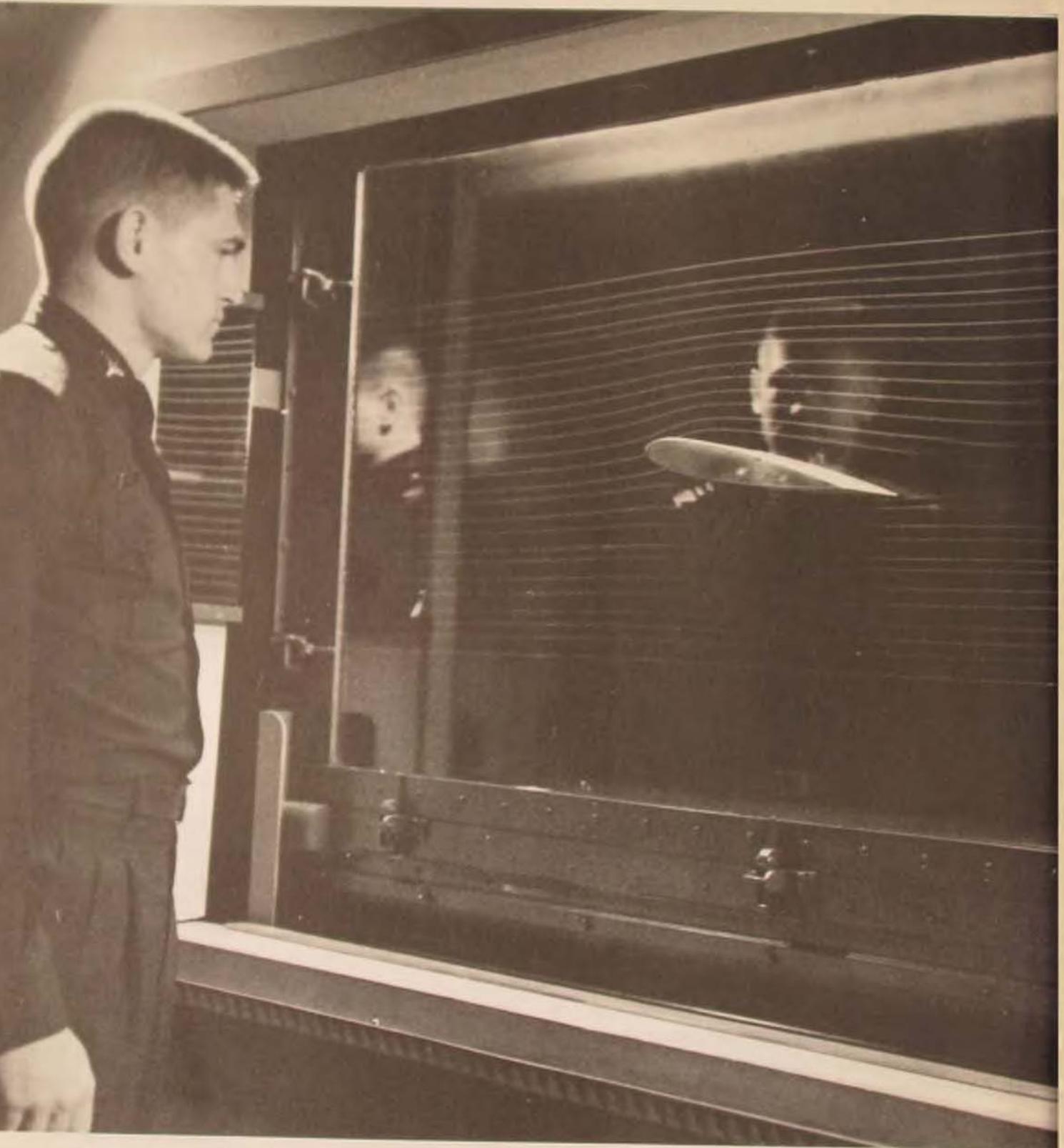
Another challenge for our most talented cadets is the competition for national and international scholarships and fellowships. Nominees for these scholarships are selected by the Academy's Graduate Scholarship Committee on a whole-man basis, and the winners are representative of some of the top talent graduated from the Academy. The success of Academy cadets in competing for these scholarships and fellowships can be seen from the following table:

	Class of 1966	Class of 1967	All classes
Rhodes Scholars	—	1	10
Guggenheim Fellows	2	1	4
National Science Foundation Fellowships	7	5	34
Fulbright Scholarships	5	4	25
Atomic Energy Commission Fellowships	7	14	33
East-West Center Institute Scholarships	3	2	9
Other scholarships	7	25	41
Totals	31	52	156

While this record is indicative of the dedication and hard work on the part of the cadets, it also reflects the efforts and example of the Academy officers with whom the cadets have close contact. All faculty members are active duty military officers. The all-military faculty is designed in consonance with the Academy's mission, which is not just to impart

(Continued on page 18)

A cadet studies boundary layer control on flow pattern around airfoils by viewing the effect in a smoke tunnel simulator. . . . An instructor explains the effects of space flight on the heart.



knowledge but also to develop character and qualities of leadership in the cadets and motivate them for a lifetime Air Force career.

The ideals of duty, honor, and service to country are not self-generating. They must be imparted. They are imparted by teachers who teach by what they are as well as by what they say. Through precept and example, these ideals are imparted by instructors on the academic, military training, and athletic faculties who are in daily contact with the cadets. Approximately half of the cadets' formal contact hours of instruction take place under the supervision of the academic faculty.

The first requirement for selection as a member of the academic faculty is that he be a career officer in the United States Air Force. The second criterion is that the record of his performance as an officer clearly show that he is above average as indicated by his officer effectiveness reports (OER). From these same reports and from interviews and letters of reference, we assure ourselves that he will meet the third criterion: character, integrity, and the other qualities of leadership which it will be his role to impart by precept and example.

The fourth criterion is that he possess the academic qualifications to teach the courses assigned to him. Our policy in this matter is that he possess at least a master's degree and that at least 25 percent of the faculty members hold doctorates. We also look for related professional experience because we know, for instance, that the officer with a degree in aeronautical engineering will be a better teacher if he is also a pilot, preferably a test pilot. The important link of relevance of the subject matter taught in the classroom to an Air Force career is obviously strengthened if the instructor has this kind of related professional experience. The fifth criterion, teaching ability, is met in two ways. We conduct a teacher training program for all new instructors during the summer before they teach their first classes, and the supervisors in each department visit classes frequently to guide, assist, and evaluate the instructors.

We think we have the finest teaching faculty in the country. On the other hand, measured by doctoral degrees and publica-

tions, our faculty cannot compare favorably with the faculties in many civilian institutions, where much more emphasis is put on research. We do some research, yes, but it is limited to the direct support of Air Force commands and requirements. This spring, for example, we have five department heads with doctoral degrees (three in science or engineering and two in the humanities) engaged in consultant and research assignments in Southeast Asia. I doubt very much whether there are five Ph.D. department heads from all the other educational institutions in the United States engaged in consultant or research work for the military in Vietnam. Recently I received a request for the consultant services in Vietnam this summer of two officers with Ph.D.'s from our Chemistry Department. So far we have sent 26 faculty members to Southeast Asia on consultant and research assignments. In addition, 77 faculty members have served or are presently serving combat tours as rated officers, ten of whom have been listed as missing in action or killed in action.

The Academy's percentage of doctorates, 28 percent, may not compare favorably with percentages at civilian colleges and universities, particularly with those granting advanced degrees. On the other hand, we think it is more than adequate to support our curriculum and the relatively small number of graduate-level courses we teach, as well as the limited amount of research we do in support of Air Force requirements. And it should be emphasized that all our faculty members are primarily engaged in teaching, which means that our undergraduate cadets have the benefit of instruction in every class by officers holding graduate degrees in their field, a benefit which is denied to most civilian undergraduate students. The result is not only excellent academic instruction but also, more important, unexcelled character molding and motivation.

These results have been verified by numerous criteria the Academy employs to validate its program in relation to the performance of its graduates. In terms of general intelligence as measured by the Defense Officer Record Examination, motivation as demonstrated by pilot training attrition, and general

performance as indicated by officer effectiveness reports, Squadron Officer School ratings, and duty in Southeast Asia, Academy graduates are showing their ability to build upon the foundations established at USAFA so as to develop into highly effective Air Force officers.

Despite this record, the notion remains prevalent among some Air Force people that the Academy's academic program is counter-productive. Specifically, they say that the academic program develops intellectual talent at the expense of leadership or athletic capability. Too often they arrive at the simplistic deduction that a cadet can be an "egghead" or a leader, an "egghead" or an athlete, but never both. The facts simply do not bear this out. First, there is a high correlation between academic excellence and athletic and military excellence. Of the 2464 graduates in the 1959-65 classes, 44 percent of those who ranked in the top third academically also ranked in the top third in military order of merit. And 31 percent of those in the top third academically also earned athletic letters—quite remarkable in that to achieve both academic excellence and athletic excellence a cadet must take overloads in both programs.

Second, a comparison of pilot attrition with academic order of merit shows that intellectual competence is closely related to military performance and motivation. Of the 232 graduates in Classes 1959-1965 who later dropped out during undergraduate pilot training in Air Training Command, 54 had been in the upper third academically, 70 in the middle third, and 108 in the bottom third. For test pilot school at Edwards AFB, the prerequisite training for astronauts, selectees included 14 who had been in the top third academically, 6 from the middle third, and 4 from the bottom.

Third, of the 159 resignations of members of the same classes, 46 had been in the top third academically, 59 in the middle third, and 54 in the bottom third, indicating that academic success goes hand in hand with those characteristics sought in career officers.

Fourth, a comparison of academic order of merit with officer performance as indicated by later earning of "outstanding" rating on

officer effectiveness reports, Silver Star awards, and below-the-zone promotions gave further evidence of consistency in the way the top third of Academy graduates later perform.

In other significant comparisons, 32.3 percent of graduates in the top third academically had earned outstanding OER's, against 25.8 percent of all graduates. Of graduates in the top third in military order of merit, 35.1 percent had outstanding OER's, against 25.8 percent of all graduates. Of graduates who had earned athletic letters at the Academy, 26.9 percent had earned outstanding OER's, against 25.8 percent of all graduates. Finally, of graduates who achieved one or more standards of excellence in academic order of merit, in military order of merit, or in athletic letters, 73.2 percent went on to earn outstanding OER's, as contrasted with 25.8 percent for all graduates.

Similarly, the record shows that the academic enrichment program does not compete with other Academy programs for the talents of the cadets but rather complements them. For example, 71.8 percent of the 1967 graduating class took one or more academic overloads while at the Academy and completed more than the required minimum of 146 semester hours. Among those cadets who achieved the top military ranks in the cadet chain of command, the participation in academic overloads was approximately ten percent higher. Furthermore, 68.3 percent of the winners of varsity athletic letters also participated in the enrichment program. A varsity athlete probably spends nearly 15 hours per week in practice and contests, as contrasted with 3 hours for the cadet participating in the intramural program. An academic overload requires up to 7½ extra hours of cadet effort. It is therefore remarkable that so many athletic letter winners take both academic and athletic overloads, though indicative that the academic enrichment program does not prevent cadets from developing their physical and leadership potential. Rather, the cadet who strives for excellence in academics, or athletics, or military training is motivated to do so in all his activities, and this character trait is one of the most important that we seek in our future Air Force leaders.

Perhaps the most impressive evidence of the relationship between the pursuit of intellectual excellence and high motivation for flying can be seen in the record of our graduates who have participated in the cooperative graduate programs. Of the 134 graduates who qualified for flying training and went to graduate school, 120 or 90 percent have taken flying training after earning their master's degree. Only four, or 2.9 percent, have washed out, and two of these were for medical reasons, not flying training deficiencies. This compares with 79.6 percent of their flight-qualified contemporaries who attended flying training, 11.9 percent of whom washed out. The point is that our top cadets are interested in becoming both scholars and "warriors," they pursue both graduate training and pilot training, and their motivation and success in both programs should be commended.

The Academy's ten Rhodes Scholars present a similar picture of competence and dedication. It is important to note that the Rhodes Scholarship competition is based on a "whole man" selection system that evaluates character and leadership potential as well as academic performance, as does the procedure for selection to attend the Academy. Their records are replete with Number One ranking in whatever activity they undertake, heroism in line of duty or beyond, and distinguished service. Their profiles are representative of the kind of whole man the Academy produces. They are both scholars and warriors, who have climbed many peaks of excellence and will, I am confident, climb many more. They are important to the Academy not primarily because they are Rhodes Scholars but because their abilities, dedication, achievements, and potential exemplify the whole man we seek to develop.

This leads me to the conclusion that I draw from the Academy's record. We are interested in the whole man, most definitely;

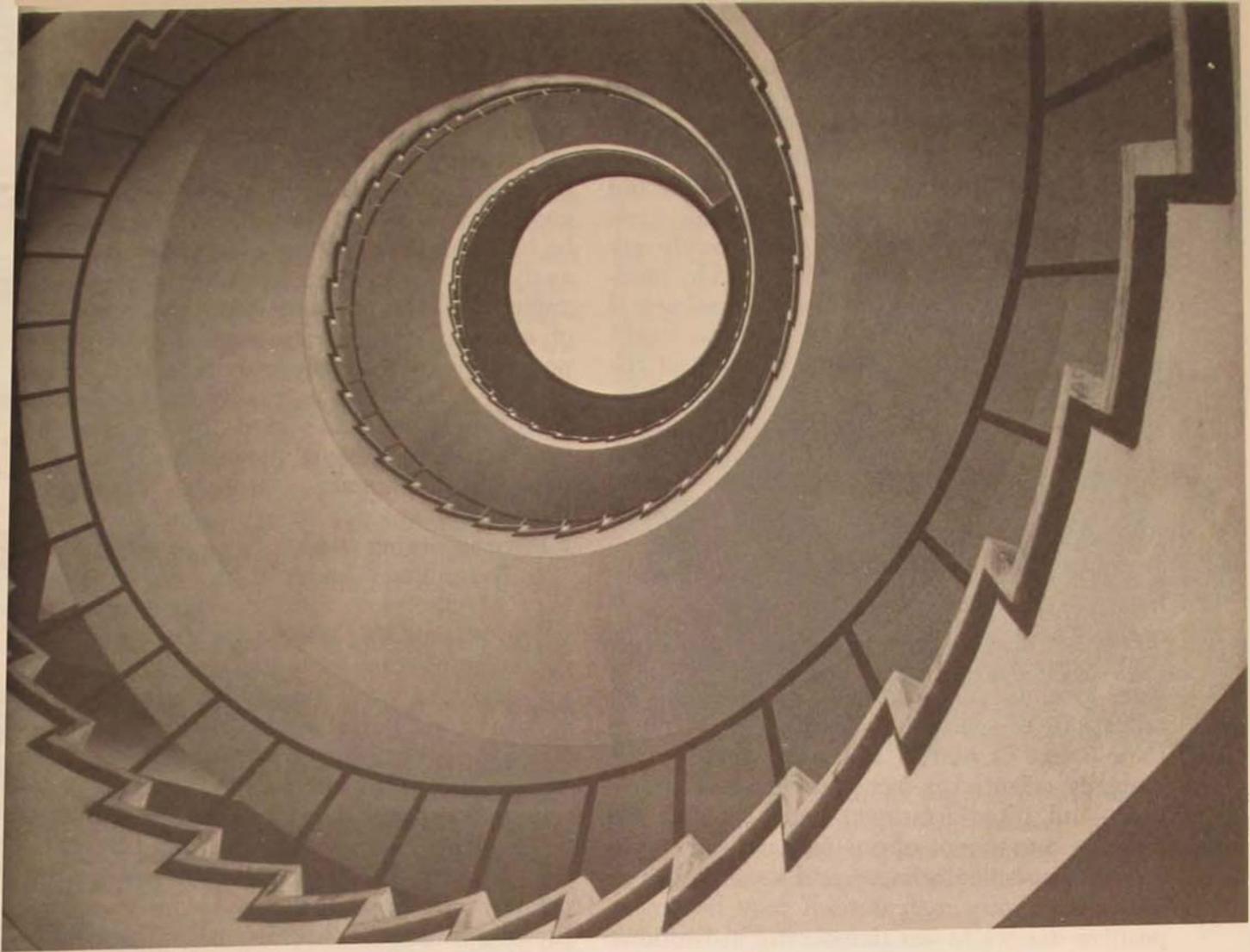
but we are not interested in the whole man who might be symbolized as a circle with a short radius. That circle indeed might symbolize the balance in our prescribed programs, which set the minimum standards and goals for all cadets in each of our three programs—academic, military training, and athletic. But to set these minimum standards and goals as our maximum expectations would lead to regimentation and mediocrity and would constitute a gross failure on our part to match the challenges of our programs to the stature of our cadets.

Our three programs, with elective and selective opportunities for enrichment in the academic curriculum, the intercollegiate athletic program, and the military training program, are based on the philosophy that at least half of a man's potential is to be found in his patterns of uniqueness. The significance of this is that if he is trained only in those procedures which are equally useful to everybody, he will have the necessary skills to achieve no more than half his maximum potential. On the other hand, if he is stimulated, challenged, and rewarded in the pursuit of excellence in those areas where his talents and interests are strongest, the development of his intellect, his physical skills, his military skills, and his character will be at optimum. This optimum development will lay the foundation of self-discipline that will establish in him an insatiable appetite for exploiting his potential talents and performance up to his capacities. It is this philosophical tenet which is the basis for the Academy's academic majors and enrichment programs, intercollegiate athletic program, and military training program.

United States Air Force Academy

Note

1. John T. Dailey, *The American College, A Report by Project Talent.*



**THE ROLE OF THE
HUMANITIES
IN EDUCATING
THE PROFESSIONAL
OFFICER**

COLONEL JESSE C. GATLIN, JR.



WRITING about the value of studying the humanities is in some ways like writing about God. In any audience there are likely to be some who believe on faith alone, some who believe on faith and reason, some who are mildly skeptical, some who are agnostic, and some who simply say the whole subject has been outmoded by modern advances in science and technology. I wish to take issue with none of these viewpoints specifically, but simply to state at the outset my conviction that it is not only desirable but downright essential for the professional Air Force officer to broaden and deepen the liberal aspects of his education.

Today the military professional is so often evaluated in terms of a stereotypic image: a rigid, unthinking, tradition-bound dunderhead; an intellectual, emotional, and moral cretin whose sole concern is glorying in wars past, escalating wars present, and fomenting wars to come. His reputation among the intellectuals of our nation is often low indeed; their image of him as a narrow-minded, provincially oriented power-grabber gives rise to deep and often irrational fears that, as the military component of our national policy becomes economically more and more demanding, the military man himself may become a positive danger to our democratic institutions. I am reasonably sure that many military men would disagree with this concern for our national reputation among those generally acknowledged to be the intellectuals, but I believe that we ignore such derisive or antagonistic estimates at our peril. In our national life the military profession *is* important; it has *always* been important; I can see no evidence that it will not *continue* to be important. We must, I believe, concern ourselves with attracting and keeping young men whose intellects are superior and with educating them not only technically in the skills of the military profession but liberally in the history and values of our open, ever changing, intellectually challenging culture.

The humanities are an indispensable part of such an education, because they concern themselves not so much with the utilitarian and practical aspects of life as with the dis-

tinctively human and individually significant problems which every man (and especially those who would lead other men) must face and attempt to resolve. For a young man to become a good officer, he must first become a good human being. Regardless of how skillful he becomes in flying airplanes, firing weapons, analyzing or designing circuits, solving war-game problems, or probing into the intricacies of astrophysics, one attribute without which no officer can become a truly respected leader of men is humanity, a quality exemplified, in John Henry Newman's words, by the man who has "a clear conscious view of his own opinions and judgments, a truth in developing them, an eloquence in expressing them, and a force in urging them."

The military leader at his best must be a man of discipline, and discipline often involves maintaining steadfastness of purpose in the midst of complexity and ambiguity. Often his decisions must be choices not of right versus wrong but of right versus right. Sometimes those decisions involve the life or death of himself and of his men. Such choices cannot be expressed by formula, nor can their consequences be properly measured by statistics. No single abstract principle offers either solution or refuge to the man who spends his life in a career that can demand of him, sometimes with startling abruptness, the surrender of self to the demands of service. It appears to me that any studies or experiences which contribute to discernment, to liberal knowledge, to precision of expression, to imagination, play a vital and indispensable role in developing a competent military officer. I believe our humanities courses at the Air Force Academy play such a role.

The term "humanities" is not a precisely limiting one. In its broadest sense it connotes any study or activity which relates to the distinctively human aspects of man. But for instructional purposes, it has come to mean studies in languages, literature, philosophy, history, and the fine arts. The core curriculum of the Academy (those courses which all cadets must complete, whatever their academic major) includes courses in all but one of these fields; the fine arts courses are elective.

In English language and literature, the cadet completes four courses. The first two in the freshman year are concerned with written composition and literature. As an upperclassman, normally in the senior year, the cadet takes a course in advanced expository writing and speech, in which he writes and speaks formally to the class, chiefly on topics directly related to the field of his academic major. During his last semester he takes the course, *Western World Literature*, in which he examines selected literary masterpieces of the Western tradition in terms of the human values they embody and the insights they provide into issues of good and evil, right and wrong, war and peace—issues which have perennially been involved in what William Faulkner has called "the human heart in conflict with itself."

In foreign languages, the cadet takes at least two semesters of Spanish, French, German, Russian, or Chinese. In these courses, he learns to use the language in spoken and written form and to understand something of the culture and history of those who are native speakers of the language.

In philosophy the cadet takes a short course which acquaints him with several of the great Western thinkers—Plato, Descartes, and William James—and introduces him to the kinds of fundamental problems concerning himself, his values, and his world with which philosophy has dealt.

In history he takes four courses, beginning in the freshman year with courses in United States history and world history since 1500. In his sophomore year he continues with a course in military history from antiquity through the nineteenth century and culminates the history series with a semester of air power and twentieth century warfare, dealing with the evolution of air warfare and military affairs during the twentieth century. These four courses provide a background against which to measure his own cultural and professional commitments; they offer him a perspective on himself as a link in the long chain of human endeavor and achievement.

One of the elective fine arts courses, *Introduction to the Arts*, deals with represen-



The fine arts constitute an integral part of the humanities program at the Academy, and cadets may approach music and art through appreciation and analysis courses as well as through more individual creative studio work.

tative works by major artists in painting, sculpture, and architecture. Another, *Music Appreciation*, combines a chronological survey of musical forms and styles with study of major works by representative composers. Courses are also offered in applied painting and sculpture and in the fine arts in our own American cultural tradition.

The core courses which I have summarized are offered by the four departments comprising the Humanities Division: the Departments of English, History, Foreign Languages, and Philosophy and Fine Arts. Each of these departments offers a range of additional elective and majors courses, many of them required in academic majors such as American Studies, History, Military Art and Science, Humanities, and the area study programs in the Far East, Russia, Western Europe, and Latin America. Many of the courses

taught by the other academic divisions—law, psychology, and cultural anthropology, for instance—also contribute to the education and values which should mold the cadet into a competent professional officer. We expect our cadets to understand what science and technology are doing *for* people; the need for such understanding is almost universally recognized. I believe it equally important that they understand what science and technology are doing *to* people, to that uniquely human need for individual dignity and importance which will confront them time and time again as both a problem and a goal in all their dealings with human affairs. It is here, in their examination of the unique individual and the specific historical event, that the humanities insist on the importance of the human element and provide an antidote to the students' tendency to categorize, to abstract, to generalize, to apply preconceived formulas in dealing with human problems.

To illustrate: Recently in one of my freshman English classes we were discussing a book in which a fictional Nazi general had committed three sadistic and brutal murders. The general had consistently maintained a reputation for strict discipline, spartan habits, and total dedication to whatever military missions he had been assigned. His public stature was heroic, and he always evoked the concept of duty as an adequate and unquestioned justification of his acts and decisions. Throughout the book there had been repeated and insistent evidence that, despite his public image as a man of courage, valor, and strict self-discipline, he was inwardly a tortured and psychologically distorted man. In essays written on the novel, a few of my freshman cadets praised this general as a military commander. For them he embodied an image of the military hero—fearless under fire, commanding in appearance, aloof in temperament, taciturn in social intercourse. These young men had overlooked the crucial distinction between the appearance and the reality of the general; they missed the author's point, because they had allowed an abstract and simplistic concept of the military leader to override the concrete and complex evidence

that this man was a thoroughly deficient human being. Our classroom discussions, I believe, succeeded in bringing out the qualifying views of the more perceptive cadets, who saw that another general in the novel, much less publicly acclaimed and physically imposing, was in the final balance a much more farsighted and humanely effective leader.

I mention this incident to illustrate the kind of lessons the humanities can teach—lessons not in the abstract evaluation of events, personalities, and experiences, but in concrete evaluations of unique people acting in specific situations involving emotions and impulses as well as ideas and actions. Most of the courses in the Humanities Division devote much classroom time to discussing, exploring, clarifying, refining the human values with which each subject deals. By the time the cadets are First Classmen, most of them have achieved great improvement in their ability to deal thoughtfully and knowledgeably with problems requiring maturity, compassion, and humane respect for conflicting views.

LET ME CONCLUDE with a few remarks about our cadets and about what I conceive to be the role of the humanities in educating them. They are collectively as fine a group of young men as could be assembled on a college campus anywhere. They all wear the blue suit, and they all have subjected themselves to a life more demanding physically, emotionally, and, I believe, morally than most young Americans experience. They are, however, individuals, persistently determined to resist the stereotypic image of sameness by which often the public and sometimes even some of us at the Academy mistakenly judge them. In ways overt or subtly devious, they resist being lumped together as identical integers in what Stephen Crane once called a "vast blue demonstration." They are young men of their own generation, more alike than they are often willing to admit (as young men of all generations have tended to be), yet willing to learn from those they respect and to confront honest issues honestly.

It is crucially important that our officer faculty, in the humanities and in all other departments, exemplify in what we teach and by what we are those standards we wish to uphold. Many of us are—quite properly, I think—concerned about the often ill-considered ideas and demands of the “now” generation. We should be even more concerned about our own equally impatient demands for action and solutions, made often without proper consideration of the past and its pervasive and formative influence on the mind of man, on the shape of his cultures, on the image he cherishes of himself and his institutions. We have an obligation, as officers who lead men and who influence and implement national policy, not only to know the skills of war and the hardware of our profession but also to understand and place a considered value upon the ideals, customs, thoughts, and feelings of those we command, those who are our allies, and those against whom it is our lot and our duty to contend. We should know the value of what we may destroy as well as the value

of what we defend. For nothing is more apparent, even in the short history of the twentieth century, than that today's enemy may be tomorrow's ally, that implacable and simplistic enmity toward peoples and nations is not only unnecessary but downright indefensible in the man who would be truly a leader. The real professional is the officer who is most able, by temperament and by education, to view his role as ultimately a humanistic influence, dedicated to his country, yes, but aware always that what his country may demand of him today it may ask him to reconsider tomorrow. He must therefore be both willing to serve and aware that service in its finest and most worthy sense is always to his own intellectual and moral integrity, to his sense of those human values without which there would be nothing left deserving of his service or of his life.

It is this sort of attitude—this widened perspective on past, present, and future—that the humanities can do much to promote.

United States Air Force Academy



THE AIR FORCE ACADEMY AND THE DEVELOPMENT OF AREA EXPERTS

COLONEL RICHARD F. ROSSER

DURING several months of temporary duty in Vietnam two years ago, I met no Air Force officer with a background in Far Eastern affairs, let alone knowledge in depth of Vietnam. The intelligence unit with which I served was a particularly good example of the inadequacy of the Air Force approach to area training. The officers (and some airmen) of the unit dealt daily with Vietnamese and other Far Eastern nationals on the most sensitive matters. But what had been their preparation? Two-thirds of the thirty officers had been drafted on a crash basis from the Security Service, Strategic Air Command, or Tactical Air Command intelligence and sent to Vietnam with no training in the area. The remaining ten had been through the Vietnamese language program at the Defense Language Institute. The course had lasted some ten months, but because of the inordinate difficulty of Vietnamese, few of the graduates could carry on more than the most rudimentary conversation. Moreover, none of the officers with language training had had any courses in the culture, politics, or economics of Vietnam. It should not be surprising that the unit's successes were few.

The problem was all too familiar. As in other crises, our approach had been to train individuals—regardless of whether they were really interested—in a crash program of area study after the crisis had developed. Unfortunately, it is impossible to create instant area experts.

The need for area experts in the armed forces first became evident during World War II. The United States was the most powerful country in the world and the key nation in the Allied coalition against the Axis. American troops inevitably became involved on every continent. Intelligence about every facet of the societies of our enemies was critical, as was the ability to understand the languages and cultures of our allies.

What kind of training program could produce "experts" with this broad knowledge? What kind of educational approach would work? The traditional disciplines, such as economics and political science, were highly specialized by 1941. A knowledge of any so-

ciety in its totality through study of one discipline was impossible. The area approach could correct this fragmentation of knowledge by combining the perspectives of the various disciplines. Hopefully, the unified treatment would give the student a multidimensional picture of the life and thought of the chosen geographical area. As prototypes, armed forces schools used the few prewar area study programs carried on by lonely experimenters at Yale and Princeton. Crash training of area specialists then, as now, did not fill the bill. It was a case of too few, too late. Specialists needed experience as well as classroom instruction, and they had to be spread through all echelons to have a significant impact.

Ignorance of the true nature of other societies was compounded by a belief that military strategy could and should be planned without considering postwar political objectives. The American chiefs of staff were concerned with one thing, military victory in the shortest possible time. And their military advice tended to determine foreign policy.

Churchill's pleas for an invasion of Europe through its "soft underbelly," the Balkans, were anathema to the American chiefs. It would detract from the cross-Channel project. The chiefs also suspected that the Prime Minister was more interested in the future of the British Empire than in winning the war. Yet the Balkan invasion is perhaps the one strategy that would have saved eastern Europe from the Russians. Few American officers, however, worried about Russia—or even thought it their duty to worry about Russia.¹ A profound misunderstanding of Soviet behavior resulted.

Our ignorance of another ally, the Chinese, was also appalling. We would soon pay for the facile assumption that Chiang Kai-shek could produce a unified, democratic country, the anchor on which our postwar Far Eastern policy was to be built. (In this instance we were concerned with political objectives.)

We certainly should have had a better understanding of Japan, a known enemy. Japan was on the verge of surrender before the first atomic bomb was dropped. Instead, our chiefs still foresaw a long, bloody war and wanted Russian military aid for the planned

invasion of the main Japanese islands. As a result, Russia entered the war in the Far East a few days before Japan's collapse. The Soviets legitimately collected the booty promised them at Yalta in return for attacking the Japanese.

The mere presence of area specialists, of course, would not necessarily have changed the course of the war. George Kennan, perhaps our foremost expert on Russia even then, had great difficulty finding an audience for his warnings about Stalin's goals. This only illustrates the critical lack of preparation of our policy-making apparatus for the role the U.S. played in World War II and, more important, for the role it would soon play in the postwar world.

There is a more compelling reason today for training armed forces area specialists than during World War II. The United States is now the leader of the Free World. Almost any crisis in any region of the world can affect our security or that of our allies. And the world is much more complex than in the era of *Pax Britannica*. Gunboat diplomacy no longer works. The indiscriminate use of naked power can backfire. We have to comprehend and sometimes deal with developments which only began to reach full flower after 1945: the age of mass communications, the clash of ideologies, and the revolution of rising expectations. Communism, anticolonialism, and nationalism in varying mixtures are potent forces in almost every conflict in almost every sector of the globe.

Victory in the various types of conflict we now face depends upon a sensitive appreciation of the issues involved. The contest rarely is clearly drawn between the forces of evil and the forces of good. Vietnam is not a simple contest between "democracy" and "communism." The Congo crisis was even more complex.

The Air Force can argue that these questions belong to the President and the State Department. But this argument is even more fallacious today than in World War II. More than ever, military operations must be carefully and precisely related to political objectives. Military men must discard the assump-

tion—which never was correct—that there is no substitute for victory on the battlefield. Wars today, and in the foreseeable future, are fought for limited political objectives with limited military means.

Given the complex interrelationship between political objectives and the use of force, military men need a sophisticated understanding of potential enemies. We need to appreciate their aspirations, objectives, and basic concerns—what makes them tick. Only with this knowledge can we begin to have an accurate picture of their strengths and weaknesses, their strategies. If we lack this knowledge, our military planning will be ineffective and our military force poorly applied. The Communist World, for example, is hardly monolithic, if it ever was. Yet some still talk about the "threat" as if it could be abstracted from the intense strains within the Communist sphere. It can be argued that the U.S.S.R. now is more worried about Communist China than about the United States. In short, we need a much more sophisticated appreciation of what the Communist "threat" entails.

It is just as important that we understand our allies and their problems. This means, in effect, the totality of their cultures. Today we rarely can apply military power and quickly depart. American troops are still in Korea, more than a decade after the cease-fire. American military power is used today to create political stability as well as to defeat enemies on the battlefield. Weapons are provided through the Military Assistance Program for the same dual purpose.

These are facts of life in the 1960s and will be in the 70s and 80s. The problems are more difficult than ever. We will need great expertise in order to find feasible solutions. In the armed forces, we will need men who understand all facets of the societies, both enemy and ally, with which we may deal. They will work in intelligence, in plans and operations, in military assistance, as advisers to allied forces, as attachés. The need for at least a small corps of area experts at all levels will be greater than ever.

The Army already has responded with its Foreign Area Specialist Training Program

(FASTP).² The Air Force still has no formal program for area training.

Meanwhile, the Air Force Academy has instituted area study majors on the undergraduate level in the belief that the Air Force could not find a better source for its future area experts who also are dedicated, professional officers. In doing so, we have followed a growing trend toward area study in the civilian educational community. Let's examine briefly the status of area study in the United States and then note how the Academy established its own programs.

Shortly after World War II, Robert B. Hall wrote in his pioneering pamphlet on area study:

Two ghastly wars within a generation have proved beyond reasonable doubt that we must know more of the other nations of the earth. We have not had the answers to pressing questions concerning other lands nor have we built up our materials so that we could find the answers when they were needed. In each war, we promise that we will do better. With each peace, we again forget. This knowledge that we must somehow acquire—this understanding of other people's potentials, aspirations, and ways of life—is as necessary to maintain the peace as to win a war.³

The civilian educational community responded. There were a dozen area study programs at the graduate level in 1946; in 1964 there were 154. There were apparently no programs at the undergraduate level immediately after the war; in 1964 there were 250. Almost 150 were at small, four-year liberal arts colleges.⁴ For example, Earlham College (Richmond, Indiana, 1061 students) offers a major in Far Eastern Studies and is planning programs for Latin America and the Middle East. Florida Presbyterian College (Saint Petersburg, 560 students) has a program in Asian Studies.

In 1966 a number of faculty members at the Academy began to discuss informally the concept of area study majors.⁵ It was apparent that the Academy could institute area training with much greater ease than many civilian colleges and universities. Because of the increasing richness and sophistication of our cur-

riculum, we already had most of the courses to construct four academically sound area study programs—Soviet Russian, Latin American, Western European, and Asian. In addition, an unusually large proportion of our faculty already had area expertise. Most schools of our size were lucky to have three or four area experts, yet we had five instructors with Ph.D.s in the Russian area alone. Finally, we taught the languages required for the four programs listed. The major courses lacking for area study at the Academy were in the field of literature. But the Department of English (and Foreign Languages, in the case of Spanish) agreed to establish the required courses if area study majors were approved.

Before launching four new academic majors, however, it was necessary to do a thorough study of the whole concept of area training. What was the optimum number of courses in an area study major? How many courses were needed from each discipline? How much language training was required? What level of area expertise could be expected at the undergraduate level? Could the academic departments recruit faculty members with area specialties on a continuing basis?

To make the study, the Ad Hoc Committee on Area Study was organized in September 1966. From the outset the thirteen members representing nine academic departments agreed that a comprehensive investigation was needed of the feasibility of training in all the main geographical areas. It was not enough to concentrate on the four areas in which faculty expertise and courses were already available. To undertake the necessary studies, six subcommittees were organized, consisting of all faculty members with relevant area specialties. The committees studied respectively Asia, the Soviet Union and East Europe, Western Europe, the Middle East and North Africa, Sub-Saharan Africa, and Latin America. In all, some thirty-six faculty members participated. The result was a fifty-page report entitled "A Proposal for Area Study at the Air Force Academy." The report was submitted to the Dean of the Faculty and the



Four semesters of a foreign language are required for a major in one of the area studies, and the Academy language offerings in Chinese, French, German, Russian, and Spanish complement nicely the four current area study programs: Soviet, Latin American, Western European, and Asian.

heads of the various departments.

The ad hoc committee recommended that four area study programs be instituted immediately as prescribed curriculum majors: Soviet, Latin American, Western European, and Asian Studies. These four majors were subsequently approved. The members of the committee also recommended that the Academy begin planning two additional area study programs: Sub-Saharan Africa, and North Africa and the Middle East. The potential importance of these two areas to American security was obvious, but the Sub-Saharan program needed additional faculty members with appropriate area expertise, and the North Africa and Middle East program required considerable course planning.

In constructing the four area study majors now in the curriculum, the ad hoc committee was guided by several general principles:

- Core courses in each major consist of offerings in economics, geography, history, language, literature, and political science. Anthropology is included where applicable.

- Four semesters of language are required, including the two taken in the core curriculum by all cadets. (This is the standard language requirement in undergraduate area study programs throughout the nation.)

- Two open options are included in each major. A cadet may take additional work in a given discipline and may specialize in a specific country within an area by taking tutorial courses.

- Area majors have several broad comparative courses to enhance their analysis of a specific area. Political Science 232: Contemporary Foreign Governments, provides this in the field of political science. Area majors also take Philosophy 400: Great Religions of the World.

- The capstone course in each major is an interdisciplinary seminar taught on a cooperative basis by the faculty members teaching other courses in the major. The seminar focuses on one broad topic. In Soviet Studies this could be a semester-long examination of all facets of the Sino-Soviet dispute. The political scientist normally teaching the course

in Soviet politics would examine the political aspects of the dispute, the economist the economic aspects, and so on.

- Cooperative master's programs for the four existing majors will not be developed at present for two reasons. First, cooperative programs generally require some 10 to 15 master's candidates in a given class; it is doubtful whether there will be more than this number of cadets in a particular class in any one undergraduate major, and some of these would not be of the caliber required for a cooperative master's program. Second, area master's degree programs usually require two years, and it would be difficult to construct a cooperative program within the normal seven months' limit.

- Graduate school fellowships appear to be a temporary solution for the further education of outstanding cadets in each area major. Such educational opportunities already exist for those specializing in most of the geographical areas, and the Academy cadets have had excellent success in winning scholarships (for example, the Fulbright competitions). Our success should be enhanced with better-prepared applicants. Ideally, we would like to see several graduate school assignments for study in each area in the annual education quota of the Air Force Institute of Technology.

Past experience suggests that we can expect no more than 30 to 40 area majors in each class, distributed over the four areas. These majors will be neither popular nor easy, if only because of the additional language required. But this number should serve the needs of the Air Force. Assume, for example, that the Academy can train ten Asian Studies majors each year for 20 years. Given normal attrition, the Air Force should have a corps of at least 100 officers at the end of this period, spread through all ranks. A group this size with some talent in analyzing Asian affairs could have a vital impact on Air Force effectiveness in furthering national interests in that area. The relatively small numbers in each major will not be an inordinate burden on the faculty or departments involved. Most of the courses will be taught anyhow because they are integral to other majors.

A legitimate question might arise concerning the validity of the basic concept of area study in view of uncertainty as to whether area majors would be hampered by lacking "tool" courses of the traditional disciplines. An area major might be said to know a little bit about a lot of disciplines as they relate to his area, but not to have the tools of any one discipline to permit research in depth; he is a poor political scientist, economist, historian, etc., even in relation to his chosen area.

Before accepting this argument, one should consider three points: First, the most venerable major in the Social Sciences and Humanities Divisions at the Air Force Academy is International Affairs. This major is truly interdisciplinary, yet the validity of International Affairs as a field of study has not been challenged.

Second, a political scientist (or historian or economist, etc.) who attempts to analyze the situation in Vietnam without the tool area courses in history, literature, language, etc., may not do as good a job as an area major. The question of which tool courses a man needs—area courses or disciplinary courses—for analysis of a regional problem is debatable.

Third, area study provides a superior background to work in the traditional disciplines for many jobs in intelligence, advisory tasks, attaché duty, etc. Indeed, it could be argued that the Air Force needs more area experts than economists, historians, or political scientists in these types of positions.

If anyone should wonder how cadets can be area "experts" after ten courses, the answer is that they cannot. But neither is an

undergraduate political science major a "political scientist," or an economics major an "economist." Area majors at the Academy are *introduced* to a culture or group of cultures. Most, if not all, undergraduate majors *introduce* disciplines.

An area major's training will not be wasted if his Air Force assignments are not in his geographical area any more than when a cadet with a major in political science, economics, or astronautics spends his first six or more years in a flying unit or working in any job not requiring his special analytical skills. Anyway, this misses the point. Area training at the Academy, just as training in the traditional disciplines, is only a minor part of the cadets' general education in the liberal arts, engineering sciences, and military art. We want to develop professional, dedicated officers who will serve wherever they are needed. Of course we trust the Air Force will enable these officers to work in their specialties when such specialties are needed.

We hope the Air Force will realize its need for officers who are area experts and utilize them effectively. These men, of course, will require further education and language training to enhance their specialization. They also will need occasional assignments to jobs requiring knowledge of their given area to refresh their understanding. By developing this corps of area experts, we will not necessarily avoid future crises, but we may better understand the nature of the conflict and have more than a superficial knowledge of the language of the area.

United States Air Force Academy

Notes

1. One of the rare exceptions was General John R. Deane, head of our wartime military mission to Russia. See his book, *The Strange Alliance* (1947).

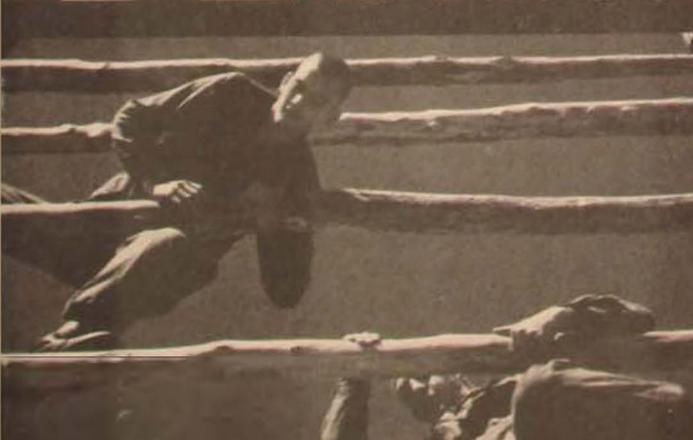
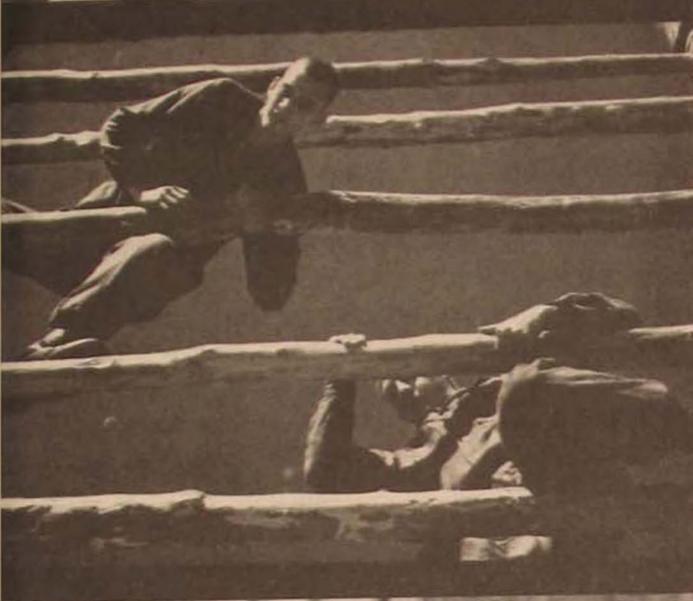
2. "The FASTP provides for the procurement, training and utilization of officers with detailed knowledge of foreign areas. The objectives of the program are to develop selected officers with a thorough knowledge of a geographic area, to utilize these officers in military operations and to employ these officers to prepare sound estimates and recommendations concerning their geographical areas of specialization. The general phases of training are: language training (6 to 12 months); academic area studies in the United States or at selected foreign

civilian universities (9 to 12 months); and travel, research and study in the overseas area of specialization (12 to 36 months)." Excerpted from *Officer Education Study*, Office of the Assistant Secretary of Defense (Manpower), July 1966, Vol. II, pp. 193-95.

3. Robert Burnett Hall, *Area Studies: With Special Reference to Their Implications for Research in the Social Sciences*, Social Sciences Research Council Pamphlet 3 [New York, 1947], p. 82.

4. Statistics can be found in *Language and Area Study Programs in American Universities* (Department of State, 1964).

5. A year earlier, the Academy had instituted its first area program, *American Studies*.



THE LEADERSHIP AND MILITARY TRAINING PROGRAM

BRIGADIER GENERAL ROBIN OLDS

THE KEYNOTE of the USAFA Commandant's Leadership and Military Training Program is challenge—both mental and physical. To further that challenge, every opportunity possible for leadership and management of resources is afforded the cadets. From the time they first enter the Academy, cadets are confronted with tests of varying degrees of complexity calling for resourceful use of time and manpower. These challenges are designed to convert the young civilian into a cadet, the capable cadet into a confident leader, and the leader into a competent, dedicated junior officer.

Leadership training is conducted under the philosophy that the cadet must first be able to follow before he can lead. Under the guidance of the upper classes, the cadet's first two years at the Academy (the Fourth and Third Class years) are spent in learning how to exercise authority. In addition to formal academic study, informal squadron training is conducted on the theory of leadership. Although some opportunity is afforded for practical application of this theory, most of the leadership assignments are reserved for the last two upperclass years. As the cadet emerges from the trainee status of his first two years, he is given positions of authority. The most immediate leadership challenge for the upperclass cadet is the assumption of a position of responsibility in his own Cadet Wing. Under the guidance of the Commandant's staff, the wing, group, and squadron cadet officers are appointed twice a year. These positions of responsibility are assumed in addition to the full academic load carried by all cadets. The operation of the Cadet Wing with its myriad of daily activities is in the hands of these young men. They quickly learn to live with their mistakes and to avoid repeating them. The confidence, maturity, and skill gained in these assignments are directly reflected in the ability of Academy graduates to rapidly and positively assume positions of demanding leadership early in their officer careers.

In order to extend the challenges of leadership over as broad a field of education and practical experience as possible, the military

training program is conducted both in a classroom and in a field training environment. Each is designed to provide the cadet with the knowledge and skill necessary to increase his confidence in himself and his ability to lead others. This program begins the day the cadet first reports to the Academy and ends with the march-on to graduation four years later. It is conducted not only during the academic year but during the majority of the cadet's four summers at the Academy as well. During the academic year, both faculty and cadets teach a variety of military subjects designed to familiarize cadets with the armed forces of the United States and its allies and the forces of the Communist powers. Classes are also conducted on the combat operations and tactics used by the United States Air Force. Command training conducted on Saturday mornings orients and motivates the cadet toward service life. Through the use of officer-conducted seminars and guest speakers, cadets are kept abreast of current military and political affairs.

During the summer periods, cadets are involved in a number of field training programs. These programs, which begin with the "doolie" summer, consist of instruction and experience in survival, evasion, resistance, and escape as well as weapons familiarization, aircraft orientation flights, and experience in air base defense. The rough country adjacent to the Academy is utilized for most of the field exercises, with nearby Fort Carson providing training areas and demonstrations of Army weapons and tactics. With the exception of flight training, all field training is conducted by upperclass cadets, each of whom must fulfill at least one leadership position in a field training program.

In addition to the field training provided at the Academy, training programs are conducted at various Air Force bases throughout the country. Third Class cadets spend three weeks visiting various bases on a zi field trip. Upperclass cadets can elect training and research programs located at many different bases. Each upperclass cadet must also complete a three-week tour of duty with an active Air Force unit. This training introduces him

to Air Force life in the most practical way possible—actually involving him in a working position on an Air Force team. This program, called Operation Third Lieutenant, has proven to be one of the most popular and beneficial programs on the military training schedule.

Nor is service contact limited to the Air Force. Each year the Academy sends nearly 500 cadets to the Army's parachute school at Fort Benning. The program is voluntary and leads to the awarding of the coveted jump wings. In addition, selected cadets attend programs conducted by the U.S. Navy which challenge their mental and physical ability.

To complement the required classroom and field training, the Academy has many optional flying programs. Lightplane training in the T-41 is required for those First Class cadets who volunteer for pilot training. Optional programs in soaring, parachuting, and navigation training help to motivate the cadet toward a rated career in the Air Force. Flying training and indoctrination are performed out of nearby Peterson Field and from the new landing strip facilities on the Academy grounds. These optional programs are supplemented by participation in cadet clubs featuring glider, parachute, and lightplane training.

Throughout the entire four-year program of academics, military training, and athletics at the Academy, there is a continuous orientation of the cadet toward an Air Force career. The best training in the world, improperly motivated, would not produce the outstanding young career officer we hope to graduate from the Academy. With this in mind, the Commandant's staff is carefully chosen to reflect a cross section of the finest career officers in the Air Force. The curriculum of the Leadership and Military Training Program is designed to furnish the skills, self-assurance, maturity, and motivation needed by the junior Air Force officer.

The Academy recently graduated and commissioned its tenth class. In Vietnam and throughout the world, alumni of the Academy have established outstanding records. The United States has cause to be proud of these young men, many of whom have paid the ultimate price in the service of their country. They have answered well the challenge to their country, because they were trained and nurtured on challenge and responsibility from the day they entered the Academy.

United States Air Force Academy

WINTER MILITARY TRAINING

THE LABORATORY for the Leadership and Military Training Program, carried on in conjunction with the formal classroom work under the Dean of the Faculty, enables the cadet to put to practical use the philosophy he has studied.

Winter military training consists of four major phases:

- (1) A series of academic classes during the first three years for indoctrination and general information.
- (2) Night field training exercises in escape and evasion tactics and navigation.
- (3) Saturday morning periods of general military training.
- (4) Cadet operation of the Air Force Cadet Wing.

Academic program. With the beginning of the academic year, the new Fourth Classman takes the first of three military training courses. He spends nearly 50 hours in a survey course called "United States, Allied and Communist Military Forces." Exchange officers assigned to the Academy from the Navy, Army, and Royal Air Force assist in teaching the course.

As a Third Classman, the cadet takes a formal course in instructor training, during which he delivers practice presentations using lesson plans and training aids that he prepares himself. Both officers and students critique and grade each lesson. This program comes to practical fruition in the last two years as the cadet assumes wing leadership positions and conducts classes for other cadets.

Finally, as a Second Classman, the cadet makes a detailed study of "USAF Combat Operations and Tactics." The course is supplemented by briefing teams from the major commands and by guest speakers with recent combat experience. No formal classes are given to First Classmen so that they can be free to put the knowledge of the past courses into practical experience.

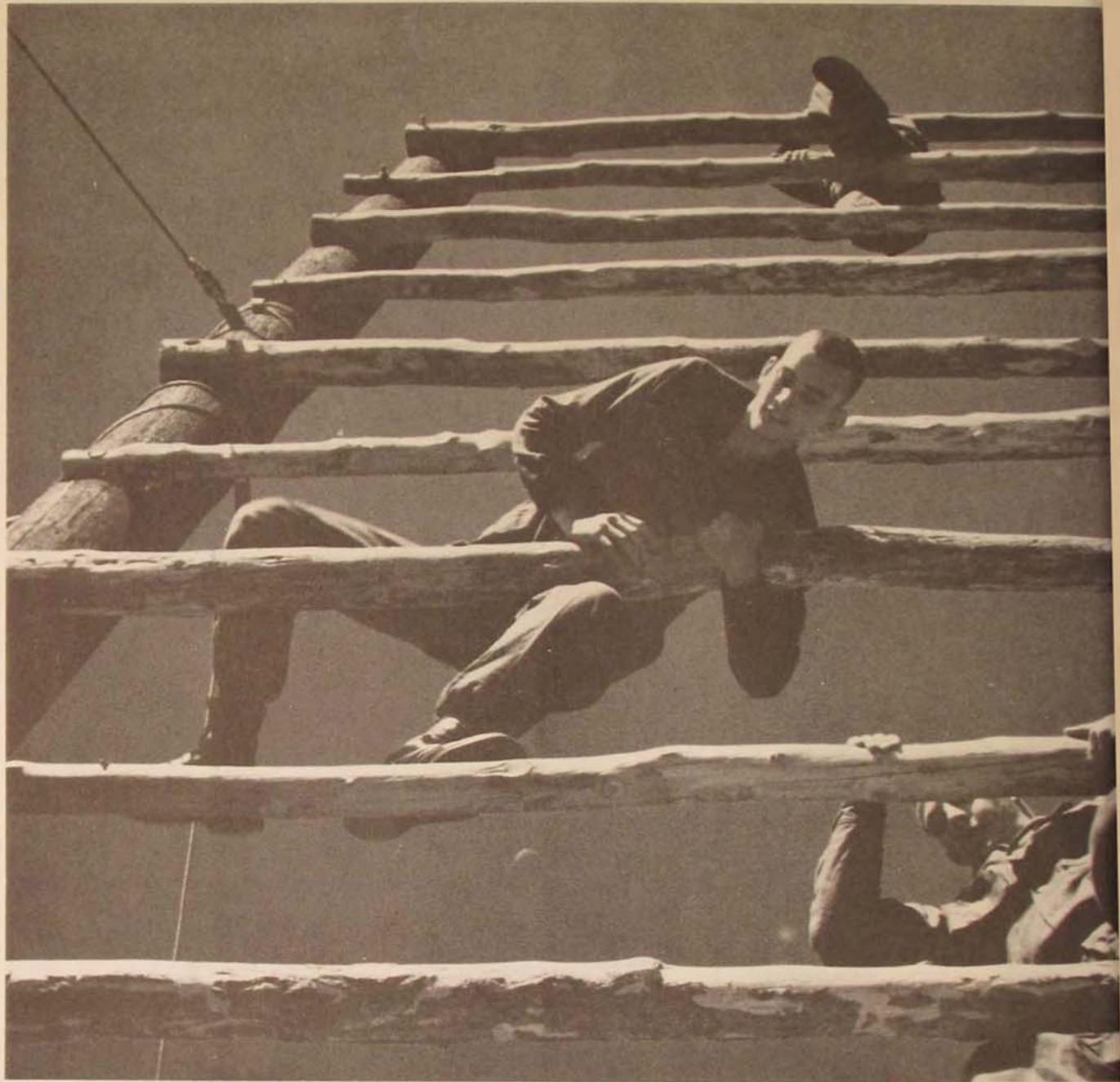
Field training. The Survival-Evasion-Resistance-Escape (SERE) program is designed to give each cadet the equivalent of the training received in Survival School at Fairchild AFB, Washington. While most of this training takes place in the summer, some additional exercises are scheduled during the academic year on Friday evenings. In addition, cadets receive training in night navigation and participate in a leadership competition which forms part of the military rating for the outstanding squadron of the year.

Saturday morning training. A cadet's Saturday morning is divided into four periods. Into these periods are fitted lecture and classroom subjects dealing with honor and ethics, decorum and etiquette, ground safety, current affairs, leadership, and career orientation. These are usually followed by inspections, drill, parades, and Air Officer Commanding (AOC) time. Outstanding guest lecturers often give presentations during this time.

Cadet operation of the Air Force Cadet Wing. The Cadet Wing is programmed to expand to four groups with 40 squadrons of approximately 110 men each by August of 1969. In a carefully monitored program, the Commandant has entrusted the actual operation of the Cadet Wing to the cadets themselves. This increased responsibility given the cadets has three advantages. First, it creates a healthy climate among the cadets themselves as the Wing becomes their organization. Second, it gives the cadets experience in leadership and responsibility. Third, and most important, it is the best way of inculcating a sense of personal responsibility for one's own actions, and the actions of his command, in the men who will one day be the leaders of the United States Air Force.







SUMMER MILITARY TRAINING

THE FIELD portion of summer training at the Academy was first conducted during the summer of 1966. Its immediate success as a leadership laboratory has made it a continuing part of the Academy program. It provides for a progression from learner and follower to the role of teacher and leader. Its basic concept is to continually challenge the cadet to produce his best regardless of the situation he faces.

Fourth Class (freshman) summer. Divided into two major areas, this basic summer orients the new cadet to Air Force life and then gives him practical field training. The orientation lasts for four weeks and utilizes the classroom, drill field, and dormitory to provide a transition from civilian to military life. Upperclass cadets plan and instruct in areas of character development, physical conditioning, and basic military subjects. One of the primary things the cadet learns is to operate under and believe in the Cadet Honor Code. Through formal instruction and discussion, again by the cadets themselves, the new cadet prepares himself to assume the responsibilities imposed by the rigorous Code.

The field training encampments are built around air base security and personal survival situations. Again, the entire camp is operated by upperclass cadets. Commissioned officers serve only to monitor the program and advise when guidance is requested. Under field conditions the cadet learns to be a member of a team and to function in small groups for land navigation, survival, field fortifications, and fire and movement exercises. Basic survival training covers six days in the remote areas of Pike National Forest. The objective is to teach the cadet fundamental combat skills while integrating him as a member of a military team.

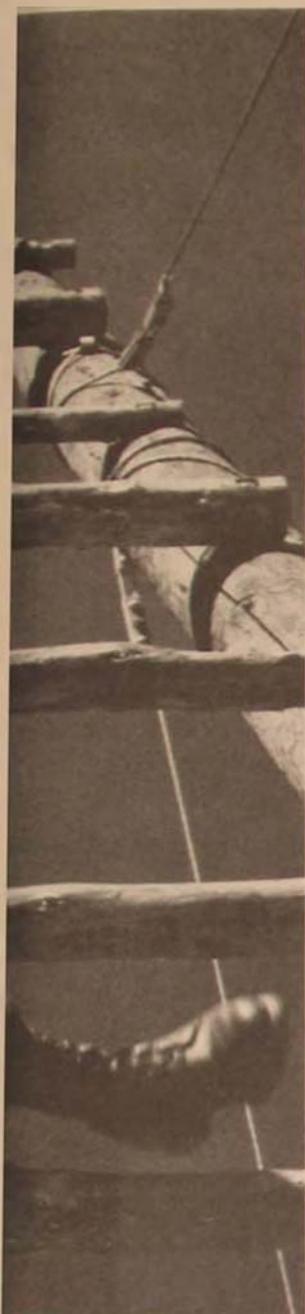
Third Class (sophomore) summer. Third Class summer involves a more intensive field training course, building upon the skills learned in Fourth Class summer. Cadets establish a forward air base and defend it in a 24-hour pitched battle against upperclass "insurgents." Additional training in survival, resistance, and escape and evasion is received prior to advanced weapons familiarization given at nearby Fort Carson.

Completion of this course signals one of the most eagerly anticipated parts of summer training. The cadets are flown around the United States in a three-week field study of our armed forces and visit installations of ADC, AFLC/AFSC, TAC, and SAC. At each command they get a mission briefing and a firsthand look at the weapon systems used. This tour is followed by an orientation ride in an operational jet aircraft for selected cadets.

While most of the cadets go on leave after the tour, some of them forfeit leave to attend jump school at Fort Benning, Georgia. During the summer of 1968 over 350 cadets of the top three classes won coveted jump wings.

Second and First Class summers. Only the first two summer training programs are standardized at the Air Force Academy. There are, however, certain minimum programs which each cadet must complete during these last two summers. He must hold at least one summer leadership position and must participate in Operation Third Lieutenant duty with an Air Force unit. After completing the required programs, a cadet may select from over twenty-five special training programs—all designed to place him in new and challenging environments.

Today's Academy graduate knows more about his chosen profession than ever before. The summer programs are designed to contribute directly to that end while at the same time building competence, confidence, and capability.

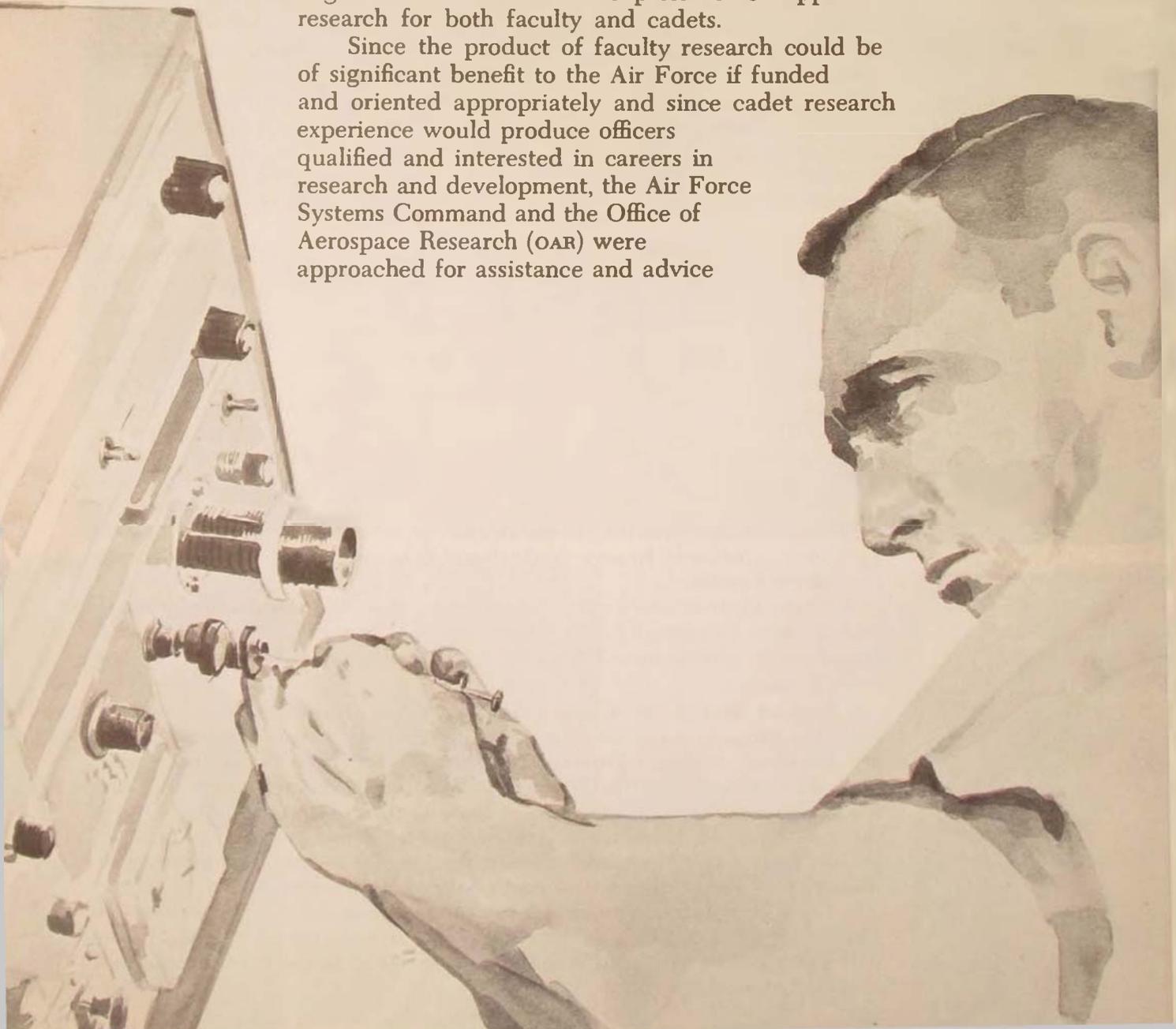


FRANK J. SEILER RESEARCH LABORATORY

COLONEL GAGE H. CROCKER

DEVELOPMENT of the USAF Academy from legislative approval in April 1954 to graduation of its first class in June 1959 was a task of considerable magnitude. With academic progress and a faculty with increasing numbers of doctoral degrees came the inevitable pressure to support research for both faculty and cadets.

Since the product of faculty research could be of significant benefit to the Air Force if funded and oriented appropriately and since cadet research experience would produce officers qualified and interested in careers in research and development, the Air Force Systems Command and the Office of Aerospace Research (OAR) were approached for assistance and advice



with regard to establishment of a research activity at the Academy. As a result, the proposal made by OAR in February 1962 to establish a small in-house laboratory at the Academy was approved at all echelons of the Air Force. The Frank J. Seiler Research Laboratory was formally established under the Office of Aerospace Research on 1 September 1962 with the assignment of two officers. It was named in memory of the late Colonel Frank J. Seiler, an Air Force research pioneer.

The Seiler Laboratory conducts basic research, provides liaison between the Air Force and the scientific community, and ensures the effective dissemination of research results in chemistry, aerospace mechanics, and applied mathematics. It promotes, fosters, and encourages an awareness of and interest in the importance of scientific research to the Air Force in the Academy faculty and cadets, and it supports selected faculty and cadet research that is within the scope of the OAR mission.

Even before the formal establishment of the Laboratory, specifications were being prepared for a computer of sufficient size to allow digital computing to be made a required part of the Academy curriculum and to provide the means for teaching advanced science and engineering courses. The availability of computational and information-processing capabilities in the digital computer is essential not only to the basic research of the Seiler Laboratory but also to an active and imaginative research program at the Academy. Additionally, knowledge and training of future Air Force officers in the use of the digital computer were recognized as essential to the long-term goals of the Air Force.

In the OAR proposal for the establishment

of this Laboratory, it was agreed that the computer would be procured and operated by the Seiler Laboratory, with a co-use agreement whereby the Laboratory would furnish adequate computer time to the Academy for the accomplishment of its faculty research program and for cadet computer courses and other courses in which the use of a computer is indicated. This support could be considered as analogous to federal research grants to civilian universities.

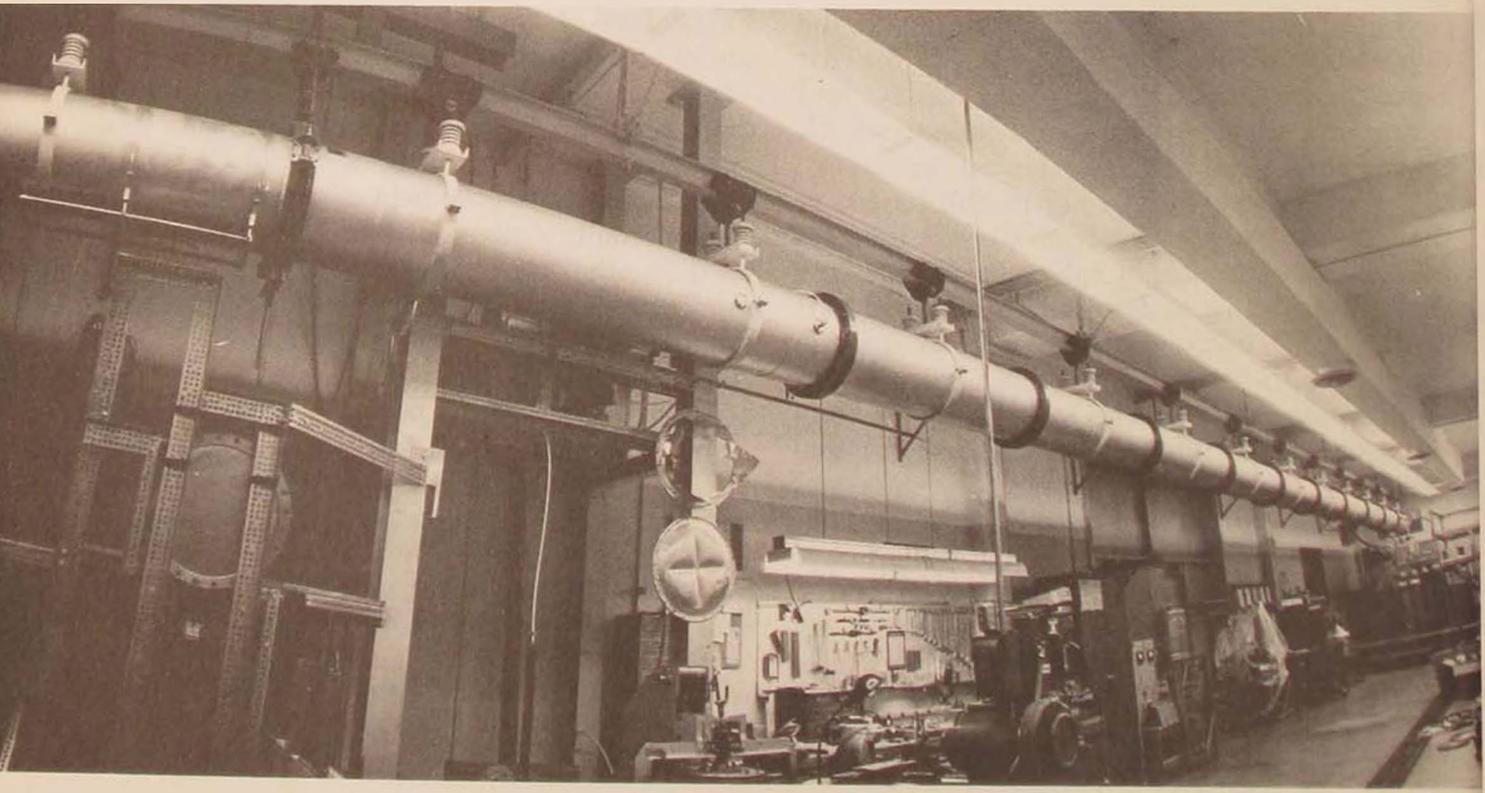
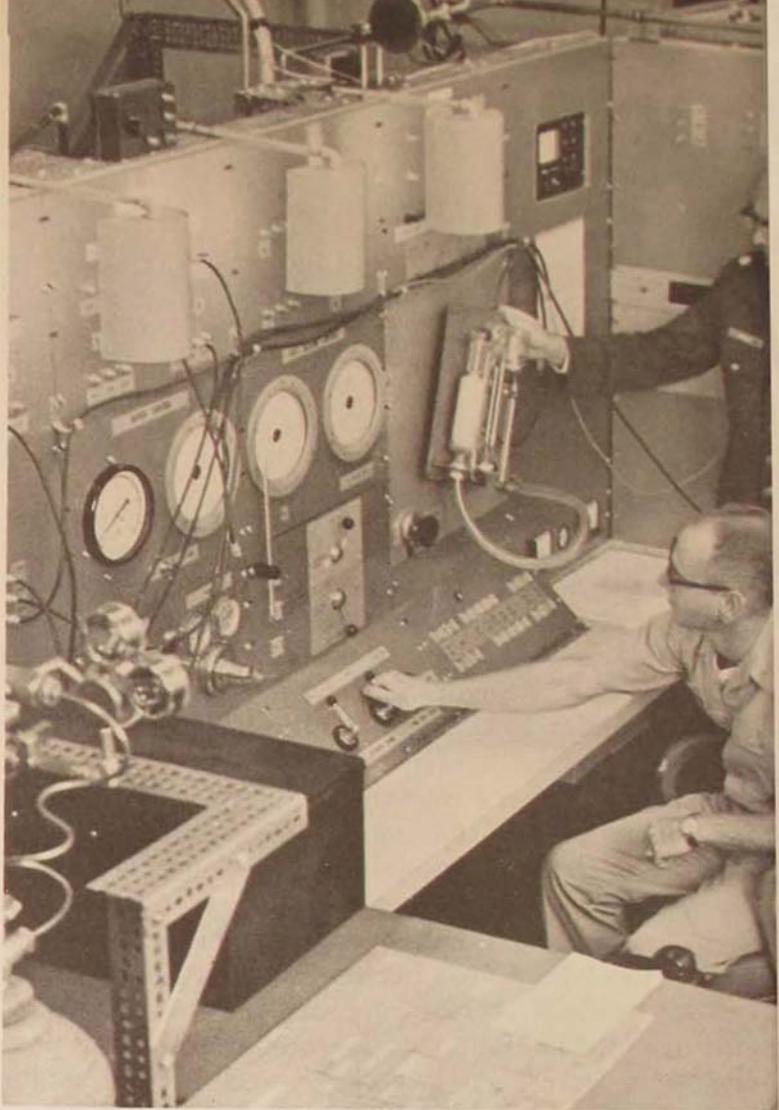
One large piece of research equipment much used by the Seiler Laboratory personnel and Academy staff and cadets is a multipurpose low-density shock tube, formally dedicated in October of 1965.

It is physically located in the Aeronautics Laboratory at the Academy and is similar to the one at California Institute of Technology. The tube is 84 feet long with a 17-inch inside diameter. The test-section initial pressure can be varied from less than a millionth of an atmosphere up to atmospheric pressure. Any gas or combination of bottled gases can be used in either the driver or test sections. Mach numbers ranging between 2 and 10 have been attained in argon at various initial pressures. A desired mach number can be repeatedly attained to within 0.5 percent.

The instrument is an extremely versatile device for studies in real gas dynamics (chemical kinetics, shock-associated phenomena, etc.). Primary interest lies in its use for re-entry gas dynamics involving shock-wave structure and in the formation and attenuation of shock waves. One of its values to date has been its use as an instructive tool and research instrument for Academy cadets. Many of the engineering problems that arose in the design and

Low-Density Shock Tube

After a firing of the FJSRL low-density shock tube, a ruptured diaphragm is removed, having been cut by the cruciform knife blades when sufficient pressure differential was developed between the high- and low-pressure sections of the tube. . . . Instruments on the shock tube control panel enable personnel to check on the performance in the low-density shock tube. . . . Cadets participated in construction of the 84-foot 17-inch shock tube, which is much used by the Academy as well as the Laboratory for various studies in real gas dynamics, especially re-entry gas dynamics involving shock-wave structure, formation, and attenuation.



construction of the shock tube were solved by cadets as independent research projects. Ten cadets participated in the design, check-out, and construction of the tube.

While the plans for the Seiler Laboratory were made in an austere environment, it was realized that the full-time scientific staff had to be large enough to provide a catalytic or "critical mass" effect. The manpower authorization was set at 37 people until November 1967, when it was increased to 39. Eighteen are Air Force officer scientists, and the remainder are supporting and staff positions. The annual Laboratory budget is approximately \$450,000.

The military scientist posts are filled by highly qualified officers, all of whom have advanced scientific degrees, mostly at the doctoral level. All of the scientific staff have been given faculty status as research associates or one of the professorial ranks. They teach cadet courses, and this activity is encouraged to the extent that it relieves a faculty member to do research. The teaching activity is encouraged because of the belief that teaching is just as desirable for a good researcher as research is for a good teacher. The policy has resulted in effective rapport between Academy faculty and the Seiler Laboratory staff and is partially responsible for attracting highly motivated cadets to participate in research projects. One scientific space in the chemistry division is used for rotating faculty members into the Seiler Laboratory for one-year tours.

Funding of faculty research in those areas of direct interest to the Office of Aerospace Research is possible through the Seiler Laboratory's resources. Faculty members may propose projects for support in a manner similar to proposals made by faculty members of civilian schools to the AF Office of Scientific Research, except that support is limited to providing equipment, supplies, and travel if absolutely necessary and does not include salary or indirect cost. This kind of support is provided to a number of faculty members each year. Where interests of the faculty and Laboratory are closely allied, it is possible to exchange individuals between the Laboratory and faculty.

The Seiler Chemistry Division has two adjacent laboratories which became operational in March 1964, a synthesis laboratory and an instrument room. The synthesis laboratory is a conventional "wet" chemistry laboratory with working spaces for six chemists. It is well equipped with the conventional utilities and has its own air supply separate from that of the remainder of the academic building. Most of the specialized chemical instruments are maintained in a separate instrument room, which is well equipped for the size of the activities of the Seiler Laboratory. Access is also available to the instruments of the Academy Department of Chemistry in a nearby laboratory.

The achievements of the program in the form of sound basic chemical research are rather noteworthy in spite of the short time the Laboratory has been in existence. The work in chemistry was reoriented about a year ago in order to relate more directly to Air Force needs. Even in this short time the Seiler Chemistry Division has managed to achieve some significant results in the new areas of chemistry that have been undertaken: electrochemistry and organometallic chemistry.

The AF Aero Propulsion Laboratory is seeking new ways of developing high-energy batteries that will operate at temperatures ranging from just above ambient to several hundred degrees centigrade. This need, plus the fact that other DOD agencies have similar requirements for high-energy fuel cells, motivated the Laboratory to enter the field of electrochemistry.

A study is being made to demonstrate the feasibility of using aluminum as the fuel in a fuel cell or battery. Aluminum is inexpensive, light in weight, and its compounds are characterized by large negative heats of formation. From these considerations, aluminum is an ideal choice for use in a fuel cell. It has in fact been the subject of many investigations for a similar purpose. However, the unique feature of this work is that a molten mixture of aluminum chloride and sodium chloride is being used as the electrolyte. Sufficient progress has been made in the work to prove the feasibility of the concept.

The second new area of research is organometallic chemistry, and its selection was based on the Air Force's requirement for stable polymeric materials. The Air Force Materials Laboratory through meetings and seminars indicated several areas where basic chemistry research is needed to help solve critical materials problems.

Prior to our entry into the fields of electrochemistry and organometallic chemistry in early 1967, research here had been quite varied and successful although less directly related to short-term Air Force needs. One of the most active areas was investigation of structure and reactivity in phosphorus chemistry. Research is still going on in this field, though at a much lower level of effort than previously.

The Seiler Aerospace Mechanics Division conducts research in applied mathematics, with emphasis on system optimization and control. Here the prime objectives are the development of mathematical models of physical systems and the development of mathematical and computational procedures for the optimization and control of such systems. This research includes studies of the effects of randomness in systems, such as might be encountered by aircraft or missiles subject to random gusts or disturbances, and in the detection of signals in the presence of noise. It includes studies in nonlinear and adaptive control of systems, with the aim of designing autopilots and control systems for advanced aerospace vehicles. It emphasizes computational procedures in optimization, such as those that



might be required for the optimum steering or guidance of aerospace vehicles.

In the area of adaptive and nonlinear control a notable achievement was made in a study on the control of unstable mechanical systems. They constitute a class of dynamical systems that have been of increasing interest to control-theory engineers over the past decade. The most noteworthy example of such a system is a steerable rocket vehicle during its launch phase. Aerodynamically unstable at low speeds, such a vehicle requires a sophisticated control mechanism to insure that it follows the desired trajectory. The present tempo of successful launches and missions indicates that sufficiently sophisticated controls have been designed for today's vehicles; but it is not evident that contemporary tech-

niques will suffice for the future. For example, the continuing stress on maximizing the payload/booster mass ratio indicates that future missiles may be significantly more flexible than those presently in use. This eventuality would seriously compound the control problem, for then the guidance system must not only maintain vehicle attitude and adherence to the desired track but must also control the complex interbody motions allowed by flexibility.

An aggressive effort has been made by the Seiler Laboratory to apply its knowledge and competency in optimization techniques to Air Force problems. As a result it has acted as a consultant to the Air Force Avionics Laboratory on their "most wanted item" in orbital transfer guidance, to the Air Force Flight Dynamics Laboratory on an optimal control prob-

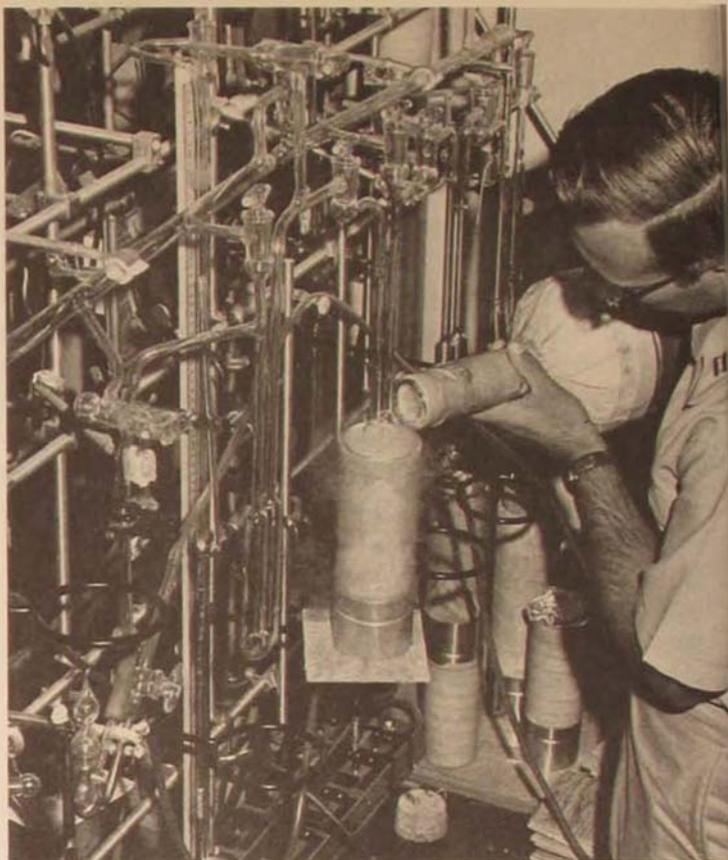
Computer Division

Personnel monitor the tape drive, card reader, and output card punch of the Burroughs B5500 digital computer, which operates on three shifts to meet the demand of hundreds of cadet programs each day, plus fewer but more complex problems for the Academy faculty and the Seiler research staff. . . . The course on the analog computer is a requirement during the Third Class year.



Research in Progress

To separate and isolate a volatile reaction product in the synthesis of carborane compounds, a preparatory step is the cooling of a collecting trap with liquid nitrogen. . . . In studying electrochemical processes in fused aluminum salt electrolytes, a staff member inserts a thermocouple lead into the furnace used to melt salt mixtures. . . . A researcher explains problems that must be solved in achieving a realistic computer simulation of engagements between tactical aircraft and missiles.

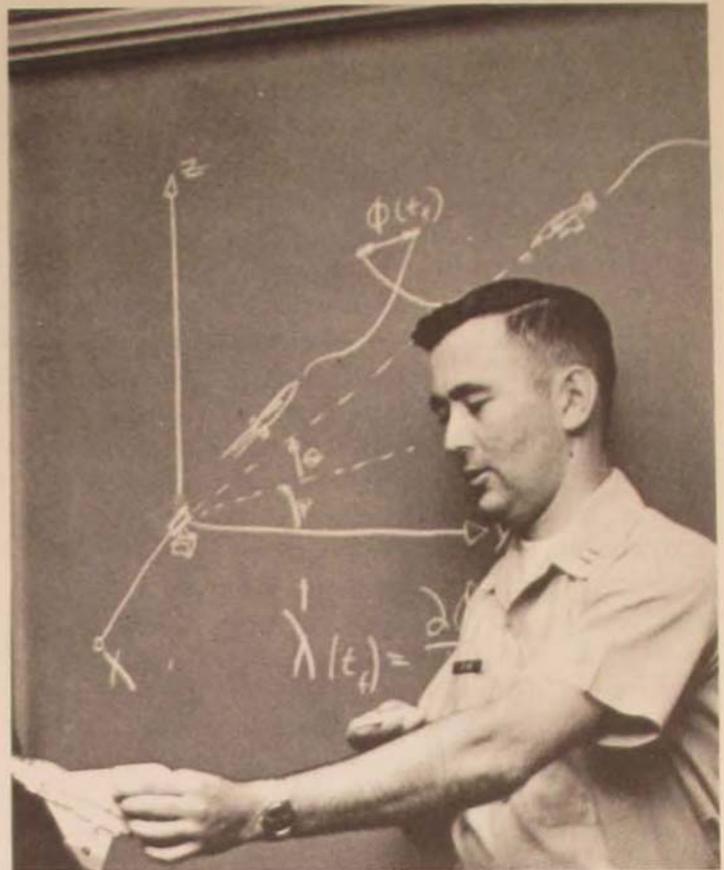


lem, to the Systems Engineering Group of Aeronautical Systems Division on the determination of optimum intercept and evasion trajectories for fighter-interceptors, and to the AF Armament Laboratory on the analysis of tactical aircraft-missile engagements.

The study of tactical aircraft-missile engagements was the result of a memorandum from Director of Defense Research and Engineering to the Assistant Secretary of the Air Force for Research and Development. The subject of the memorandum was "Proposed Initiation of an Analysis of Optimal Aircraft-Missile Evasion Tactics." The office of primary responsibility for the study was established in Hq USAF, with the AF Armament Laboratory as the project manager and the Seiler Laboratory as an active consultant. The study includes the support of a number of research projects of Academy faculty and cadets. It consists of the analysis of air-to-air combat for aircraft and of evasion tactics for aircraft pursued by surface-to-air or air-to-air missiles. The goals of the study are the quantitative

description of maneuvers, the development of new tactics, and the determination of quantitative measures of the effectiveness of various parametric improvements in either missile or aircraft design.

Significant results have been obtained so far in the development of a methodology that includes modeling, verification of the models, etc., for future computational efforts in problems of optimal pursuit-evasion. Insight has been obtained on the structure of optimal evasive maneuvers. Worthwhile progress has already been made on the problem of how to turn an aircraft in minimum time and how this maneuver applies to air-to-air combat. Since the results are of a quantitative nature and prescribe precisely how to perform certain maneuvers, they are of considerable value to simulation models of air-to-air combat. This research program has also produced some novel ideas on fighter armament, target tracking, and cockpit displays. Results of this research have been discussed with members of the Fighter Weapons School at Nellis AFB,



Nevada, and the Interceptor Weapons School, Tyndall AFB, Florida, and they will be introduced into aircrew training and instructional texts where appropriate.

The work discussed so far is an application of optimization techniques to combat for which it has been assumed that the strategy or guidance laws of only one of the combatants is completely known. This situation is known as a one-player game in the theory of differential games. A more difficult game to analyze is a two-player game in which each combatant seeks to optimize his strategy. A current study consists of the analysis of a two-player differential game, a pursuit-evasion problem of an aircraft and a missile. This study emphasizes the very practical situation of time delays in the processing of information on the positions and velocities of the opponents. Naturally due to processing delays, a pilot or his computer does not know instantaneously the activities of his opponent. Similar situations exist for the opponent. Results from our study will be directly applicable to

improvement in the design of missile guidance systems.

The establishment of a research and educational computer system was proposed to Headquarters USAF in a Data Automation Proposal dated 1 November 1962. The concept was approved and acquisition authority was granted on 20 February 1963. As a service facility of the Seiler Research Laboratory, a Burroughs B5000 computer became operational in June 1964. In January 1965 it was modified to the B5500 configuration.

In addition to computer processing support, technical programming assistance was provided during 1965 in the development of programs to schedule classes at the Academy and to study incentive contracting for the Space and Missile Systems Office.

Initial investigation and experience with remote consoles for programming, problem-solving, data storage and retrieval, and computer-assisted instruction are being accomplished by use of a JOSS Console of the RAND Corporation, a teletype console to the Bur-

roughs B5500 computing system at the University of Denver Research Institute, and six teletype consoles to the General Electric 635 Computing System at the Rome Air Development Center, Griffiss AFB, New York. This early experience has been most encouraging and has afforded a variety of applications and capability. Use of the B5500 terminal to Denver permitted a familiarity with the present capabilities of the B5500 Datacom Operating System. Additionally, it provided a means for exploring several conversational languages and a basic tutorial logic for programmed instruction. Joss was used extensively by Seiler research scientists, as well as Academy faculty and cadets, for problem-solving applications as well as one-time computations. The Rome terminals, installed in November 1967, have been used by the Academy for a controlled experiment in teaching computer programming to cadets in time-sharing mode versus conventional batch processing. The appropriate role of time-sharing within this educational and research environment is becoming clearer, and efforts are now under way to define the degree, applications, and specific requirements for devices and systems.

In 1967-68, the Computer Division provided support and services each term for 23 Academy courses, 7 of which were in computer science. Approximately 1200 cadets were using the computer for computer science and other scientific and engineering courses in the fall and spring. In addition, a variety of research projects by Seiler research officers and Academy faculty and cadets were furnished computational support. Among current projects which require use of the Seiler Laboratory computer are the analysis of tactical aircraft-missile engagements, shock-tube data reduction, simulation of human eye move-

ment, optimal control problem studies, and computer generation of molecular structures and actions to be animated on a cathode-ray tube. Academy staff and faculty research projects include orbital trajectory studies, development of a list processing language, wind-tunnel data reduction, statistical studies, simulation of the growth of molds, modeling historical events and situations to analyze and predict future events, investigation of higher-order programming languages, and economic analyses. Present plans call for the addition of a number of remote consoles this winter. By 1971, increased activity (including the addition of time-sharing) will cause the computing capacity available in the B5500 to become inadequate. Consequently, plans for a follow-on computer system are now being developed.

Plans for the Seiler Research Laboratory envision a stabilized level of effort and a budget with only modest increases and occasional special funding for updating equipment to provide a stable, modern, and fertile environment in which to perform relevant research. The emphasis is and will remain on quality. It was hypothesized in 1962 that this OAR laboratory could be manned with officer scientists, could accomplish worthwhile research, could secure cadet participation, and could improve the opportunity for research among the faculty. In the first six years of operation, the Seiler Laboratory has succeeded on all counts. By 1971 the Academy will have completed its expansion from 2500 to 4400 cadets, with a corresponding larger faculty. The catalysis provided by the small full-time research staff of the Seiler Research Laboratory should continue to stimulate that larger faculty, much as it does today.

Frank J. Seiler Research Laboratory, OAR

Shutdown

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the final verdict.

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President Truman's dismissal of General MacArthur was infinitely more than a dispute between two highly placed men. It climaxed a disagreement over strategy involving the peace of the world. The intensity of worldwide interest in the event reflected its importance. To bring all aspects of the crisis into focus and assess their significance, NEWSWEEK is devoting a special section to it. Following is an index of this section.

	Page
What the President did.....	22
What Congress did.....	23
The nation's reaction.....	24
The political outlook.....	24
Ernest K. Lindley's opinion.....	25
Raymond Moley's opinion.....	100
The rival strategic concepts.....	26
Japan and Europe reaction.....	28
The outlook abroad.....	32

THE UNITED STATES IN KOREA AND VIETNAM

A STUDY IN PUBLIC OPINION

MAJOR PHILIP D. CAINE

World Report
WASHINGTON, D. C.

WAR FOR ASIA?

ge the U. S. directly, and they hard when attacked at sea. The and Moscow get the message.

ghter-bombers and interceptors as-
led in a matter of hours on fields
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alerted as far away as Hawaii. The
Seventh Fleet moved powerful
into position to deal with any kind
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ary power was described as "im-
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failed to show up to counter U. S.
il operations in the area.
lear warning. U. S. behavior, all
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id on a decision to make sure the
munists understand that the U. S.
ing patience in Southeast Asia—
means business there.

with superior force of its own. Their bluff called the visible reaction of the Communists... to back away from an all-out fight. The same had happened at the time of the missile crisis in Cuba when the Russians backed away.
Why did Reds attack? Then... the attack made by the Communists... the first place?
The answer to that key question... and an analysis of what yet lies... is given in a dispatch by Robert... tin of the International... News & World Report... has fol-
lowed the war in Vietnam from its be-
ginning. His report:
North Vietnam... most certainly en-
couraged and... by Red China,
challenged the... military
sphere—on the high seas... the
Communists could not possibly win.
The nature of the naval incidents in-



THROUGHOUT the course of her history, the United States has been involved in numerous wars with seemingly different objectives and end results. If, however, one takes a close look at these conflicts, they all emerge, in one way or another, as crusades. The only two wars the United States has fought that were not of this mold have been the undeclared wars in Korea and Vietnam.

This new type of war, in terms of objectives, has presented a number of problems for the American people, for it has injected into their ideas of warfare a strange, yet very old, concept. This is the Clausewitzian dictum that "war is not merely a political act but a real political instrument, a continuation of political intercourse, a carrying out of the same by other means."¹ In other words, Americans have been thrust into the old world situation of fighting a limited war, a war that is primarily political, and thus a war that is alien to their traditional way of thinking about this interruption of the normal progress of human events.

If the conflicts in Korea and Vietnam are categorized as limited wars, the role of politics must be vitally considered. Limited war emerges as the prime example of political war, for military considerations are, for the most part, secondary. And it is the United States, among the major powers of the world, that has the most difficulty reconciling itself to this type of war. One of the key factors in this inherent difficulty is the great amount of weight that democracies place on public opinion, which, after all, determines who shall and who shall not govern. It is the public that has the most difficulty coming to grips with the whole concept of *Realpolitik* in foreign affairs.

In any comparison of the wars in Korea and Vietnam, one must take into account several striking differences between them. The Korean War broke out suddenly, and the United States went to a position of complete involvement and active combat almost overnight. Vietnam came on slowly and over a long period of time. American forces were committed in large numbers immediately in Korea, whereas the force buildup was very

gradual in Southeast Asia. The basic type of war was also quite different. Although Korea was a limited war, it was a conventional conflict in terms of definite battle lines, generally age-old tactics, army fighting army in a defined battle zone, territory being either under the complete control of the United Nations forces or the enemy, and other obvious ways. Vietnam, on the other hand, has presented the American people with what appears to them to be a new type of war, although it is in fact as old as warfare itself, both throughout the world and in America. It is a war without army facing army, without conventional battle lines, and without areas that are completely controlled by one side or the other. These considerations radically color public opinion.

The objective of the war was also different in each case. In Korea, it was to drive the aggressors back into North Korea and occupy that portion of the country as well. This objective was later modified to ridding South Korea of the military power of the North. In Vietnam, on the other hand, the objective is to make a country safe for the people to freely choose and live with their own government.

The Korean War also differed from the Vietnam conflict in the vital respect of international response. South Korea was a member of the United Nations; that organization formally recognized North Korea as the aggressor and called upon its members to aid the beleaguered South, which did receive material and/or moral support from a large percentage of U.N. members. Vietnam, in contrast, is being fought outside the U.N. by a largely American force, and the United Nations has withheld backing or condemnation.

Finally, the Korean War was waged when memories of World War II were still fresh and by a generation that knew war with all its ramifications. Vietnam is far removed from a major conflict and it most directly affects a segment of the population that was not even born until after World War II. Overall, then, it seems that Korea was in many ways like the rest of the wars which the United States had fought, while Vietnam is different in almost all respects. These factors, too, color public response.

The Korean War came as a sudden shock to the American people. Their initial reaction was to ask where Korea was, what language the people spoke, and what they looked like. According to *Time* magazine, there was no doubt in the mind of the man on the street who was behind it all. It was obviously the Russians, in a move to accomplish such possible purposes as to test American strength and determination or to force the United States to let Communist China into the United Nations.²

Americans reacted quickly and soon threw themselves, at least in spirit, behind the United Nations effort. A poll conducted by the National Opinion Research Center in June 1950, immediately after the war began, found that 81 percent believed the United States had done the right thing by going into Korea.³ Most respondents also believed it would be a short war, 67 percent indicating it would last one year or less.⁴ War had not been far from the minds of many people for some time prior to Korea, however, for in May 1950 *Public Opinion Quarterly* noted that 57 percent of the Americans polled indicated that the United States would be involved in a war within five years.⁵

The immediate call was for preparedness, although in March 1950 a poll summarized in *Public Opinion Quarterly* found that 59 percent of Americans believed our military spending was adequate or excessive.⁶ Almost every periodical examined commented on the sad state of our military machine in the days following the outbreak of hostilities, and by August the willingness to increase taxes to support a larger military was evident in 70 percent of the people, whereas only 14 percent had supported such a move in November 1949.⁷

Over all, the first reactions to the Korean War were approval and support, both from the press and from the public. According to opinion polls, from 65 to 81 percent supported the government position and believed that the United States had done the right thing by moving into Korea.⁸

The great ardor of Americans was soon dampened by events in Korea. *The Reporter*

phrased it well when it found Americans confused as to why an American army, led by no less than General Douglas MacArthur, could be so constantly outmaneuvered and defeated by an Asian foe lacking in recent combat experience.⁹ This sentiment was also evident in public opinion polls as the percentage of those supporting our entry into Korea dropped to 65 percent, according to the American Institute of Public Opinion.¹⁰ The dark days of the Pusan perimeter were replaced on 15 September by the U.N. forces' landing at Inchon, a maneuver which *Time* found, in its seven-page coverage of the event, to be in the great American tradition and brilliantly successful.¹¹ The American people evidently thought so too, for the percentage approving our intervention in Korea jumped back to 81 percent.¹² The results of this landing and the ensuing operation, most people believed, would soon end the war and bring the boys "home for Christmas."

Once again Americans were subjected to a rude shock. In its 13 November 1950 issue *Time* noted that a few Communist Chinese troops had been captured in Korea and further speculated about the possibility of Chinese intervention, a move which it believed would threaten to bring on World War III.¹³ One week later the *New Republic* also brought this situation into focus but tended to downgrade the power of the Chinese.¹⁴ It would seem that most Americans did not share the view of the *New Republic*, for the percentage of those who thought we had done the right thing by going into Korea dropped rapidly to about 55 percent in the Survey Research Center polls. As the Chinese intervention turned into a rout of the U.N. forces, the public continued to lose its enthusiasm. By February 1951 those approving our action in Korea dropped to 39 percent.¹⁵ At about the same time a poll by the *Public Opinion Quarterly* found that 66 percent believed the United States should pull out of Korea.¹⁶ Additional evidence of reaction to the Chinese threat was apparent when 73 percent of those polled felt that if the U.N. forces got to the 38th parallel again they should stop there. This compares with 64 percent who had favored going on

into North Korea in October 1950.¹⁷

Certainly the frustration and confusion of the American people were at no time during the Korean fighting more evident than when President Truman dismissed General MacArthur. The whole episode was a great disillusionment to Americans and brought into sharp focus the questions of foreign policy, containment, Asian policy, and related issues. For not only did the man in the street have some misgivings about his nation's being involved in Korea, he now wondered about the military and the Administration: Just who was right, the General or the President? Anyone following the news media during this period certainly got mixed opinions. The *New York Times*, for example, carried numerous articles on both sides of the issue. It noted that the world press, in general, approved the action of President Truman, while the American people rallied behind the dismissed General. Most Americans did not really examine the issues, according to the *Times*, but rather based their judgments on the personalities of the men involved. Ten days after Mr. Truman took his action, the *Times* concluded that "the man in the street and the woman in the home take the side of the dismissed General while the press leads a debate on the issues."¹⁸ *Newsweek* shared this conclusion as it found the nation "overwhelmingly pro-MacArthur" a week after his dismissal, but a month later it noted that its mail was less than two to one in favor of the General.¹⁹ Several major periodicals, the *New Republic* for one, applauded the ending of the MacArthur reign and believed that our efforts to achieve peace in Korea, without insisting on total victory in the MacArthur manner, would now go forward much more rapidly.²⁰ Over all, one can conclude that, at least in the mind of the public, MacArthur came out on top. A poll by George Belknap, reported in *Public Opinion Quarterly*, found that after the smoke had cleared 56 percent supported MacArthur while only 26 percent took the Truman side.²¹

From this point in the Korean War until the armistice agreement, on 27 July 1953, public support of the conflict varied with the success or failure of the peace talks and cease-

fire proposals. For example, in November 1951, when a cease-fire line was agreed upon, 55 percent of those polled by the National Opinion Research Center supported United States entry into Korea, while in October 1952, when negotiations were broken off just prior to the American elections, support was only about 38 percent.²²

What, then, can be concluded about the American public during the period of the Korean War? First, it seems obvious that they like to back a winner. If one charts the course of American public support of the war against the fortunes of American forces, he finds that there is almost a direct correlation. When things were good, public backing was high, as in the days following the landing at Inchon. Conversely, when things looked bad, as they did after the intervention of the Chinese, Americans began to wish they had never become involved in the whole mess.

Second, although the American people are great backers of the underdog and champions of human rights, it does not take long to dampen this spirit if things start to go badly for their cause. At the beginning of the war Americans praised the Administration for its strong and courageous stand, but less than six months later a very significant percentage were quite sure that our intervention had been a gross error. This reaction, I would suggest, is in the tradition of American Asian policy, which has always involved a great deal of talking and pious hoping but little concrete action and a concerted effort to run no risks in that part of the world. This point is illustrated by a poll taken in January 1951, when things did not look at all good in Korea. The question was asked, Which is more important for the United States to do: try to keep the rest of Asia from falling under Russian control (note here the assumption, which continued throughout the war, that it was really a Russian matter); or try to stop Russia from taking over Western Europe? Only 9 percent favored Asia, while 49 percent favored Europe and 28 percent regarded them as equals.²³ The American patience seems to wear thin much more rapidly in Asia than in Europe.

A third conclusion that can be drawn is

the degree to which American foreign policy, especially when related to war, is seen as a personal policy of the President and identified directly with him. When the course of public opinion about the Truman Administration is traced, its popularity and support seem to vary in relation to the events in Korea. This facet of public opinion quite probably had some influence in turning out the party of Mr. Truman in the 1952 elections in favor of the opposition.

Fourth, I would suggest that Korea demonstrates the degree to which the people of the United States become attached to great military leaders and tend to follow them through thick and thin. This was very evident in the press when it was announced that General MacArthur would take over command in Korea. There was a feeling that now everything would be all right. And even when the Chinese intervened and the General got into problems with the Administration, it was the longtime hero MacArthur who came out on top in the public eye and Mr. Truman who was the culprit. This in spite of the fact that the General had not been really too successful in Korea and had advocated a policy that was opposed by almost everyone in a position of responsibility, from the President down through the Joint Chiefs of Staff to a large percentage of knowledgeable commentators on Asian affairs. In 1952 the American people again displayed this characteristic when they turned in record numbers to another war hero, General Eisenhower, to guide them through the treacherous times.

Americans had entered Korea with high hopes, idealism, and confidence in their ability to shape the course of the hostilities. Yet, when it was over, the National Opinion Research Center found that only about one-third of the people believed that the United States had come out on top, one-third believed that the Communists had got the better end, and one-third that neither side had. In September 1953, when President Syngman Rhee of South Korea threatened to break the truce, less than one-third of those questioned were ready to back him up with American forces.²⁴

These figures suggest one more aspect of

the American character at the time of the Korean War. The high hopes and noble aspirations of Americans seemed to fade when what initially appeared to be a victorious crusade got bogged down in the many factors involved in limited war. It was obvious that, as the Korean conflict dragged on, more and more people questioned its advisability, its course, and the wisdom of Americans for ever getting involved in the first place. An American soldier on the second retreat from Seoul no doubt summed up the situation that became and has become so frustrating for so many Americans. "It's the war we can't win, we can't lose, we can't quit." It's also the kind of war that we must learn to live with in this complex world.

AN ANALYSIS of public opinion on the war in Vietnam presents certain problems not found when dealing with the Korean conflict. These factors, of necessity, greatly influence any evaluation of Vietnam. First, it is a war that is still in progress. Thus opinions, ideas, and concepts are constantly changing, and what is true of public opinion today may not hold true tomorrow.

Second, each one of us holds quite definite views about Vietnam, and these represent all shades of public opinion. Because they are current opinions, we hold them quite dear, and thus it is difficult to deal with this war objectively.

Third, the whole complexion of the war is so subject to change, as events in recent months demonstrate, that observations made on the basis of public response may lose their validity overnight. For these reasons, I am dealing with Vietnam only through the middle of 1967. This way at least some historical perspective can be applied to that conflict.

Americans were generally more aware of Vietnam than they were of Korea before United States involvement in these areas came about. As early as 1950 several major periodicals and newspapers, such as *Time* and the *New York Times*, were carrying rather prominent articles on the French position in Indochina. These accounts did not relate the area

to any specific future problems for the United States, however. Although the name and probably the location of Vietnam were familiar, as late as June 1964 a survey noted that one out of four Americans had heard nothing of the fighting then going on in that country.²⁵

This situation, coupled with the relatively slow rate at which the United States became directly involved, had a definite influence on the course of public opinion. There was no sudden call to the colors or seeming national crisis, and thus from the very beginning of the Vietnam situation public opinion was more divided than at the time of Korea. For example, in May and June 1964 a poll published by the Council on Foreign Relations found that about 75 percent of Americans favored giving aid and training to the Vietnamese troops fighting Communist rebels. The actual use of American forces drew a fifty-fifty split, and the ratio favoring a neutral Vietnam (as one country) was about two to one. The stronghold of opposition at that time, as it still is today, was the young segment of the population.²⁶

The turning point of American involvement in Vietnam came in 1964. During that year troop strength was significantly increased, and bombing began in retaliation for the raids on United States ships in the Gulf of Tonkin. Further key developments took place in 1965 as the number of troops again increased, American soldiers began actually fighting against the Viet Cong, and U.S. Air Force planes hunted out targets in North Vietnam.

In January 1965 a Gallup poll found respondents believing four to one that the South Vietnamese were being defeated, two to one that they could not form a stable government, but also two to one that the United States was right in becoming militarily involved.²⁷ As the year progressed, public opinion came to favor the American commitment even more. *U.S. News and World Report* published the results of a Harris-CBS poll in December 1965 which found that 65 percent favored keeping our forces in Vietnam while 20 percent believed they should have been withdrawn before they became militarily involved. The same survey reported 58 percent favoring an

increase in the bombing of North Vietnam and 21 percent wanting it stopped. A whopping 82 percent believed that American troops should not be withdrawn to precipitate peace negotiations.²⁸

The most significant poll of 1966 on the question of Vietnam was completed in early March by the National Opinion Research Center at the University of Chicago, in cooperation with a group of political scientists at Stanford University. This very extensive evaluation, published in the *New York Times*, examined numerous aspects of public opinion. Several conclusions are significant. Over all, fragmentation of opinion was quite evident. While 88 percent would negotiate with the Viet Cong to bring about a truce, only 52 percent would accept them as part of a new government. When asked about withdrawal from Vietnam, 81 percent were opposed to an immediate evacuation and 60 percent favored all-out war over leaving. On the same subject, 56 percent opposed even a gradual withdrawal and 49 percent felt the then present situation was better than either all-out war or evacuation. At that time the constant "hawks" were about 6 percent and constant "doves" 14 percent in the survey sample.²⁹ Americans seemed committed in Vietnam in one way or another, and a significant proportion of the citizenry was well aware of this.

These 1966 prevailing views are little modified when compared to the trends of the first half of 1967. For example, in February 1967 a Harris poll found that 55 percent believed intensified military activity would bring Hanoi to the conference table, 67 percent supported the bombing of North Vietnam, and 71 percent saw the war as a long affair.³⁰ A similar poll, published in *Newsweek* in July 1967, found only 6 percent favoring withdrawal from Vietnam and 72 percent supporting the bombing of the North.³¹

Meaningful conclusions are not as obvious from public opinion on the war in Vietnam as they are in regard to the Korean War, but several ideas can still be advanced. First, although a definite war-weariness became evident as the Korean conflict proceeded, this same result has not seemed to manifest itself

to as great degree in the Vietnam war. This factor can perhaps be partially explained by the fact that peace was an on-again, off-again matter with Korea but did not enter the picture in Vietnam before 1968. I would suggest that if a peace negotiation situation similar to that in Korea were to become a fact in Vietnam the change in public opinion would be quite similar.

Second, the gradual rate at which American involvement in Vietnam has proceeded and the relatively slow rate at which escalation has taken place have tempered American reaction. Each move has generally been accepted by a majority of Americans, and the Yankee trait of success has come to bear as the people look at the war. "We have never been unsuccessful in a war and we are not going to start now" quite probably accounts for some of the trend evident in public opinion.

Third, the conflict in Vietnam, like the one in Korea, has become directly associated with the President who has had to fight it. Likewise, the general course of the Administration's popularity is significantly affected by the course of the war. Without doubt, Mr. Truman went through many of the experiences that Mr. Johnson is going through today.

Fourth, the question of great military leaders is not as significant in Vietnam as it was in Korea. There seem to be two reasons for this: In the first place, the prosecution of the Korean War was tied to General MacArthur, and military moves there were seen as his ideas and under his direction. In Vietnam, by contrast, the action is much more closely associated with the President and his Secretary of Defense. Thus, the great military commander has not emerged to the degree he did in Korea. Next, the reputation and stature of our commander in Vietnam were not made and established in the public mind prior to the war as were MacArthur's and Ridgway's in Korea. Thus, the course of the war in Vietnam has not been as closely tied to the military leader, nor have the expectations of the public been as great as in Korea.

Fifth, the high hopes of Americans that seemed to fade as Korea progressed have not suffered the same fate in Vietnam. It seems to me that the nature of the war accounts for this. In Korea there was a definiteness about battle lines, objectives, the enemy, and the course of the war that has not existed in Vietnam. As a result, there has probably been more confusion on the part of Americans about Vietnam and fewer well-defined objectives and related matters. This has enabled people to express themselves in terms of changing objectives, reaction to escalation, and other matters, rather than in a general war-weariness as they did in Korea.

Finally, the war in Vietnam has come closer than any event since World War II to placing Asia in a realistic perspective in American eyes and policy. The number one foreign policy issue in the United States today is an Asian one, and Europe is secondary. The situation in Vietnam is not seen as an aspect of a basically European situation, as was Korea. Both the nature of Vietnam and the changing view of Communist China have helped account for this, in addition to the lack of any really severe matters related to American national security in Europe.

DO KOREA AND VIETNAM, then, give us some lessons in the whole area of limited war? It seems to me they serve to emphasize that each limited war presents some common and some different characteristics, unique to that conflict. American public opinion responds to these different situations in diverse ways. This response is a part of the American character that cannot be predicted in all cases and many times is quite different from that expected. The makers of American policy must always be aware of this fact. Not to be aware can lead to fatal estimations of the American mentality as it relates to the phenomenon of limited war.

United States Air Force Academy

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3. William A. Scott and Stephen B. Witney, *The United States and the United Nations* (New York: Manhattan Publishing Co., 1958), pp. 78-79.

4. *Public Opinion Quarterly*, Vol. XIV, No. 4, 1950, p. 803.

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6. *Ibid.*, p. 596.

7. For examples of periodical comment see *New Republic*, 10 July 1950, pp. 5-6; *Time*, 10 July 1950, pp. 16-17; *The Reporter*, 15 August 1950, p. 25. Poll results noted in *Public Opinion Quarterly*, Vol. XV, No. 1, 1951, p. 189.

8. Scott and Witney, pp. 78-79; *Public Opinion Quarterly*, Vol. XV, No. 1, 1951, p. 170.

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10. Scott and Witney, pp. 78-79.

11. *Time*, 25 September 1950, p. 25.

12. Scott and Witney, p. 79.

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21. George Belknap and Angus Campbell, "Political Party Identification and Attitudes Toward Foreign Policy," *Public Opinion Quarterly*, Vol. XV, No. 4, 1951, p. 608.

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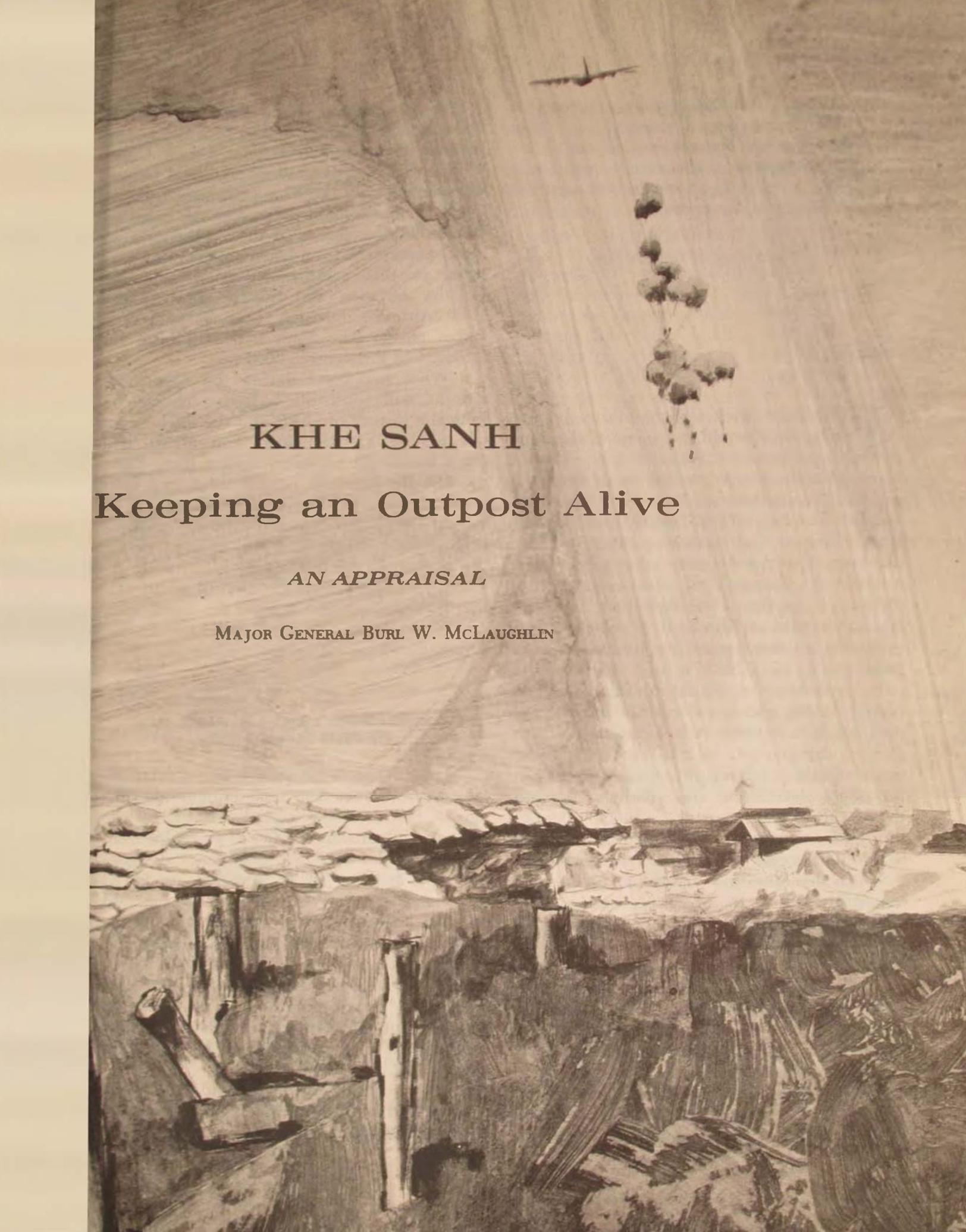
29. *New York Times*, 15 March 1966, pp. 1, 7.

30. *Newsweek*, 27 February 1967, pp. 24-25.

31. *Ibid.*, 10 July 1967, pp. 20-21.

We are indebted to Dr. M. H. Cannon, Air Force Academy Historian, for his cooperation in coordinating these articles from the Academy.

THE EDITOR

An aerial photograph of a military outpost, likely Khe Sanh, showing a stone wall, buildings, and a trench. A plane is visible in the sky, and a parachute drop is occurring. The text is overlaid on the image.

KHE SANH

Keeping an Outpost Alive

AN APPRAISAL

MAJOR GENERAL BURL W. McLAUGHLIN

On many occasions, resupply by air has saved a beleaguered outpost. . . . Often the difference between success and failure in an operation is the aircraft available to move supplies in, move the wounded out and redeploy the troops.

THE HONORABLE HAROLD BROWN,
Secretary of the Air Force

THAT the defense of the Marine base at Khe Sanh would prove one of the most important campaigns of the Vietnam war, militarily and politically, was a foregone conclusion from the start. Even before the siege was lifted on 8 April 1968, nearly three months after it began, Khe Sanh was being called a clear-cut victory, a dramatic reversal of earlier nonmilitary warnings of disaster and predictions of another Dien Bien Phu. The successful defense of Khe Sanh was maintained primarily by the dogged determination of a small group of U.S. Marines, supported by Army and Army of the Republic of Vietnam (ARVN) forces, and a massive and skillful application of air power, which included, as an integral component, tactical airlift. The demands for aerial resupply tested tactical airlift in its classic role and vividly illustrated that airlift is, and must be, an extension of the battle, not divorced in any way from the realities of success or failure of an engagement.

The evolution and operation of the sustained air lifeline to Khe Sanh were part of a shifting tactical situation not uncommon at the time in South Vietnam. There had been, since late 1967, indications of extensive enemy buildup below the western part of the demilitarized zone, the area around Khe Sanh, signaling the possibility of a major offensive. From the beginning of the northern monsoon season and throughout the Christmas truce, enemy activities increased in all parts of the Republic. The major threat appeared to be in the northern I Corps area, and Khe Sanh,

a strategic point on a vital North Vietnamese infiltration route, appeared to be a key target. In early January, an estimated two North Vietnamese divisions, 15–20 thousand troops, were reported in the Khe Sanh area, occupying the high ground surrounding the base. To counteract the threat in the northern provinces, several U.S. and ARVN units were airlifted to that area, including the 1st Air Cavalry Division and two brigades of the 101st Airborne Division. Marines and ARVN forces at the Khe Sanh base had been reinforced to a defensive 6000.

What happened during the next three months will constitute a lasting chapter in both the history of airlift and the final chronicle of the Vietnam war. This article will trace the decisions taken during those three months, the rationale behind them, and their consequences, in the hope of providing an insight into that chapter on the air resupply of Khe Sanh. Further, it will attempt to put the operation into proper perspective by revealing its impact on the overall airlift system in Vietnam and assessing the significance which the lessons learned will have on the future development of tactical airlift.

Evolution and Operation of the Resupply

On 21 January a rocket and mortar attack destroyed the Khe Sanh ammunition storage area, scattering shrapnel over half of the runway and preventing C-130 Hercules from landing. Under a tactical emergency designation (the highest airlift priority), six C-123 Providers were diverted from their scheduled missions, loaded with 26 tons of ammunition, and flown to Khe Sanh. They landed on the potholed runway, by the light of artillery flares, under heavy automatic weapons and mortar fire. Thus began the saga of Khe Sanh, which eventually ran into 78 days of emergency aerial resupply sorties to the embattled outpost.

At the outset the Commander, Seventh Air Force, then General William W. Momyer, directed the 834th Air Division, airlift head-

quarters for Vietnam, to begin a thorough analysis of the problems inherent in the unique situation at Khe Sanh, giving close scrutiny to all factors affecting airlift.

The resupply operation, at that time of unknown duration, would have to (1) guarantee uninterrupted air resupply regardless of weather, hazardous terrain, and enemy fire; (2) minimize the vulnerability of delivery air-

craft and aircrews; and (3) minimize load recovery problems for the Marines.

In addition to enemy activity, a major operational consideration was the weather. At that time of year the spring monsoon brought chronic fog and rain to northwestern Quang Tri Province. The particular geographical situation of the base compounded the problem. Even when visual meteorological conditions (VMC) prevailed in the surrounding area, frequently the runway was fog-shrouded below minimum instrument landing conditions each day through mid-morning. Khe Sanh's field elevation is 1500 feet above sea level; surrounding mountains tower 5581 feet on the north and an average of 3000 feet in other directions. A ravine on the runway's east end drops approximately 800 feet and acts as a trough through which prevailing winds carry the warmer, moist air to the airstrip. This is Khe Sanh's perpetual "fog factory" during the monsoon season, accounting for relatively short periods of ground-controlled approach (GCA) minimum visibility conditions each day.

This weather condition, coupled with daily mortar and rocket attacks that closed the runway, reduced the productive resupply day to approximately 2½ to 3 hours. Successive aircraft landings brought an increase in the intensity of the attacks, indicating the enemy's determination to destroy the aircraft on the ground.

By early February, landings had become extremely hazardous for both the jet-equipped K-series C-123 Providers and the larger, heavier C-130 Hercules. While any aircraft attracted mortar and artillery fire at Khe Sanh, the smaller Providers, requiring shorter runway space to land, were less susceptible to the intense small-arms fire than the Hercules. On 12 February all C-130 landings were suspended. Events culminating in the edict underscored the Hercules' special vulnerability on the runway in that environment: enemy fire destroyed a U.S. Marine Corps C-130 and hit one belonging to the Air Force, grounding it for two days before sufficient repairs could be made to enable its crew to fly it to Da Nang.

The suspension forced the obvious: the

Airdrop Glossary

ALCC	airlift control center
ARA	airborne radar approach
AWADS	adverse-weather aerial delivery system
CARP	computed air release point
CCT	combat control team
CDS	container delivery system
CEA	circular error average
DMZ	demilitarized zone
DR	dead reckoning
DZ	drop zone
GCA	ground-controlled approach
GPES	ground proximity extraction system
GRADS	ground radar aerial delivery system
ILS	instrument landing system
IMC	instrument meteorological conditions
LAPES	low-altitude parachute extraction system
LIT	light intratheater transport
MHE	materials handling equipment
PI	point of impact
POL	petroleum, oil, and lubricants
RAPCON	radar approach control
STOL	short takeoff and landing
TACAN	tactical air navigation
TALAR	tactical approach and landing radar
TALC	Tactical Airlift Center, Pope AFB, North Carolina
VMC	visual meteorological conditions
V/STOL	vertical/short takeoff and landing

primary method of resupply would be by airdrop, delivering ammunition, POL, and rations. Airland operations were reduced to delivery of cargo considered not airdroppable (special ammunition and medical supplies), troop deliveries, and evacuation of casualties. The C-130 and C-123K were designated for the airdrop role; the C-123K was designated as the airland vehicle, with the C-7A Caribou as backup as needed. In view of the Caribou's relatively limited carrying capacity and the extremely congested air traffic situation at Khe Sanh, C-7As deferred to the more efficient C-123Ks to get twice as much cargo on the ground for practically the same risk and effort.

development of the IMC technique

Our two major antagonists in this logistics drama—weather and enemy fire—were formidable obstacles throughout the entire operation. Climatology data indicated from the start

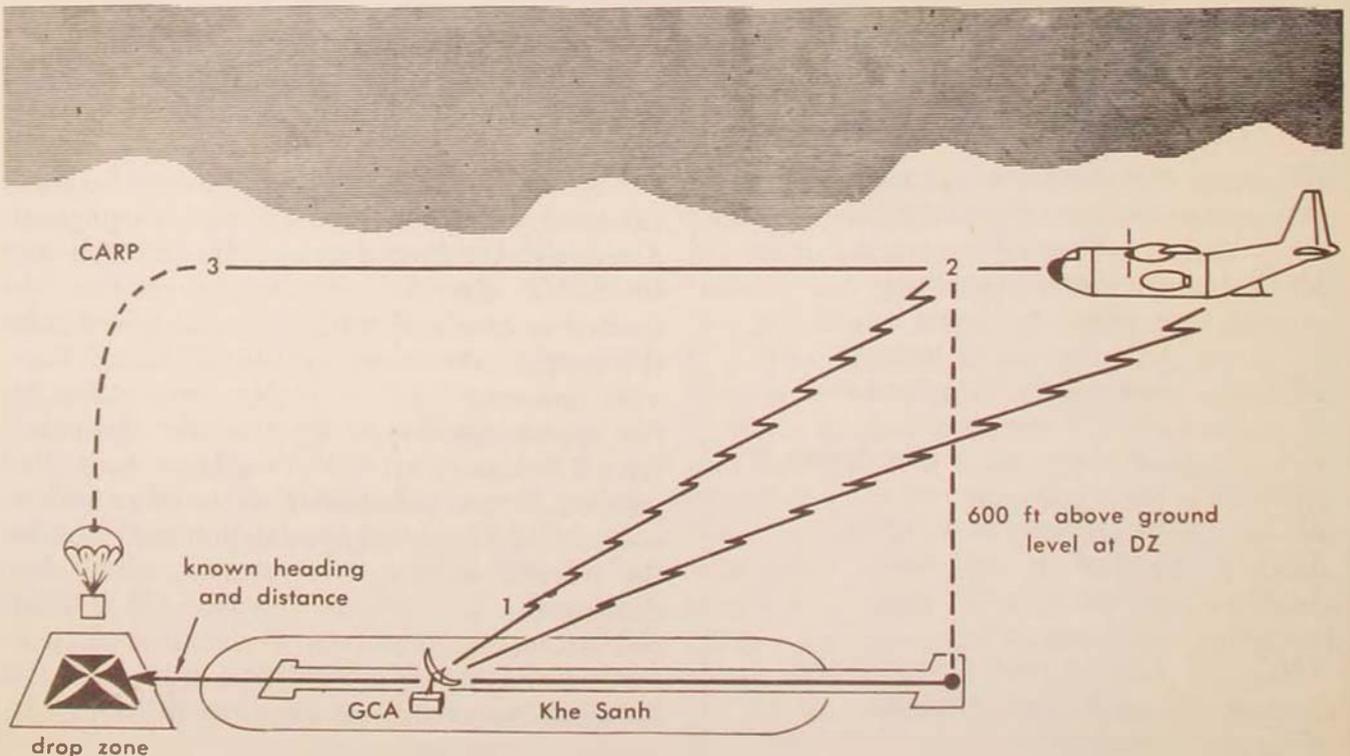
that there would be days at a time when the weather would be below minimum conditions. Thus, concurrent with the initial airlift sorties, planning for possible contingencies began. With airdrop a certainty as the primary mode of resupply, procedures had to be developed to drop in instrument meteorological conditions (IMC). To that date, no techniques had been established for dropping solely by instruments. Several techniques were, at the time, being explored, but none were operational.

A survey of Khe Sanh revealed the following:

—The drop zone was 300 x 300 yards, 200 yards shorter than the standard for container delivery system (CDS) drops. It was located outside the Marines' defense perimeter, 1000 yards from the west end of the runway and within three degrees of the runway heading.

—The runway was 3900 feet long and 60 feet wide, declining on a three percent gradient from west to east.

IMC GCA/Doppler resupply. (1) GCA directs drop aircraft to preselected point. (2) Aircrew effects precise steering and timing based on aircraft Doppler system. (3) Load is released.



—The airfield had GCA capability and a TPQ-10 radar site.

—Wind velocities in the Khe Sanh valley were extreme and unpredictable.

—The terrain was hazardous, rising steeply on three sides of the field, and enemy gun emplacements were on all sides.

—Turbulence was expected to be moderate.

An airlift planning session at the 834th Air Division resulted in several alternatives and, eventually, a formulation of the instrument procedures to be used. Dropping on the runway was ruled out because of the possibility of damaging the surface at a critical time and thus precluding any emergency air-land operations. The initial inclination was to have the GCA operator vector the aircraft to the computed air release point (CARP), about 600 yards short of the point of impact (PI) for CDS drops, with the ground controller providing a countdown to initiate the drop. A quick flight test, however, revealed that the GCA, because of design limitations, was incapable of vectoring the aircraft to a point located behind the radar itself, which in this case was the location of the CARP. The GCA could vector the aircraft to a point above the leading edge (threshold) of the runway, so a method of accurately steering the aircraft from that point to the CARP had to be resolved. Dead reckoning (DR) was ruled out; flight test proved the aircraft could be as much as 500 yards off track when using DR, which was totally unacceptable because of the size and location of the drop zone. Cross track was resolved by use of the C-130's Doppler system in the drop function. By combining the features of the GCA and the capabilities of the Doppler, the IMC technique was developed and put to immediate use.

In practice, the GCA operator vectored the aircraft over the threshold of runway 28 at 500 feet drop altitude and gave the crew a "mark." Ground speeds and winds were determined during the approach by direct readings from the Doppler instrumentation, and the desired course to the CARP was set into the Doppler instrument, establishing the correct heading. A precomputed timing sheet, based on a 130-knot indicated air speed, had been

devised, accounting for wind effect, providing the navigator the lapsed time from the mark point to the CARP, depending on ground speed. For example, at 135 knots ground speed, it took 24.8 seconds to fly that distance. The "green light" was given at the precise lapsed time, and a CDS drop performed. However, instead of using the standard pullup at the CARP, which is used in a visual meteorological condition, we decided that a smooth application of power combined with the effect of a load moving aft would adequately eject the containers and be more suitable for instrument conditions.

other planning

Although this IMC/GCA technique served as the primary method of instrument delivery, we had to plan for all possible eventualities. Clearly, GCA was the key to the functioning of the entire IMC technique. But it was vulnerable to incoming enemy fire, and airlift, as Khe Sanh's only means of supply, could not cease even for one day. A backup system had to be developed.

Fortunately, a TPQ-10 radar system, normally used to direct fighter strikes, was located on base and was operational. As in the GCA/IMC formulation process, initial flight tests investigated the TPQ-10's ability to vector the aircraft directly to the CARP. But the aircraft passed at such close proximity to the radar antenna that the antenna azimuth drive could not vector the aircraft down a predetermined glide slope; it could only position an aircraft at a point in space. Therefore, additional navigational aids were required, to guide the aircraft down the glide slope to the proper altitude at the runway threshold. Although Khe Sanh did have a tactical air navigation station, TACAN reception on C-130 aircraft is not considered reliable enough; and an airborne radar approach (ARA), using radar reflectors previously positioned along the runway, was not acceptable by itself. The combined inputs from the TPQ-10, TACAN, and ARA, with the addition of a radar beacon transponder and low-frequency beacon, however, provided an acceptable method of descent to

the threshold of runway 28. Since this method was not quite as accurate as GCA, we planned for level-off and drop at a slightly higher altitude (800 feet) to provide a greater margin of safety in the rough terrain. From the threshold, the same Doppler/time lapse procedure was used.

Yet even with this backup capability, further contemplation and planning had to be carried out for the not unlikely possibility of both GCA and TPQ-10 being out of commission at the same time.

We were familiar with efforts by the developmental community to provide the armed forces with a portable instrument landing system (ILS) called TALAR (tactical approach and landing radar). This system, with its compact, 35-pound transmitter, would have been ideal at Khe Sanh to replace a nonoperational GCA or TPQ-10. However, at the time, TALAR had not been fully evaluated and tested and thus could not be used at Khe Sanh.

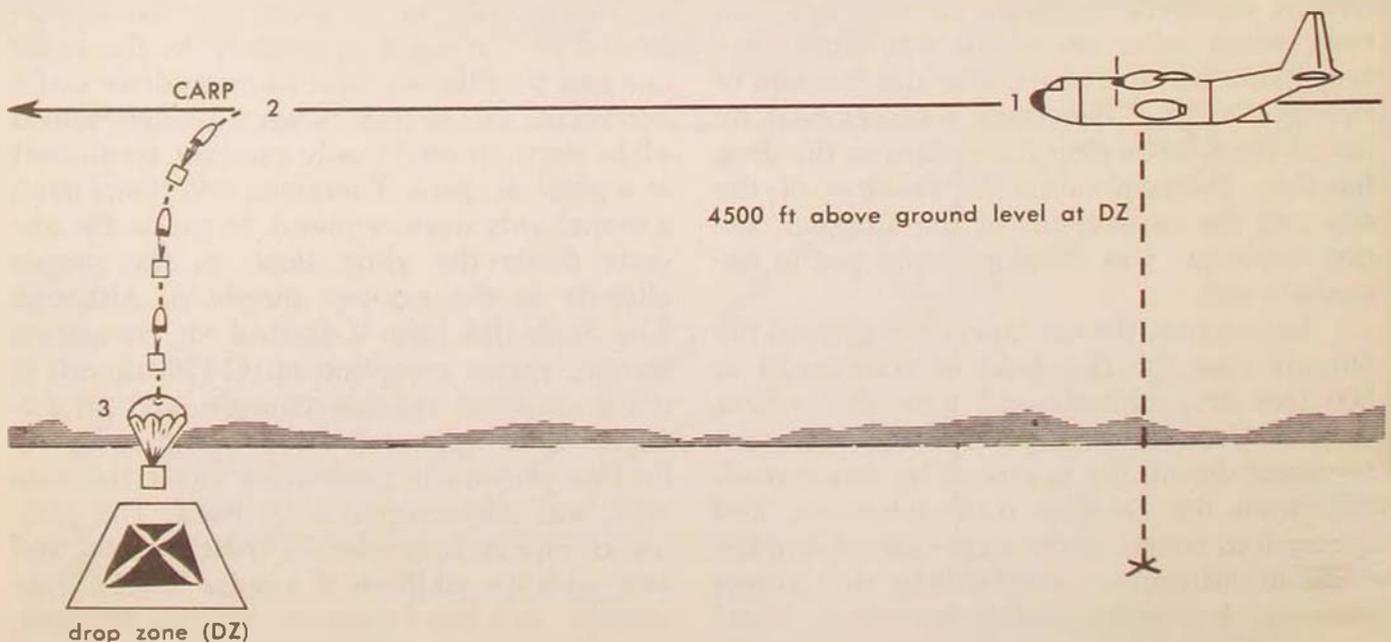
We also had the option of using a variation of the CDS technique called ground radar aerial delivery system (GRADS), a high-altitude drop system that was initiated in Vietnam and further developed at the Tactical Airlift

Center (TALC), Pope AFB, North Carolina, for use in adverse weather, darkness, or hostile ground-fire conditions. Several test runs were made using this system, also controlled by TPQ-10 ground radar. For Khe Sanh, we decided on a TPQ-10 located nearby, which would have vectored the aircraft over the CARP at approximately 4500 feet. Wind drift effects caused by dropping from the high altitude are minimized through use of delayed-opening parachute techniques.

Because of the large drop zone required, this was a last-resort technique, but, nevertheless, it could have been used to keep the supply line open.

The new IMC/GCA technique was initiated at Khe Sanh on 13 February when C-130s dropped 30 tons of supplies, and again the following day delivering 98 tons. On 17 and 18 February C-130s dropped nearly 279 tons of supplies, with a circular error average (CEA) of only 83 yards, under instrument meteorological conditions in which no other fixed-wing aircraft flew. As predictable, an enemy round's direct hit put the GCA out of commission on 19 February, and the IMC/TPQ-10 technique was put to immediate and success-

Ground radar aerial resupply system (GRADS). (1) TPQ-10 radar vectors the drop aircraft to computed air release point. (2) Loads release with parachutes reefed. (3) Parachutes deploy 500 feet above ground.





Anxiously waiting to board a C-123 Provider of the 315th Air Commando Wing at Khe Sanh, U.S. Marines crouch behind a metal storage box and along an off-loading ramp. Caution was essential, for C-123s were often greeted by enemy mortar fire. After cargo was offloaded, the men scrambled aboard with their gear.

ful use. The significance and value of the IMC drop procedures were borne out in the final statistics, which revealed that of the 496 C-130 CDS deliveries 38 percent were performed by the instrument technique.

extraction deliveries

At the time the IMC airdrop problems were being resolved, survival at Khe Sanh dictated that the Marines go underground for protection against rocket and mortar fire attacks. Because of a severe lack of bunkering material, the Marines requested an emergency delivery of 2 x 12 x 22-foot lumber, which was too bulky for A-22 CDS containers. The use of airland was ruled out for two reasons: the hazards of enemy fire and the lack of 463L equipment to unload the material once on the ground. Two other methods were available: heavy-equipment drop (modular platforms) and low-level extraction. Heavy drop was ruled out for the following reasons:

—The drop zone was too small for this tech-



nique, which normally requires 600 x 1000 yards as a minimum standard for one platform.

—Recovery of heavy loads outside the normal perimeter was impractical due to lack of adequate recovery equipment.

—Personnel breaking down the loads manually would be exposed to rocket and mortar fire. Additionally, recovery time would interfere with the continued delivery of CDS containers.

—The lack of adequate space inside the base to allow for heavy drop.

—The desire that the material be delivered as close to the proposed bunker sites as possible.

—Increased dangers from enemy fire, since at the higher drop altitude (1100 feet) the CARP would have been within line of sight of enemy positions in the hills, thus exposing the aircraft to more severe fire.

Low-level extraction provided the most suitable solution. The west end of the runway was selected as the extraction site, and the low-altitude parachute extraction system (LAPES) was put to use on several occasions, guided down to landing minimums by CCA. However, because of a limited number of LAPES delivery components in the airlift system, it was clear that a large-scale use of LAPES was out of the question. Consequently, we began an Air Force-wide search for other available low-level extraction systems. One, the ground proximity extraction system (GPES), was found (in storage since 1966) and shipped in two days to Vietnam. The Army consented to rig the GPES loads, aircrews were expeditiously trained, and the arresting gear was installed at Khe Sanh. As the use of GPES increased, the use of LAPES decreased until finally, toward the end of the resupply operation, LAPES was entirely replaced by GPES.

In the final analysis, GPES proved more suitable for Khe Sanh than LAPES, and the advantages of each warrant discussion. The drop platforms in LAPES are free-flying objects for a short period of time; GPES is never that, for the load is always attached to either the airplane or the ground, providing a positive, controlled extraction system ideal for the confined and populated area at the west end of

Khe Sanh's runway. With GPES, irregular delivery techniques do not result in uncontrollable loads: if the hook does not engage the cable, the load simply will not extract. Once the GPES load is extracted, the arresting cable stops it in the same location every time, permitting efficient recovery and breakdown—important factors under Khe Sanh's heavy enemy fire.

There are other advantages to GPES: it uses a standard modular platform, not the LAPES special sled, which was in short supply; there is a constant delivery altitude with GPES, versus the possibility of a high delivery with LAPES.

At Khe Sanh, the effectual recovery of delivery components also favored GPES delivery, with its comparatively simple process of picking up the hook, belly band, and clevises and quickly throwing them aboard the next airland aircraft as it completed its offload. The components were flown to Da Nang and used on following loads. For LAPES drops, the heavier parachutes had to be dismantled, bundled up, and put on board the next aircraft, then flown to Cam Ranh Bay, turned in to the repair company to be cleaned, rerigged and repacked, and flown to Da Nang for use on following loads.

It should be strongly emphasized, however, that although these advantages of GPES were applicable under the particular conditions surrounding the Khe Sanh operation, under a different set of circumstances, when quick deliveries of greater tonnages per load are required or when it is not practical or feasible to install the ground arresting gear, LAPES would be more suitable. As it was, LAPES was used on 77 percent of the extraction deliveries before GPES was phased in.

C-123 landings

While the C-130s performed the majority of the airdrop missions, the C-123s continued to land on the battered runway, delivering supplies and replacements and evacuating casualties. Only C-123Ks were used, for they provide more rapid climb-outs over enemy positions and provide the added safety factor

of four-engine performance. Again, the particularly hazardous conditions at Khe Sanh prompted specific procedures and standards to be developed and used in C-123 landings. With absolute minimum ground times necessary for all landings, extremely rapid turnaround procedures were developed. At night, the first 1000 feet of the runway was usually controlled partially by the enemy; therefore, aircrews were advised to land long. The aircraft landed in the assault configuration and stopped, whenever possible, without reversing the props, which would have caused the jets to shut down. At touchdown, the loadmaster opened the ramp and door and, upon reaching the offload area, pushed the pallets out while the aircraft continued taxiing slowly. Passengers scampered aboard the aircraft. Three minutes from touchdown to gear up was average; several times it took only 55 seconds.

During the airland operation and also while airdropping, the C-123 used a maximum assault descent procedure that had been developed in early January. By employing this high-altitude/assault-descent approach to the Khe Sanh runway and drop zone (DZ), the C-123s were subjected to hostile fire from the surrounding enemy positions for only a few seconds. The assault descent began about five kilometers (75 seconds) from the DZ, the aircraft descending at a rapid 3000-feet-per-minute rate without flaps (with flaps when landing), leveling off at 800 feet, 12 seconds from the DZ. When properly executed, the maximum period at drop altitude was 15 seconds. This technique considerably reduced hits from ground fire, with little sacrifice in accuracy.

ground operations

The ground operations performed by aerial port and combat control personnel played an extremely vital role in the success of the Khe Sanh resupply. Operating combat control equipment on the DZ was hazardous because of incoming mortar, rocket, and sniper fire on the exposed controllers. Significantly, enemy fire was at first concentrated on the runway and main part of the camp, but toward the end of the operation it was intensified on

the DZ. The combat control team (CCT) discovered that when a lengthy transmission was made from the MRC-108 radio jeep, incoming rounds were soon directed at the jeep, indicating the enemy's probable capability to home in on the radio. Consequently, the jeep was moved after each transmission. During the Khe Sanh resupply, the Tridea low-frequency beacon was used for the first time to provide a navigational aid to the C-123s, as well as an additional aid to the C-130s. The beacon was necessary because of poor visibility and limited navigational equipment on the Provider. Three beacons were used; all were severely damaged by enemy fire, causing us to position part of the beacon and its generator underground.

Because of recovery vehicle traffic across the DZ and the helicopter downdrafts, the combat controllers had trouble keeping marker panels in place. Therefore, smoke had to be kept on the point of impact as a target for the aircrew. Sniper fire made this hazardous, too, so a deep hole, large enough for one man, was dug near the PI; there a controller was positioned, to throw the smoke grenades.

While the Marines recovered loads on the drop zone, Air Force aerial port mobility teams were responsible for offloading the airlift aircraft. Speed in recovering the cargo pallets was obviously essential, since the most intense mortar attacks came during landing and offloading. Two of the major problems aerial port personnel encountered were equipment failure because of battle damage and a low level of equipment performance caused by constant operation of forklifts and K-loaders over uneven terrain, exposure to severe dust conditions, and flat tires. The materials handling equipment (MHE) which required extensive maintenance or which sustained battle damage could not be evacuated from Khe Sanh because of the suspension of C-130 landings.

Aircraft maintenance recovery teams were originally positioned at Khe Sanh but were eventually reduced when landings became minimal. A minimum capability—tire specialists, tires, and jacks—was always maintained because of Khe Sanh's battered and shrapnel-



Vietnamese civilians await air evacuation at Khe Sanh. More than 400 refugees were evacuated to Da Nang Air Base by USAF aircraft after Khe Sanh City was attacked on 23 January 1968. . . . U.S. Air Force and Navy jets provide defensive fire to protect a C-130 preparing to leave Khe Sanh. Enemy forces, apparently planning to destroy the aircraft and its cargo of ammunition, were thwarted in their attempt, though on the mountain-side in easy firing range of the base.



strewn runway. When heavier maintenance was needed, recovery teams were flown in.

airlift totals

At the conclusion of the 78-day emergency resupply of Khe Sanh, C-130s and C-123s had delivered a total of 12,430 tons of cargo, 8120 tons by airdrop and 4310 tons by airland. C-130s made 273 landings, 52 LAPES deliveries, 15 GPES deliveries, and 496 CDS drops. C-123s made 179 landings and 105 CDS drops. CEA for the C-130 IMC drops was 133 yards, and for VMC drops 95 yards. C-123s averaged 70 yards. Sorties flown by Air Force airlift aircraft totaled 1120. During the resupply, 2676 passengers were airlanded at Khe Sanh and 1574 lifted out, including 306 aeromedical evacuees (138 litter and 168 ambulatory). Over all, CDS constituted the mainstay of the airdrop operation, boasting a 99.5 percent recovery rate. A few loads were dropped excessively long or wide of the dz; most were recovered, although three had to be destroyed by fighters to prevent them from falling into enemy hands. Fifty-three USAF airlift aircraft were hit by ground fire; 18 were extensively damaged, and three C-123s were destroyed.

impact on airlift management system

As a result of the increased allied effort shifted to northern I Corps during early 1968, most of it in support of Khe Sanh, the entire in-country airlift system was affected. To illustrate, from January to March the average monthly tonnage delivered to the eight airfields (Camp Evans, Ca Lu, Quang Tri, Quang Tri Lavang, Hue Phu Bai, Hue Citadel, Dong Ha, and Khe Sanh) served in the northern I Corps area increased by 14,533 tons, or 310 percent of the previous six-month average. Tactical maneuver elements supporting Khe Sanh and other Tet offensive engagements shifted rapidly, requiring daily resupply to give them freedom of action. Although these units normally use a certain amount of airlift, the additional aircraft movements increased requirements on the entire system.

The total amount of airlift required in

Vietnam is measured in "tonnage to be delivered" rather than "ton-miles to be flown" because it is the most practical measurement for Military Assistance Command, Vietnam (MACV) transportation planning. The measurement of tonnage is feasible because of an established standard average sortie length, historically about 45 minutes. Planning factors for airlift requirements are derived from empirical data based on the total troop strength in-country. This includes a population factor of five tons airlifted per day for each 1000 troops, plus a constant eight tons per day for each maneuver battalion to compensate for their additional unit moves. The factors are based entirely on sustained levels of past activity and do not include major moves, such as those to northern I Corps during early 1968. Further, simultaneous actions—increases in total in-country population and numbers of maneuver battalions—also added to the rising airlift requirement.

As airlift forces in Vietnam are afforded a measure of flexibility by being able to call on other C-130 aircraft from out-country Pacific bases, additional C-130s were requested and received to augment the in-country force. But an interesting phenomenon develops here, proving that the amount of airlift provided by each aircraft is inversely proportional to the number of aircraft in-country; i.e., the more aircraft needed, the less tonnage each airlifts. This phenomenon is caused partially by saturation of aerial ports, maintenance facilities, air traffic control, and base support, thus decreasing the ability of those facilities to support the increased numbers of aircraft. The number of terminals remains relatively fixed, and the option of flexibility for the command and control system does not increase proportionately; the majority of cargo still originates at the same terminals and cannot be effectively shifted with changes in tactical situations. The net result is that the requirement for additional aircraft in itself adds to the requirement.

This phenomenon held true during the Khe Sanh airlift period. While the average number of C-130s in Vietnam increased from 58 to 84.7 during the last six months of 1967 and the first three months of 1968, the tonnage

per day delivered by each aircraft decreased from 36.9 to 30.6. Although this downward trend appears contrary to efficient airlift management, instead it serves to underscore the primary antecedent to the existence of tactical airlift: that *reliable responsiveness* to emergency requirements transcends in priority the efficient use of aircraft.

As was the case during the Khe Sanh operation, unit moves and support of tactical units at temporary forward operating locations provide very little backhaul cargo. Since nearly all the locations north of Hue fall into this category, missions during early 1968 were largely productive only one way, further decreasing cargo load efficiency. The average monthly tonnage airlifted out of the eight northern I Corps fields from January to March was 5984, or 28 percent as much as the 21,300 tons flown in. By contrast, for the same time period the nine major aerial ports in Vietnam experienced an 87 percent rate of backhaul cargo.

Another condition that caused a decrease in capability was the particular geographical relationship of Khe Sanh to the location of the C-130 aircraft beddown bases (Tan Son Nhut, Cam Ranh Bay, Tuy Hoa, and Nha Trang), where crew housing, maintenance facilities, and security were available. Khe Sanh and its surrounding bases just below the demilitarized zone (DMZ) were farther from the beddown bases than the average sortie length, and because of the accelerated effort for that area, many sorties were flown from the more southern bases, i.e., Cam Ranh Bay and Tan Son Nhut. Approximate flying time from Tan Son Nhut is 95 minutes; from Cam Ranh Bay, where the majority of the C-130 missions originated, 75 minutes; and from Tuy Hoa 60 minutes. Consequently, during the first three months of 1968 the average sortie length increased 22 percent over the previous six months' average, from 45 to 55 minutes, in turn decreasing the number of sorties flown per day. The long, narrow shape of Vietnam will permit beddown bases to compensate for these shifts in tactical emphasis as long as destinations are not farther from the nearest base than the average sortie length. If these

limits are exceeded, as they were at Khe Sanh, the airlift job will nevertheless still be performed with the necessary responsiveness, but it will cost more in terms of aircraft and flying hours.

The airlift effort expended into the Khe Sanh area was an extreme example of the effect of a particular operation on the entire system. However, even this demand was absorbed by the flexibility of the system, and day-to-day requirements were still accomplished throughout all four corps tactical zones.

the materiel operation

Operations such as the Khe Sanh resupply also have dramatic impact on overall materiel functions. Extensive aircraft damage from ground fire greatly increased the maintenance man-hour requirements. Landings on the damaged runway prompted not only more tire changes but also increases in aircraft and component damage. The severe stresses imposed on airlift aircraft under these conditions, even though the planes were designed to withstand assault procedures, caused fatigue and failure rates never before experienced and completely impossible to program. To illustrate: In 1967 the C-130s flew approximately 30 sorties per tire change. During the first three months of 1968, when C-130s landed 273 times at Khe Sanh, the sortie rate dropped to 18 per change. Further, from January to April C-130s averaged 866 tire changes per month, compared with the 1967 monthly average of 350. The demand on base supply and the wheel and tire buildup work center was excessive and narrowly missed being a major problem. The insidious aspect is that it could not be anticipated.

As tactical emergency situations like Khe Sanh never occur without attendant priority requirements for the entire surrounding area, the resupply of Khe Sanh produced an even larger requirement for aircraft at other bases in northern I Corps. The result on maintenance and supply was a requirement for increased in-commission rates for an extended period of time. For example, during the 78-

day period, the average number of C-123 aircraft possessed was 58. A minimum of 38 were fragged each day; 3 were destroyed, and 8 sustained major battle damage, eliminating 11 available airframes. Yet the number of flying hours increased from 5939 in January to 6113 in February to 6691 in March. The impact on C-123 maintenance and supply requirements is clearly evident.

In addition, C-130 utilization rates were kept at a high percentage, as shown by the accompanying table.

Date	Assigned aircraft	Missions fragged	Missions per aircraft
10 Feb	72	73	101%
11 Feb-28 Feb	88	83	94%
29 Feb-11 Apr	96	91	95%

These in-commission rates may seem incredible to those familiar with the Air Force standard of 71%. However, both the standard and in-commission rates for C-130 airlift in Vietnam are much higher because of utilization of rotational aircraft from out-country bases in the western Pacific, where the heavy-phase maintenance is accomplished. Therefore, the 29% under the Air Force standard allowable for heavy maintenance does not apply to C-130s in Vietnam. Realistically though, unscheduled maintenance produced by the hazards associated with Khe Sanh and similar combat situations precludes sustained attainment of the high goal.

To increase materiel reliability, action was necessary in several areas. Da Nang Air Base, the primary staging base for the operation, is principally a fighter base, with no maintenance capability for C-130s and only limited capability for C-123s. From austere manned home bases, a 19-man maintenance team with limited amounts of equipment and supplies was sent to Da Nang, which reduced maintenance delays considerably.

At other locations where teams could not be deployed, an around-the-clock "maintenance coordinating" system, similar to a Logistics Readiness Center, was developed to recover damaged or unflyable aircraft.

A "maintenance coordinator" stationed at

the 834th Air Division's Airlift Control Center (ALCC) at Tan Son Nhut AB responded immediately to any airlift aircraft requiring maintenance support away from its home station. Depending on the requirement, the coordinator contacted the nearest support base to obtain parts, equipment, and/or personnel, then turned to the ALCC duty officer for airlift, which was usually accomplished by diverting the nearest aircraft. If major structural repair was required, the coordinator tasked the parent wing to dispatch maintenance personnel and equipment for a one-time flight to the mission support base.

The number of aircraft requiring assistance during the month 8 February-8 March is typical of the load usually handled by the maintenance coordinator in the ALCC:

Type	Number of aircraft	Average response time (hours)	Average repair time (hours)
C-130	91	2:43	5:52
C-123	55	2:36	5:54
C-7	40	1:46	3:03

The factors determining response time were parts requirements and available airlift. Response time was measured from notification to arrival of the team at the aircraft. There were instances of 30-minute response from notification to airborne.

Lessons Learned

Numerous lessons were learned and ideas crystallized at Khe Sanh, some which reinforce current concepts in tactical airlift and others which provide impetus for further discussion to improve future performance in this field.

- The initial necessity and ultimate success of the IMC drop technique at Khe Sanh confirms an obvious and immediate requirement for systems capable of performing in this kind of environment. The almost total reliance on ground radar to airdrop loads at Khe Sanh points up a definite deficiency in this system. Though we were fortunate at Khe Sanh in having sufficient backup radar com-

(Continued on page 72)

Khe Sanh Overview

The single landing strip at Khe Sanh, seen here from the approach end, runs almost due east-west. From overhead

vantage one can see the surrounding installations, both military and civilian and grim evidence of recent warfare.





ponents in case of battle damage to primary systems, the next location requiring IMC drops might not prove as fortunate. Reliability of a ground system is directly related to the enemy's ability to put it out of commission. The ultimate need for IMC airdrops is a self-contained aircraft capability requiring no ground aids. Similarly, the ultimate in airland capability under IMC is an aircraft with self-contained precision approach capability. The adverse-weather aerial delivery system (AWADS) development program will equip tactical airlift aircraft with a self-contained avionics package and provide adequate capability with possibly one exception, terrain-avoidance radar. If, in the absence of ground radar, airland had been the only method of resupplying Khe Sanh, the terrain-avoidance capability would have been necessary to provide the pilot glide slope information to complete a safe precision approach. In addition, the need to deliver loads as low as possible is dictated by the inherent inaccuracies of a parachute drop, resulting primarily from unknown wind conditions between the aircraft and ground. Therefore, the lower the aircraft, the more accurate the drop; and to provide the aircraft the capability to descend to these low altitudes for IMC drops, terrain-avoidance radar is essential. It is recognized, however, that because of expense not all tactical airlift aircraft can be equipped with AWADS, even though the need to airland and airdrop in a forward area under instrument conditions will continue to exist. Therefore, a portable instrument landing system (ILS) is required. At Khe Sanh the size of the GCA and TPQ-10 radar, with the necessary location of antenna above ground, proved extremely vulnerable to enemy fire. The current TALAR IV appears to have excellent potential; had it been fully developed and available, its use would most likely have proved extremely effective at Khe Sanh. Light and portable, this miniaturized ILS system could have been placed for airlandings at the end of the runway, completely protected except for an opening for beam coverage. Another transmitter could have been located on the ground at the CARP and used to direct drop aircraft to the release point. Several TALAR units could

have been stocked at Khe Sanh as replacements in case of battle damage or malfunctioning.

- Khe Sanh taught us a valuable lesson concerning the high risk of conventional, fixed-wing aircraft performing resupply sorties to a camp surrounded by enemy forces. The most vulnerable aspect of the fixed-wing aircraft's operation is that its approach and departure patterns are necessarily restricted to runway headings, at least for the final portion of the approach and the initial portion of the departure. If tactical airlift had been equipped with vertical/short takeoff and landing (v/STOL) aircraft, attempts by the enemy to "zero-in" the approach and departure courses at Khe Sanh could have been easily thwarted and aircraft damage reduced. As it was, the enemy was able to employ small-arms fire effectively, using a minimum number of weapons and personnel to inflict a significant amount of damage. v/STOL aircraft could have used a variety of approaches and landing techniques, similar to those used by Marine and Army helicopters, while delivering, of course, heavier loads. A v/STOL aircraft could have used the no-stop, low fly-by, dump-truck method of delivery, allowing for deliveries at various locations on Khe Sanh closer to the different supply points. The value of v/STOL to evacuate wounded is easily envisioned; worth considering is the time required for a helicopter flight from Khe Sanh to Dong Ha and then to Da Nang versus that required by v/STOL directly from Khe Sanh to Da Nang or even to Tan Son Nhut, if patients required special attention. Also, with v/STOL, all airdrops at Khe Sanh, except those performed below GCA-minimum landing conditions, could have been replaced by airlandings.

- The currently programmed light intratheater transport (LIT) is urgently needed for use in an environment like Vietnam. This aircraft should be rugged, capable of operating into extremely short dirt strips, and simple to maintain. Experience in this war has shown that, for the ground forces, it is expensive, in terms of both real estate and defensive ability, to maintain strips longer than 800-

1000 feet. The LIT must be built to withstand a Vietnam situation and should be equipped with tires that will not be affected by bullets or shrapnel fragments and fuel tanks made of an explosive-suppression material. In fact, it is vitally important that our present-day aircraft be equipped with such tires and fuel tanks. The programmed LIT is considered the ultimate near-term, light tactical airlift aircraft, scheduled to replace the aging C-123 and the overworked C-7 force. However, it must be acknowledged that there is an urgent need to provide additional STOL aircraft to satisfy the immediate Southeast Asia requirement for specialized airlift. The commitment of additional C-123 aircraft or the procurement of an off-the-shelf, state-of-the-art STOL would enhance the Air Force's ability to sustain the present responsiveness of our tactical airlift force in Vietnam until the advent of the LIT in 1974-75.

• Since integration of new tactical airlift aircraft into the inventory is, unfortunately, still years away, the value and need of the following auxiliary modes of delivery were strongly reaffirmed at Khe Sanh: (1) low-level extraction to deliver heavy, oversized cargo; (2) medium-altitude deliveries as the mainstay of most operations; and (3) high-altitude airdrop techniques to provide the flexibility of delivering cargo under adverse conditions. The availability of these aerial delivery systems allows the airlift commander options from which to select the best aerial delivery mode to support the existing tactical situation, thereby insuring tactical airlift's primary responsibilities of responsiveness and flexibility. The effective performance of GPES, for example, as an option in low-level extraction, proved its merit in the Khe Sanh situation. Another option available during the Khe Sanh operation was an improved LAPES system, with a heavier, 36,000-pound-per-drop capability. This system, although not used at Khe Sanh, was successfully employed in the IV Corps area during that time and was available for other tactical situations if needed. GRADS served as the option in the high-altitude category and could have been used at Khe Sanh

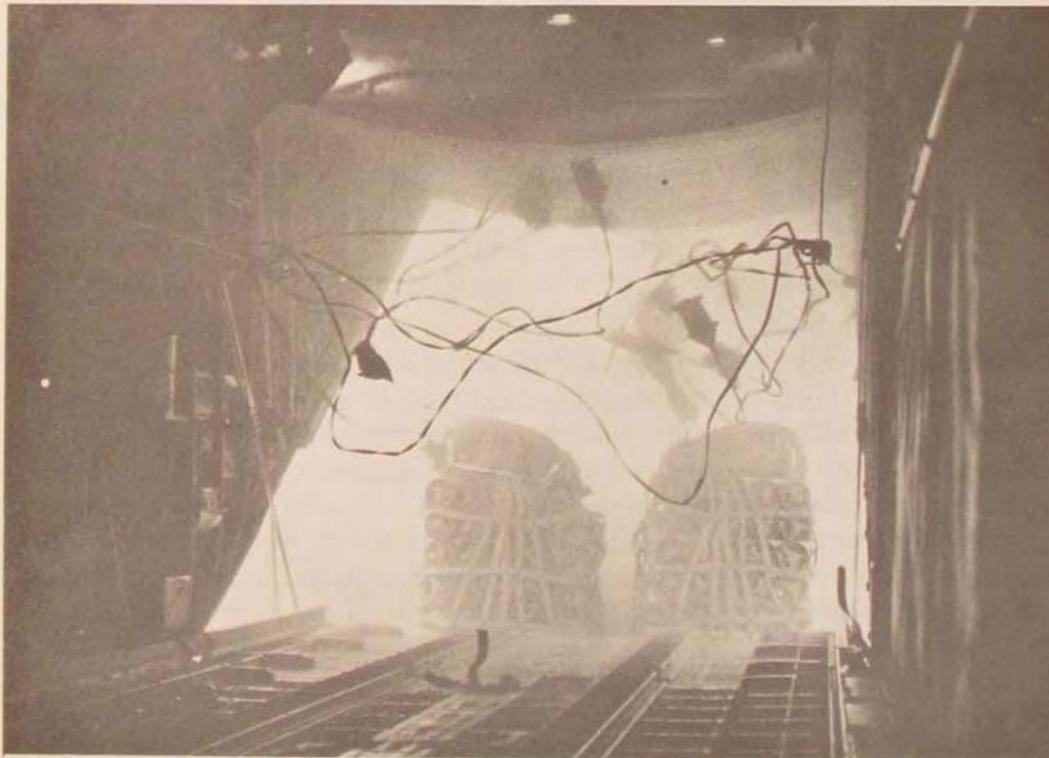
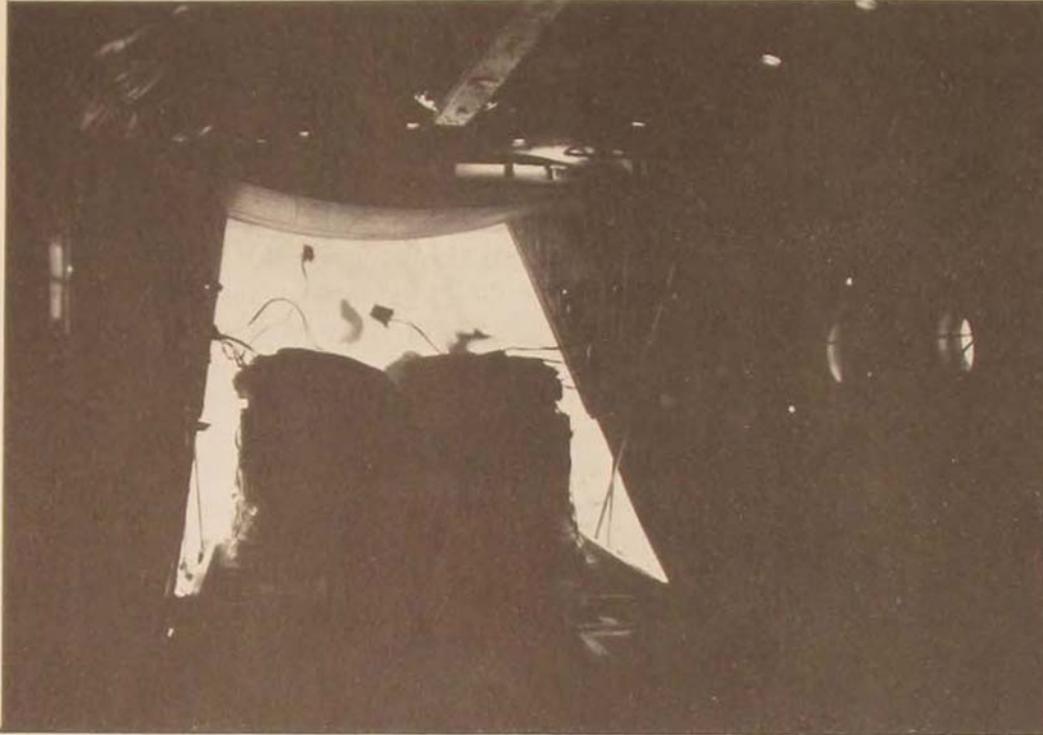
if conditions had worsened. It has, in fact, on occasion since Khe Sanh, proven itself as the only means of supplying an isolated camp when intense enemy fire was too hazardous for helicopters or for low- or medium-level airdrop. Khe Sanh demonstrated, as have numerous other operations throughout Vietnam, that emergency airdropping is often requested under the most varied and unfavorable conditions imaginable. There are other systems of delivery even more exotic than these that could have been effectively used at Khe Sanh, such as a radio-controlled parachute guided to the exact point of impact by the man on the ground. But these are at present extremely expensive, especially for sustained operations such as Khe Sanh, and expense is one of the critical limitations on development today. Therefore, airlanding is always preferred and performed if at all possible, and rightly so. But in Vietnam today, the hazards of landing an airplane, in itself an implied and potential financial risk, are often too great, or even impossible because of the lack of adequate airstrips. Consequently, as long as the present family of aircraft remains the backbone of tactical airlift, we must exert efforts to improve aerial delivery modes—developing cheaper parachutes, a higher degree of accuracy, greater capability and flexibility—instead of eliminating or discounting airdrop because of expense. These methods are vital to our very ability to fulfill emergency requirements of ground units in Vietnam. Future designs of tactical airlift aircraft will, admittedly, decrease the importance of most current airdrop modes, but that day is still years away.

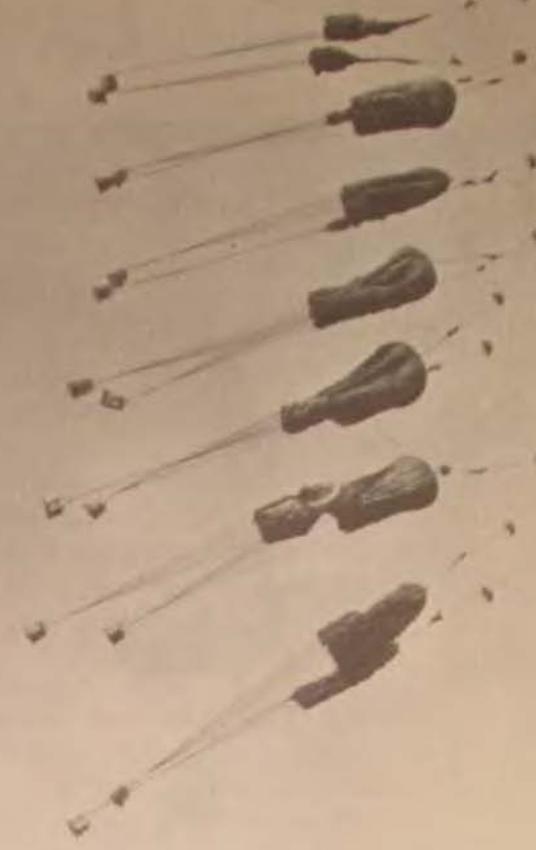
In addition to these broad concepts of airlift developments, other brief and more specific tenets evolved from Khe Sanh which proved significant and worthy of mention and discussion.

—Whenever we establish new or reoccupy old bases away from supply lines, initial consideration must be given to air resupply, not only by airland and helicopter but most particularly by airdrop. Space should be allotted for suitable drop zones inside the defense

C-130 Airdrop-Khe Sanh

In just four seconds and with the whoosh of a speeding express train, tons of palletized cargo rumble down the ramp and out of an Air Force C-130 Hercules, to resupply Army and Marine units at Khe Sanh. The chutes stream behind, the C-130 climbs and heads back to Da Nang for another load, and the supplies drop into the beleaguered drop zone.







Supplies for U.S. Marines at Khe Sanh are unloaded from a C-130 transport, while overhead a CH-53 helicopter returns with a damaged UH-1 helicopter.

perimeter if possible, convenient to offload points, and usable day or night.

—Prior to the start of any large-scale air operation, air traffic control facilities should be built up immediately to handle all anticipated traffic. At the start of the Khe Sanh operation, there was only one radar approach control (RAPCON) unit, at Hue Phu Bai, to direct the increasing numbers of aircraft into Camp Evans, Quang Tri, Dong Ha, Khe Sanh, and Hue Phu Bai, and it proved inadequate. Subsequently a second unit was located at Quang Tri to handle half of the traffic, thus providing a more effective and safer air traffic control operation.

—The entire Khe Sanh operation graphically illustrated one particular trend of airlift today, the evolution of the specialist. Crews flying in support of Khe Sanh performed daily airdrops that required the versatility of adapting to new techniques or variations of current air resupply standards. Those with thorough knowledge of and practice in the different modes of delivery were naturally more adept. Yet the nature of conditions and the urgency of the situation at Khe Sanh demanded proficiency and accuracy from the start. There was no time for training. The highest possible degree of accuracy and reliability could have been pledged had we been able to press into service a group of select, specialized aircrews, those identified as airdrop experts, highly proficient in LAPES, GPES, CDS, GRADS, heavy-equipment drops, and formation flying. With specialists, we could apply a variety of resupply techniques to meet a myriad of contingency and emergency situations for which the standard just doesn't always apply. The crews would be able to adapt immediately to each situation and not need an extensive training program. At Khe Sanh, they would have readily recognized any problems connected with IMC procedures, such as not receiving the threshold mark on time and thereby running the risk of hitting the mountains ahead. Using the radar reflectors along the runway, beacons, and TACAN, they could have determined exactly when they crossed the runway. But again, this comes from experience, from knowing what to look for.

Khe Sanh also emphasized:

—That our present Air Force management system must consider the tremendous sustained surges in requirements that are absolutely essential in and an integral part of a combat situation. Manpower should be based on documented maintenance man-hours of the current year; supply levels on demands of the current year.

—That fighter cover for airlift aircraft making drops or airlands in hostile surroundings must be employed, if at all possible, to suppress enemy ground fire.

—That the enemy's ability to listen to the frequency being utilized by the controlling agencies and aircraft and comprehend the data greatly enhances his firepower effectiveness, proving the need for frequency changes, using discreet frequencies, code words to designate loads, and certainly a secure voice transmission system.

—That maintaining adequate recovery capability is highly important. Mobility teams at Khe Sanh used K-loaders during initial minimum ground times (engines shut down) and forklifts later for the speed offloads. Our delivery rate was based not on airdrop capability but on the ground forces' ability to clear the DZ: after each drop the average time was 45 minutes, but several hours if bundles fell outside the DZ perimeter. There is a definite requirement for a large-capacity forklift (10K)

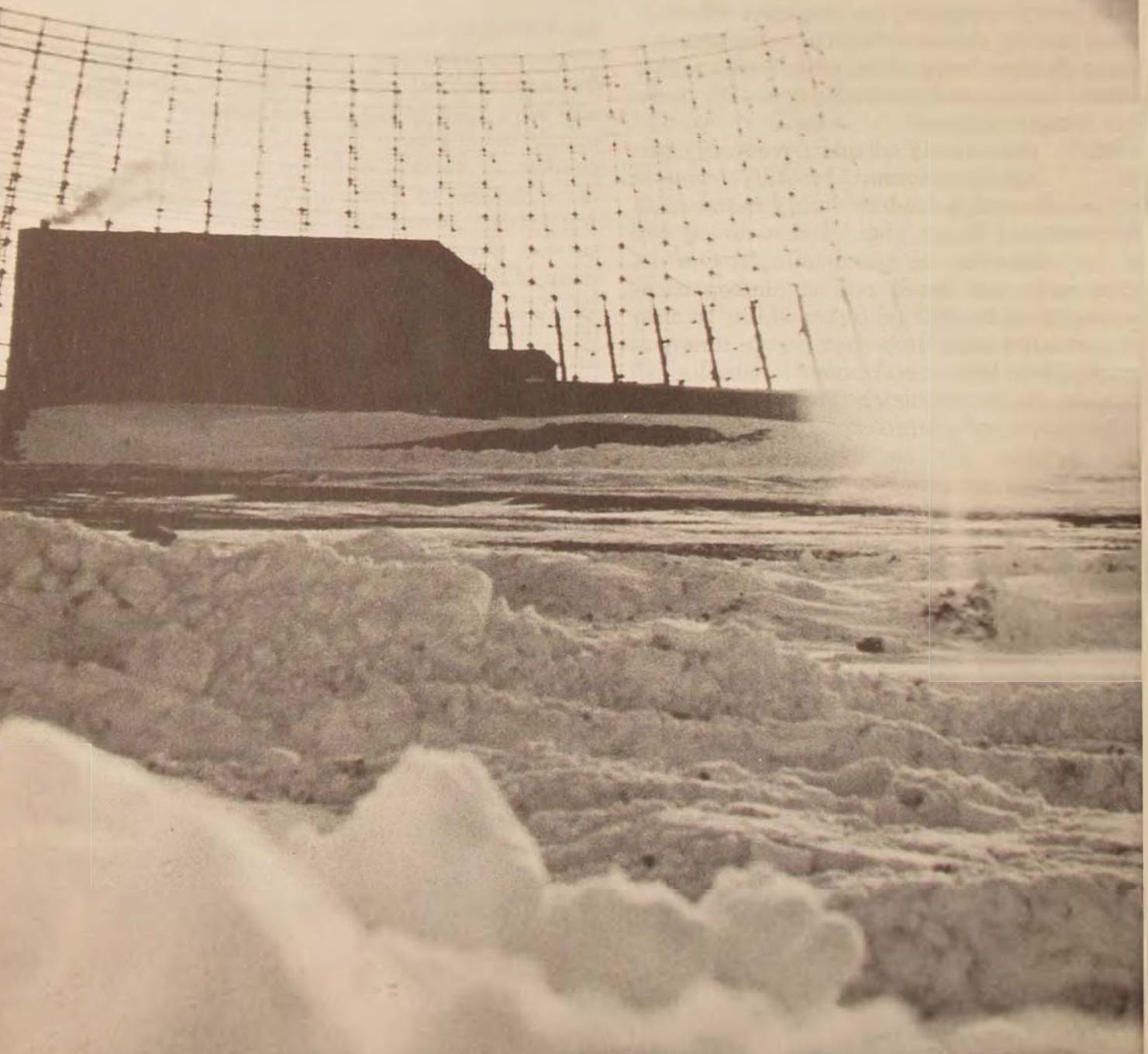
that will perform in a combat environment for extended periods of time without unacceptable maintenance delays. Concurrent with the requirement for aircraft tires, K-loaders and forklifts should also be equipped with tires, air-cooled engines, and shielded hydraulic lines capable of withstanding hits by bullets and shrapnel. We should explore the possibility of developing a ground sweeper, perhaps magnetic, capable of clearing runways and ramp areas of shrapnel and other debris. The vulnerability of our present tires on materials handling equipment and aircraft too often jeopardizes not only the equipment but the entire operation.

IN VIETNAM today, tactical airlift requirements are constantly changing, fertile areas for improvement are being uncovered daily, and Khe Sanh is but one example of the demands being placed upon our airlift forces in combat. As tactical airlift in the Air Force is not restricted to Vietnam, the comments and suggestions here must necessarily be considered along with requirements from other parts of the world. But Khe Sanh must indeed be the classic example of tactical airlift to date, and what happened there portends a bright and expanding future for the entire airlift field.

Hq 834th Air Division

AEROSPACE DEFENSE AND NATIONAL SECURITY

LIEUTENANT GENERAL ARTHUR C. AGAN



THE strategic offensive capability of the Soviet Union is being strengthened across the aerospace spectrum. The Soviets are continuing to deploy improved ballistic missiles of intercontinental range at a rapid rate. In addition, they are making significant improvements in their submarine-launched missile force. There has been no apparent decline in Soviet long-range bomber strength despite the ballistic missile buildup. They are continuing to produce heavy and medium bomber aircraft. They also have the technical ability to develop a supersonic intercontinental bomber. In space, the Soviets are intensively testing a fractional orbit bombardment system. After launch into a low orbital profile, such a weapon could deorbit a nuclear warhead onto a chosen target during its first revolution of the earth. They are pursuing a large-scale military research and development program. Their expenditures on aerospace research have increased steadily, and they have greatly expanded their weapon testing operations.

Overall consideration of the Soviet activities described leads to several fundamental deductions which have significant implications for the future security of the United States.

The possibility of a strategic nuclear attack through the aerospace medium remains a most dangerous military threat to this country. The real intent behind the Soviets' current military expansion is, of course, a matter of conjecture. It may be that they are seeking only to improve their deterrent posture vis-à-vis the United States. On the other hand, it is also possible that they are attempting to achieve a first-strike capability aimed at overcoming our deterrent. The fact remains that the forces involved in their current buildup are primarily those which could be used for direct attack on this country. Should the time come when they believe their relative strategic strength has reached a point where they could defeat the United States without suffering unacceptable (in their view) damage in return,

the attempt might be made. The consequences of such a possibility are so awesome that it must be guarded against as a matter of highest priority.

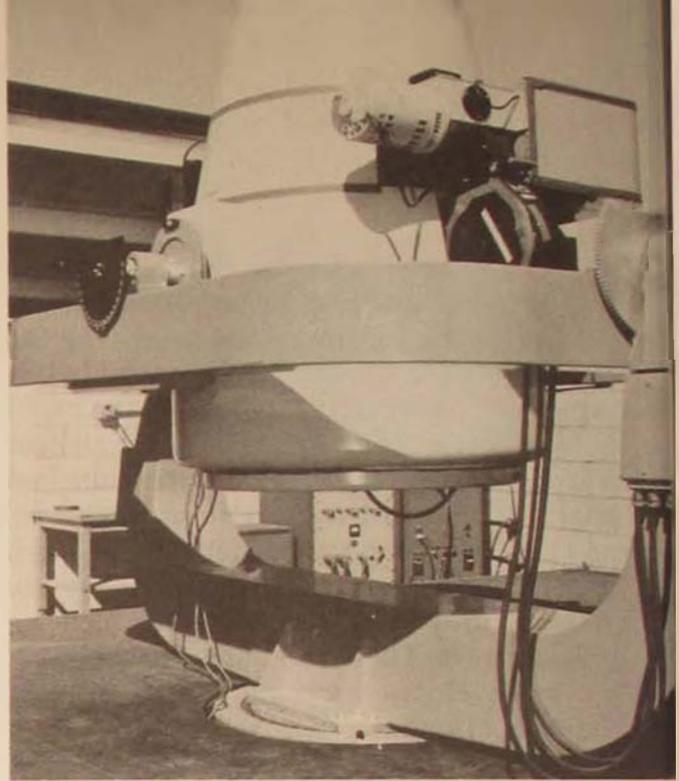
If a direct attack on the United States were attempted, it could comprise a diversity of nuclear delivery vehicles employed against us through a region extending from the earth's surface to low orbital altitudes. Such an attack might begin by discriminating strikes against selected targets for coercive purposes. On the other hand, it could entail a massive surprise attack in which the full range of available aerospace weapons would be initially used.

Ballistic missiles launched from land and sea would probably spearhead the attack. Early last year, then Soviet Defense Minister Malinovski stated categorically that in their military planning "first priority is being given to the strategic missile forces and atomic missile-launching submarines—forces which are the principal means of deterring the aggressor and decisively defeating him in war."

Strikes by manned bombers delivering gravity bombs and air-to-surface missiles could be expected to follow the ballistic missile attack. The significant role played by bombers in Soviet strategic exercises and their increasing use in probes around the U.S. perimeter attest to the importance which the Soviets place on this offensive weapon. In an official statement made in April 1966, the Soviet Minister of Defense pointed out that the Soviet Union continues to count on the additional contribution to its strategic delivery capability provided by long-range bombers equipped with missiles for "stand-off" attacks on enemy targets.

Additionally, certain targets in this country might be struck by nuclear warheads delivered by a fractional orbit bombardment vehicle launched on a low orbital profile across either the northern or southern approaches to the United States. While this system probably does not have a high order of accuracy at this time, the Soviets might

The Baker-Nunn camera, most sensitive and precise satellite tracking instrument in the space defense inventory, can observe targets the size of a basketball out to 50,000 miles. . . . Designed specifically for the SPACETRACK system operated by ADC, the AN/FPS-85 radar at Eglin AFB, Florida, tracks almost 200 objects in space simultaneously.



believe it to be useful for surprise strikes against soft targets.

The cornerstone of our national military policy is deterrence of an attack on the United States and its allies. A would-be aggressor is deterred from such attacks only if he is convinced that our military power and national resolve will cause him unacceptable damage if he provokes war. An effective aerospace defense, able to provide warning and active protection against attack, is an essential ingredient in convincing a potential enemy that we do possess such power and resolve.

An effective aerospace defense introduces an element of uncertainty into any aggressor's attack planning. It tells him, first, that he cannot count on surprise and, second, that an indeterminate portion of his attacking forces will be destroyed en route to target. As a result, he knows that he can never calculate with accuracy the effectiveness of a premeditated attack on this country.

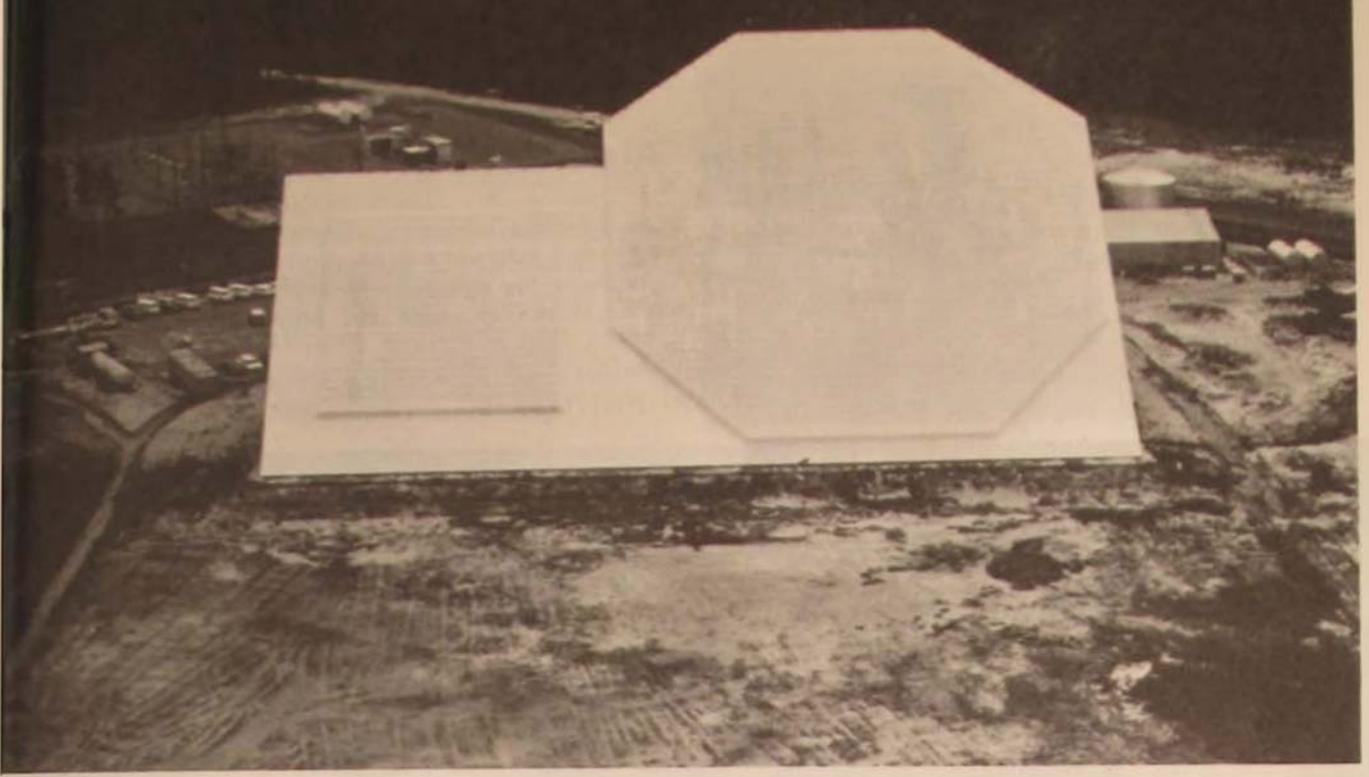
A strong aerospace defense posture lends credence to the United States' resolve to halt limited aggression that endangers our national interests anywhere in the world. It is a major indicator to both friend and foe of our willingness and intent to take whatever steps are necessary to support our positions—even at the risk of accepting direct attack. In other words,

by bolstering our security at home, aerospace defense gives us freedom of action to deal with aggression abroad.

An economic deterrent is also served. By reacting to the U.S. aerospace defense posture, our most powerful adversary must divert resources into more sophisticated and costly offensive weapons. He is forced to increase his budget for qualitative and quantitative improvements to his offensive forces or fall behind in strategic posture. Although this form of deterrence is a two-way street, it works to the advantage of the nation with the better economic base. Also, small unfriendly countries are inhibited from acquiring nuclear delivery systems for use in an attempt to blackmail us.

These are the several ways in which aerospace defense strengthens our ability to deter. Nevertheless, we must face the possibility that deterrence can fail—and general war ensue—because of an aggressor's miscalculations or irrational acts. If that occurs, aerospace defense may well be the deciding factor in whether or not the United States survives the conflict in an advantageous position.

One of the most significant contributions of an effective aerospace defense in case of a general war would be to provide warning of attack, giving us time to alert our offensive



and defensive forces and implement our contingency plans at home and overseas.

Our retaliatory forces can be actively protected by the destruction of enemy weapons en route. In a controlled attrition situation, aerospace defense can be of particular value in preserving the integrity of forces we might withhold for various attack options. It would also provide surveillance data on the status and employment of enemy aerospace forces for use by our national command authorities in battle management. By reducing the destructive nuclear force delivered on this country, our aerospace defense can limit damage to our population and industrial resources and thereby increase the chances of our survival as a viable nation. For these reasons, an effective aerospace defense is essential to both the deterrent and the war-fighting capabilities of the United States. It will remain essential as far into the future as can possibly be seen.

Our forces must be equipped, trained, and employed for *detection* of potential aerospace threats, *determination of intent* of unknown objects, and *destruction* or neutralization of hostile weapons. The weapons and employment techniques used to perform these functions must keep abreast of advancing technology, which is drastically compressing time and distance parameters.

A fundamental concept of aerospace defense is to deploy a family of weapons in such a way as to provide area defense in depth. Under this concept, long-range weapons are used to engage hostile aerospace forces as close as possible to their point of origin. This permits a defense force of manageable size to provide a basic level of protection to all potential targets regardless of their specific location or relative importance. It lets the defense seize the initiative and engage the enemy when he is most vulnerable. It complicates the enemy's tactics and destroys the orderliness of his attack. Thus it provides us the opportunity for reattacks, if required.

A weapons mix is needed because it permits engagement of the enemy force all along his route of attack, permits the advantages of one type of weapon to offset the limitations of another, insures that effective enemy counter of one type of weapon will not completely degrade the entire defense system, and allows the defense to be supplemented around selected vital targets.

In addition to providing aerospace defense of the United States, the Aerospace Defense Command provides forces for defense of overseas land areas, as required. One of the specific responsibilities assigned to ADC, as a major USAF command, is to propose require-



Airborne Warning

An effective aerospace defense ensures that an aggressor may not rely on surprise. The EC-121H enhances the effectiveness with its sophisticated components of radar and reporting equipment.



ments for new systems and equipment to meet our aerospace defense needs.

In this regard, boost and mid-course phase intercept of ballistic missiles would provide a defense in depth to counter the potential threat posed by multiple warheads and penetration aids, which are vulnerable to countermeasures in different ways in different parts of the trajectory.

Another objective is to improve our capability against atmospheric threats. The recently approved program for an Airborne Warning and Control System (AWACS) will extend substantially our surveillance and warning capabilities against enemy bombers. But a better manned interceptor—having increased speed and range as well as more effective armament—is essential for the time when supersonic transports with bomber potential become operational. Such an interceptor could exploit more fully the range capabilities of AWACS. Also, when employed in combination with AWACS, it would provide a highly mobile air defense package that could be deployed rapidly to any part of the world.

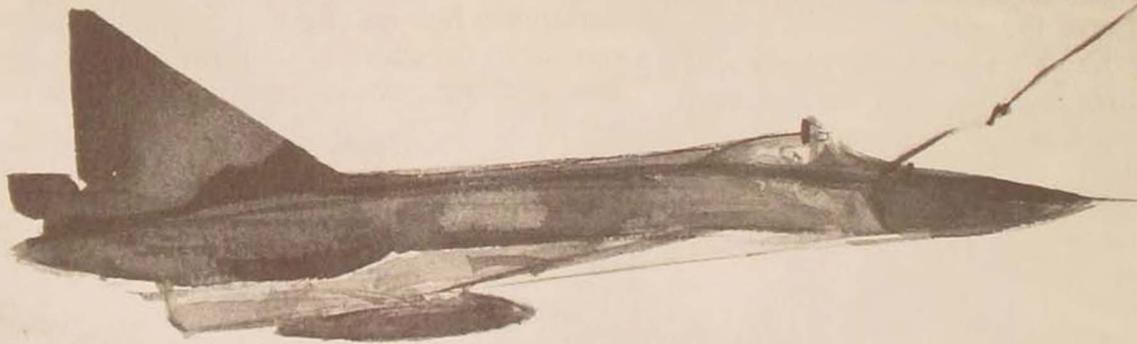
We are working on expansion of our space surveillance and warning and control capability. At present, we have a good detection

system, with the ability to maintain an ephemeris of objects in space. But we lack the ability to perform precise, continuous tracking of all satellites, and we are unable to determine their nature quickly and accurately. We require this capability in order to provide warning and battle management data for selective response and control of active defense weapons.

IN SUMMARY, I believe that the United States must maintain a proper balance of offensive and defensive forces that can destroy any would-be aggressor, even after undergoing a massive nuclear attack, while simultaneously limiting damage to ourselves. This requires an effective aerospace defense able to provide surveillance, warning, and active protection against such attack. A family of weapons is needed to permit area defense in depth.

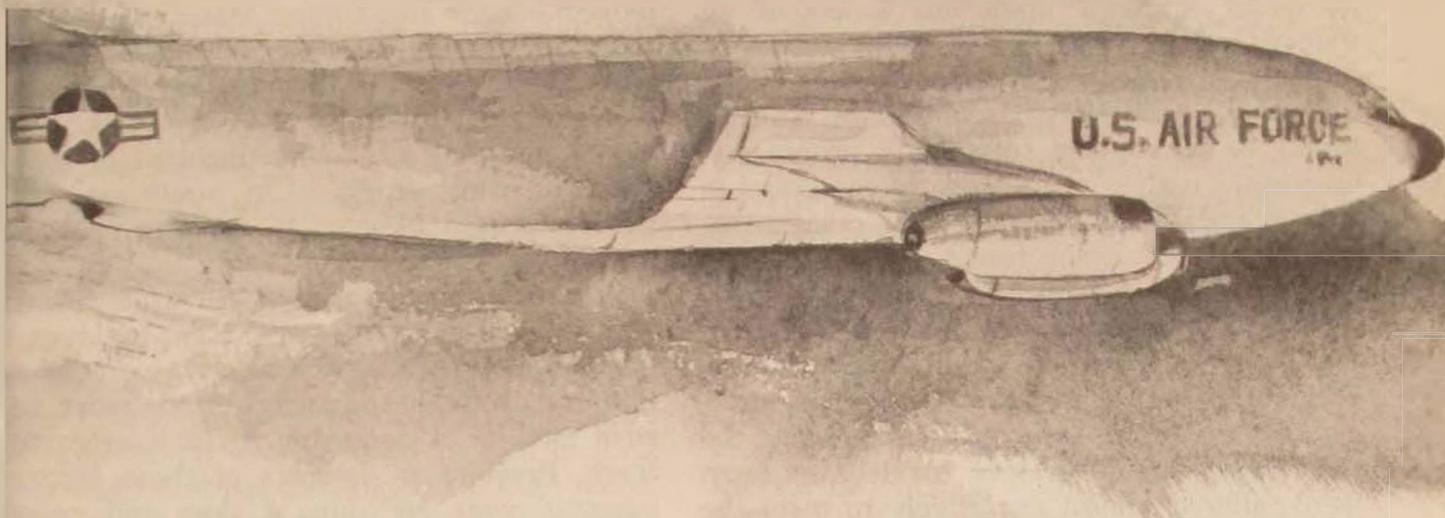
The need for an effective aerospace defense must be viewed in the context of its overall contributions to national security. It plays a significant role in deterring war. Should deterrence fail, an effective aerospace defense can mean the difference between our destruction and our survival as a sovereign nation.

Hq Aerospace Defense Command



**GLOBAL
AIR DEFENSE
THROUGH MOBILITY**

MAJOR GENERAL WILLIAM D. GREENFIELD



FOR THE past two decades the Aerospace Defense Command has been equipping, training, and providing a variety of forces for employment in air defense. Initially, this commitment was devoted to defending certain major industrial and population centers of the United States against air attack. Now, however, the concept embraces defense of the entire North American continent under a highly automated and sophisticated system of aerospace defense. Forces are being provided by Canadian and United States armed services for employment within the operational framework of the North American Air Defense Command.

This current system of air defense is oriented primarily against the threat of attack by manned aircraft. Paradoxically, the major threat now stems from the intercontinental ballistic missile and various missile sys-

tem derivatives, such as the fractional orbital bombardment system, submarine-launched cruise missiles, and air-launched missiles of one kind or another. To be sure, the manned bomber still represents a sizable threat to the North American continent, but on a more modest scale than that originally envisaged for the existing defense system. Consequently, changes in the kind, order, and magnitude of threat are bringing about corresponding changes and adjustments to the system. In effect, the United States Air Force is moving from a system of predominantly air defense to one of aerospace defense that takes into account a full threat spectrum ranging from missiles and space vehicles to manned aircraft employing both air-launched missiles and gravity bombs. The shift was implicit in the recent order redesignating Air Defense Command as Aerospace Defense Command (ADC).

One highly significant and important phase in this transitional period is the development of a global air defense capability. Basically, global air defense calls for highly mobile, quick-reaction air defense forces composed of air-refuelable fighter-interceptor aircraft and attendant command, control, and support elements capable of worldwide deployment to any theater of operation. In view of the increased emphasis upon this aspect of air defense along with recent deployments of Aerospace Defense Command interceptors outside the continental United States, it seems timely to review the command's progress in creating a mobile air defense force, global in nature and highly responsive to crisis situations involving lesser forms of conflict than nuclear war. Let us examine first some of the recent events that have given rise to this need.

Until 1961, air defense doctrine and planning were shaped, in large part, by the strategy of massive retaliation espoused during the Eisenhower Administration. Air defense forces were tailored almost exclusively to meet the threat against the North American continent and were employed in depth to provide area defense while point defense was left largely to air defense missiles. This technique accorded well with massive retaliation, since a Communist excursion anywhere in the world would be met with nuclear power. Air defense forces had to be constantly ready to guard against any counteroffensive move against this continent. One incident did occur, however, which dramatically pointed up the need for some degree of mobility of air defense forces.

In 1958 Communist Chinese forces were seriously threatening the islands of Quemoy and Matsu, located in the Taiwan Strait, and ultimately Taiwan itself. To meet this threat, the Air Defense Command was tasked to provide F-104 interceptors to Taiwan. Because these aircraft were not equipped for in-flight refueling, they were disassembled, loaded aboard C-124 aircraft, and airlifted to their destination on Taiwan. The operation was neither a timely nor an efficient technique for mobility.

In the early 1960s, the Kennedy Ad-

ministration adopted a strategy of flexible response, which placed renewed emphasis upon improving the abilities of the armed forces in a conventional role for limited-war situations. Harking back to the 1958 Taiwan crisis, several voices were raised within ADC for a mobile air defense force. Some preliminary planning was done, and the Cuban missile crisis of 1962 again saw air defense interceptors deployed outside the United States. Since that time, air defense interceptors and command and control elements have, on occasion, been deployed to various overseas locations. Following the Gulf of Tonkin incident in 1964, the worsening situation in Southeast Asia gave increased impetus to creating a global air defense capability.

In the summer of 1965 events in Southeast Asia led to a large-scale, rapid buildup of forces in that area. Concurrently, studies were initiated at ADC headquarters on the most feasible method of deploying F-102 interceptors there. Previous movements of these aircraft overseas were by ship, a slow and costly process that did not readily lend itself to the urgency of the buildup. Consequently, Air Force Logistics Command was asked to do an engineering study on the feasibility of an in-flight refueling system for the F-102. By the end of 1965 AFLC, working with Convair, had developed and proved such a system. Essentially, it consisted of a refueling tube mounted externally along the right side of the fuselage and terminating in the fuselage tank. This rig proved highly effective at only a small penalty to aircraft performance in the cruise configuration, and it could be easily installed and removed in minimum time. In early 1966 sufficient quantities of these probes had been procured and installed to allow ADC F-102 aircrews to be trained in aerial refueling. By February 1966, F-102 aircraft had been deployed to Southeast Asia by using this in-flight refueling system. Later that same year additional air-refuelable F-102s were deployed. General Thatcher, then Commander of ADC, regarded these deployments as the real beginning of mobile air defense.

The in-flight refueling system designed for the F-102 was purely an interim measure

to facilitate overseas deployment. Once these aircraft were in their theater of operation, the probes were removed. Although it served to prove the concept of mobile air defense, the F-102 program never reached major proportions. For some time prior to these deployments, the F-102 aircraft had been earmarked for those Air National Guard squadrons assigned an air defense mission. By the time of the Southeast Asia buildup in 1965, the ANG program of converting to F-102s was well under way. Conversion is now complete, and only one full-scale F-102 fighter-interceptor squadron remains in the ADC active inventory. While the F-102 played a brief but highly significant role in furthering global air defense, ADC still did not have a force in-being to fulfill the concept.

The air defense staff urgently began consideration of other aircraft for the worldwide role. Ultimately the F-106 became the interim choice, since it seemed to be the best existing aircraft to offer the combination of high speed, maneuverability, and acceleration demanded by the global air defense situation, particularly in the air-to-air role. The concept of employment envisioned by the planners was basically twofold: the F-106 along with command, control, and supporting elements would deploy to a crisis area and provide the air defense required for the friendly forces and lines of communication—the classic air defense role; and the F-106 would be used to augment or fulfill the air-to-air combat mission—the classic air superiority role.

The effectiveness of the F-106 in classic air defense is without question, having been proved by its mission in North American air defense. Contrariwise, the global air defense mission is largely carried out in a crisis area or during a limited war wherein air defense fighter forces oppose first-line enemy fighter aircraft. The nature of the F-106s' North American mission left it relatively untried in the fighter-versus-fighter role. The next evolutionary step, then, in the development of a global air defense capability was to put the F-106 to the test.

In the spring of 1966 the first of a series of fighter-versus-fighter tests was carried out.

These tests served two important purposes: first, they were designed to indoctrinate selected ADC aircrews in classic air-to-air combat maneuvers in a purely visual environment; second, they evaluated the effectiveness of the F-106 in the three-dimensional field of maneuver of fighter-versus-fighter combat. Of particular concern was determining the degree of control response and aircraft stability throughout its full performance envelope. To that end, the F-106 was pitted against the F-102 and the F-104. It exhibited superior characteristics while the ADC aircrews, relatively inexperienced in the air-to-air maneuvering environment, encountered little difficulty in handling the aircraft at the extreme limits of its flight envelope. As a result of these tests, a qualification training program in aerial combat maneuvers for F-106 aircrews was formally adopted and implemented for selected squadrons.

Further tests were conducted at the Tactical Air Command's Fighter Weapons School at Nellis AFB, Nevada, to determine optimum employment techniques in a hostile fighter environment. In these tests, conducted in a ground-controlled interception (GCI) environment, the F-106 was arrayed against the F-4C. Here the ADC aircrews enjoyed a decided advantage because of their greater experience in the radar environment. They were particularly adept at early target acquisition on radar and at making the kind of scope display interpretation to permit rapid and precise maneuvering for a fighter kill. The F-106 compared most favorably in performance and maneuverability with the F-4C. These tests, coupled with additional ones at the Aerospace Defense Command Weapons Center at Tyndall AFB, Florida, have provided a sound basis for optimum employment of the F-106 in the fighter-versus-fighter role and for the aircrew aerial combat training program.

Training in aerial combat maneuvers begins with a series of classroom instructional periods on the aircraft and its flight characteristics in the air combat environment. These are followed by comprehensive instruction in the kinds of aerial combat maneuvers and flight tactics most likely to be employed in



A pilot scans the skies over the North American continent for possible intruders. . . . At the end of a mission, the pilot leaves his supersonic F-106 Delta Dart with its capable ground crew.



air-to-air combat. The initial flying qualification phase of the training consists of twelve missions. Confidence maneuvers in the low-speed regime and at extreme angles of attack come first. Training then progresses gradually to full-scale employment of the F-106 using optimum techniques in both the CCI and the purely visual environments. At this juncture it is well to emphasize that this basic program is often the first experience an ADC pilot has in maneuvering his aircraft to defend himself, especially in maneuvering at maximum performance limits to gain the offensive. Just as the ability to thread a needle does not a tailor make, neither does completion of the twelve-sortie aerial combat maneuvering program make a fighter pilot. It does lay a firm basis for developing the necessary skills. More important, the pilot gains confidence while acquiring fundamentals vital to success in the fighter-versus-fighter arena. His continuation training focuses on developing these skills so that maneuvering for a weapons launch advantage is the paramount objective.

One technique for employment of the F-106 in area air defense operations in the hostile fighter environment requires a formation of four aircraft under CCI control. Since visual identification of the unknowns may be necessary, the four F-106s, at the time of commitment, would move to an "elements in trail" formation, and the lead element would then accomplish the identification while the in-trail element, spaced 6 to 10 miles back, would make the attack.

When employed under CCI control, the F-106 would normally carry two radar and two infrared (IR) guided missiles. If the attack is made with a radar lock-on, all four missiles would be fired automatically. If the attack should occur at close-in ranges where automatic tracking is not possible, the IR missiles can be fired in a visual pursuit launch. In a non-CCI environment, where most engagements come from close-in combat, an armament load of four IR missiles would most likely be carried. Serious consideration is also being given to installing guns in the weapon bay of the F-106.

The approach to worldwide air defense

requires broadly based tactics and employment techniques. Globally, the air defense force would be confronted with employment in both CCI and non-CCI environments where aggressor forces could conceivably be composed of bombers, transports, first-line fighters, as well as surface-launched and air-launched cruise missiles. All of these are considerations inherent in the global air defense concept. Aerial combat maneuvering, combat tactics, and employment techniques must, perforce, be applied accordingly.

Simultaneously with the development of aerial combat tactics and employment techniques, the development of the concept of operations began, along with the operation plan establishing the global air defense mission and tasking the necessary organizations. The mobile air defense proposal was formally placed before the Air Staff in early 1966. Subsequently a memorandum outlining the concept was forwarded to the Secretary of Defense. Acceptance of the idea was reflected in the Secretary of Defense Posture Statements of 1967 and 1968. Secretary McNamara, speaking before the House Armed Services Committee in February 1968, commented on the purposes that our air defense system might serve in the 1970s. One purpose:

Providing a complete mobile "air defense package" which would include a transportable control system and a refuelable or long-range interceptor, preferably one which is capable of close combat under visual identification rules.

With the air defense mobility concept firmly accepted by the Department of Defense, and with the approval, publication, and distribution of the operation plan creating the mission, the time seemed appropriate to formalize this concept in an Air Force directive. Air Force Regulation 23-9, published on 12 February 1968, restated the Aerospace Defense Command mission:

To discharge United States Air Force responsibilities for aerospace defense of the United States and to provide forces for defense of oversea land areas as required.

Headquarters USAF directed ADC to develop and submit such a manual to the Air Staff for

review and approval. Draft Air Force Manual 2-41 was completed and forwarded in late 1967. Essentially, it prescribes the operational concepts and capability standards for aerospace defense forces of the USAF providing defense of U.S. and allied resources overseas. Since global air defense forces would be deployed in support of unified or specified commands, AFM 2-41, *Operational Concepts and Capability Standards for World-Wide Employment of Air Defense Forces*, will be published to provide essential guidance to those commands posturing, supporting, and employing the air defense contingent.

An indispensable ingredient of mobile air defense is an effective command and control system. The global air defense mission entails deployments not only to prepared bases in areas with existing radar networks and command and control systems but also to more austere areas where radar and command and control systems are extremely limited or nonexistent. Deployments in the former circumstances present little or no problem; indeed, the F-106 fire control system is being provided an automatic data link with the highly automated air defense systems now being deployed in certain areas of Europe and the Far East. In the latter circumstances, several possibilities for command and control suggest themselves.

First, deployment of ADC forces to a crisis area where little or no radar network exists would, in all likelihood, be accompanied by a similar deployment of Tactical Air Command (TAC) forces and their attendant Tactical Air Control System (TACS). In this situation, the ADC forces would function as a subelement of the theater air forces and would be charged with the active air defense mission. Certain ADC aircraft control and warning squadrons have been tasked to develop and maintain weapons controller proficiency in the employment of ADC interceptors in such an environment; and some of the weapons controllers and associated technicians would very likely be deployed to assist in conducting the air defense missions. A second possibility for providing command and control lies in the use of ADC airborne early-warning and control (AEWC)

aircraft. These EC-121 aircraft offer an excellent means of control in those areas where they can be placed on surveillance stations over water much as they now are off the east and west coasts of the United States. From overwater stations these aircraft can provide good radar coverage of adjacent land areas. A third possibility is the use of a mobile, air-transportable radar and command and control system. This alternative is presently under study by the air defense staff. The problem of command and control inherent in the global air defense mission will eventually be solved with the development of a new Airborne Warning and Control System (AWACS).

The feasibility of AWACS depends upon the successful development of a "downward-looking" airborne radar that can provide detection coverage of aircraft over land at any altitude. Work on overcoming the problem of ground clutter has been under way for some time now, and a solution has been demonstrated. With the required technology within reach, development of the AWACS using large jet aircraft such as the C-135 or C-141 should proceed apace. The AWACS aircraft coupled with the F-106 would then provide unlimited possibilities for mobility and rapid reaction. In effect, a truly global capability emerges.

The F-106 required some refinements during its adaptation for a mobile air defense role. The most important of these modifications was an in-flight refueling capability. The entire F-106 fleet is being modified with an internally stowed refueling receptacle located in the top center portion of the fuselage. In its air refueling mode, the F-106 has proved highly compatible with SAC's KC-135 tankers. ADC aircrews normally complete their initial aerial refueling qualification in four missions, including both day and night sorties. One of these is at least five hours long. Several long endurance flights have been made with the F-106, three of the most significant ones occurring recently. The first was a flight of four F-106s from McChord AFB, Washington, to the Southeast Training Area in the Gulf of Mexico, where they executed live firing passes in a CCI environment against Ryan BQM-34A drones launched from the ADC Weapons Cen-

Supersonic wing tanks and aerial refueling have considerably extended the range of ADC's principal interceptor, the F-106. . . . Easing up to the boom of a KC-135, an F-106 prepares to refuel.





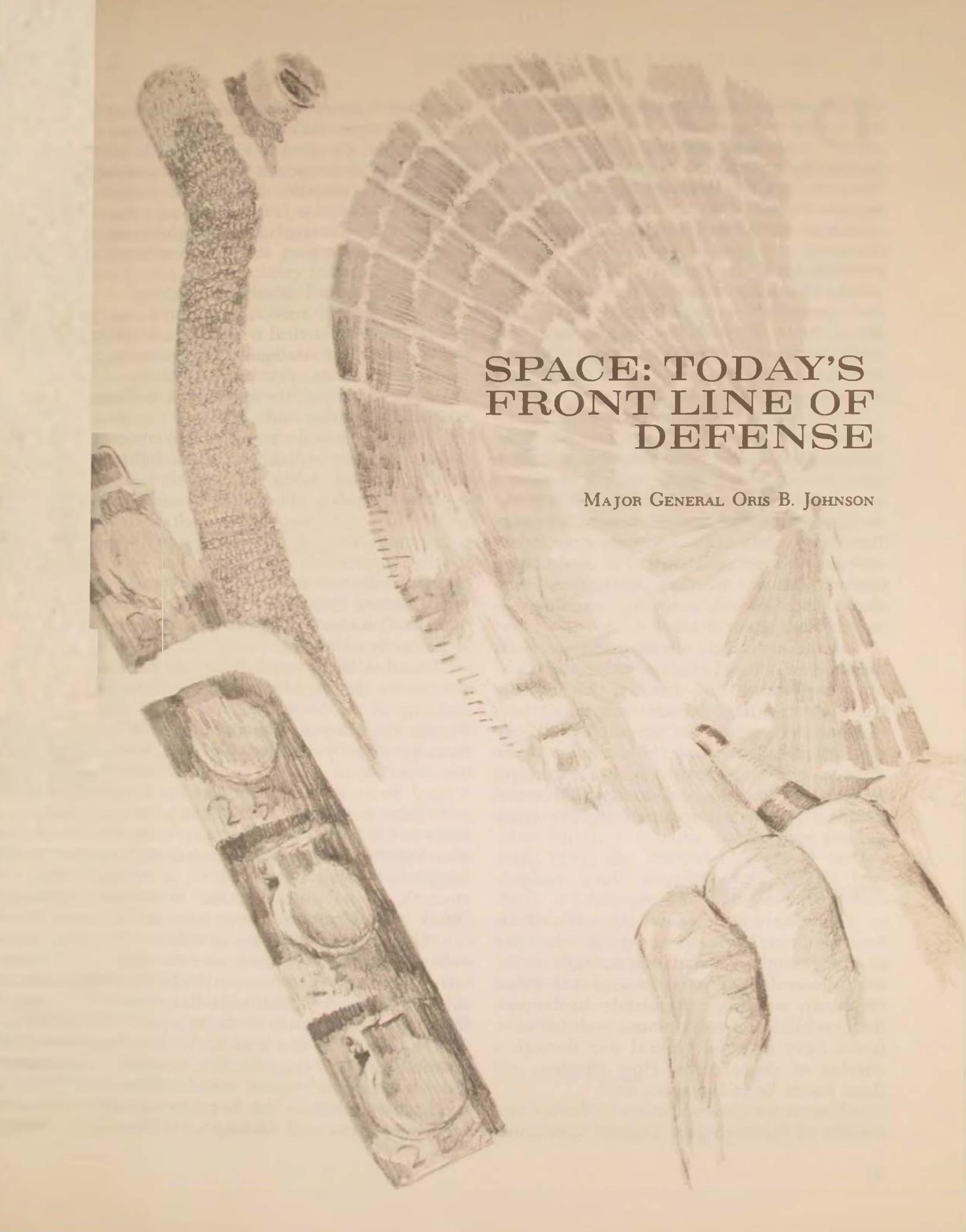
ter at Tyndall AFB, Florida. The aircraft recovered at Tyndall. The second involved a flight of four F-106s from Richards-Gebaur AFB, Missouri, to Elmendorf AFB, Alaska. The third was a flight of eighteen F-106s from McChord AFB, Washington, to Naha Air Base, Okinawa. They flew in flights of six aircraft each, and the trip was made in two legs, the second being of 10 hours 30 minutes duration and involving four in-flight refuelings.

Another refinement of the F-106 was the installation of two 360-gallon external fuel tanks aerodynamically designed for the full supersonic capability of the aircraft, thereby permitting sustained speeds approaching mach 2. These new tanks may also be refueled in flight. They significantly increase the range and performance capability of the F-106 and permit optimum cruise conditions. The aircraft's MA-1 fire-control system is also being modified for greater maintainability and reliability through installation of a solid-state computer. This modification, together with certain technical refinements in the fire-control system modes of operation, will provide a highly reliable system—a crucial factor when the aircraft is deployed to some of the more austere areas of the world.

AS STATED INITIALLY, the Aerospace Defense Command has been providing forces for aerospace defense for more than twenty years. These are not sometime forces; they are highly

trained forces in-being, ready for instant employment. What the Aerospace Defense Command is now prepared to do is to adapt and apply its experience to the world arena. Plans have been drawn, forces earmarked, and personnel trained to that end. Already, international events are proving the efficacy of the concept of specially tailored forces for global air defense. An interim capability exists. It has been tried and proved in deployments to Alaska, from McChord AFB to Tyndall AFB, and to overseas locations. Other training deployments are being planned so that the requisite forces, along with their airlift, tanker, support, and command and control elements can be exercised as a complete package. The Military Airlift Command has been providing airlift as needed, but eventually ADC will have its own specially configured airlift forces for global deployments. The AWACS, internal airlift, and the improved F-106 will ultimately provide the long-term capability so urgently needed. Once these are acquired, along with earmarked SAC tanker forces, the Aerospace Defense Command will be able to "scramble" to the four corners of the globe with a force that is ready to fight at the moment of its arrival in the theater of operations. In effect, this concept is a logical extension of the Aerospace Defense Command mission as it has been practiced within the North American continent for the past two decades.

Hq Aerospace Defense Command



**SPACE: TODAY'S
FRONT LINE OF
DEFENSE**

MAJOR GENERAL ORIS B. JOHNSON

DURING the last fifteen years the military forces of the world have witnessed a technological explosion that is having a profound impact on concepts, weapons, and the balance of power between nations. Nowhere is this impact more apparent than in Aerospace Defense Command (ADC).

The term "aerospace" emphasizes the continuity of the air/space medium which forms the operating environment of today's Air Force. Both physically and conceptually, the extension of military systems beyond the lower atmosphere has turned out to be natural and evolutionary.

Although new spacecraft are evolutionary in concept, their performance is a radical departure from the past. Strategic offensive vehicles can now deliver nuclear warheads anywhere in the world using ballistic trajectories. Simultaneously, dramatic advances have been made in the coverage and responsiveness of support satellites for surveillance, communications, weather, navigation, command and control, mapping, scientific research, and exploration.

Because strategic offensive space systems are inherently capable of operating anywhere, any time, and in any weather, the necessity for effective space defense weapons is both obvious and urgent. The purpose of this article is to detail the urgency of the aerospace defense problem, discuss the basic concepts involved, review our current capabilities, and describe operational requirements for space defense systems.

deterrence in the space age

For nearly two decades our national defense strategy has been based on deterrence of war through overwhelming strength. In the event general war occurs, the goal is to defeat the enemy as quickly as possible. In the past, the capabilities of our strategic and defensive forces have deterred general war through a number of major crises. How effective will these forces be in the space age?

Lieutenant General Arthur C. Agan, Commander of the Aerospace Defense Command,

has pointed out that deterrence is a state of mind—the opponent's mind. If the opponent does not fear the effect of a counterstrike (e.g., through his development of a new countermeasure or weapon), he is not deterred. Deterrence can also fail through miscalculation of relative strength, triggering of general war by a third power, or by an irrational or accidental act.

When manned bombers were the only threat to national survival, we could expect several hours of tactical warning. In addition, we could expect strategic warning from the intelligence community because of the unavoidable overt activity inherent in an intercontinental bomber raid.

With the introduction of intercontinental ballistic missiles (ICBM), the time in flight was greatly reduced. Additionally, with weapons deployed in silos, elimination of crew communications, and perpetual launch readiness, overt indications of preparations have been greatly suppressed. The result has been a marked reduction in both tactical and strategic warning time. Thus, the prospects of an aggressor's achieving surprise attack have been significantly enhanced.

Another factor jeopardizing our deterrent posture is the rapidly increasing size and maturity of the Soviet ballistic missile force. Former Secretary of Defense Robert S. McNamara recently testified that the Russians are expected to attain ICBM parity with the United States in 1969. Additionally, Communist China is expected to attain an ICBM capability in the 1970s. Therefore, as we enter the next decade, the chances of general war being triggered through a decrease in our relative strength, Soviet miscalculation, or irrational attack by a third power have been increased.

The Soviet emphasis on military space systems provides small assurance that our deterrent posture will improve in the 1970s, since their development time table has often put them one step ahead of us in space. The Soviets orbited the first satellite, the first living creature, the first man, the first woman, and the first multiman space vehicle. More recently, they achieved the first unmanned orbital rendezvous and docking as well as the

first soft interplanetary landing on Venus.

The demonstrated space accomplishments of the U.S.S.R., together with their avowed intention of ruling the world, leave no room for complacency. Regardless of our intent and desire to use space for peaceful purposes, the fact remains that the Soviets are deeply committed to their space program and that it is conducted under military management.

In statements to the Senate Armed Services Committee in 1968, Secretary McNamara noted that the U.S.S.R. has intensively tested a fractional orbit bombardment system (FOBS) and is now deploying an antiballistic missile (ABM) defense system. The first of these systems may be aimed at neutralizing our manned bomber force through surprise attack; the second may be intended to provide an ICBM defense function, which General Agan has identified as a vital military requirement.

basic concepts and requirements

Experience has shown that space defense concepts evolve naturally and logically from air doctrine. Specifically, space defense must adhere to the principle of defense in depth, with the goal of making the battle as remote as possible. We cannot, however, just extrapolate from past experience. The unique characteristics of space demand that we do our technological and operational homework carefully in developing specific requirements for weapon and support systems.

Inasmuch as the extrapolation process implies development of future values from past experience, a brief review of aerospace defense history will be useful to an understanding of ADC's future in space.

When ADC came into being in March 1946, its Commander, Lieutenant General George E. Stratemeier, had assigned four understrength fighter squadrons and one radar unit in training status, equipped with World War II sets. During the war scare associated with Communist seizure of power in Czechoslovakia (1948), the Air Force ordered ADC to establish air defenses in the northeastern and northwestern sections of the U.S. (one warning radar in each) and in Alaska (four warning radars).

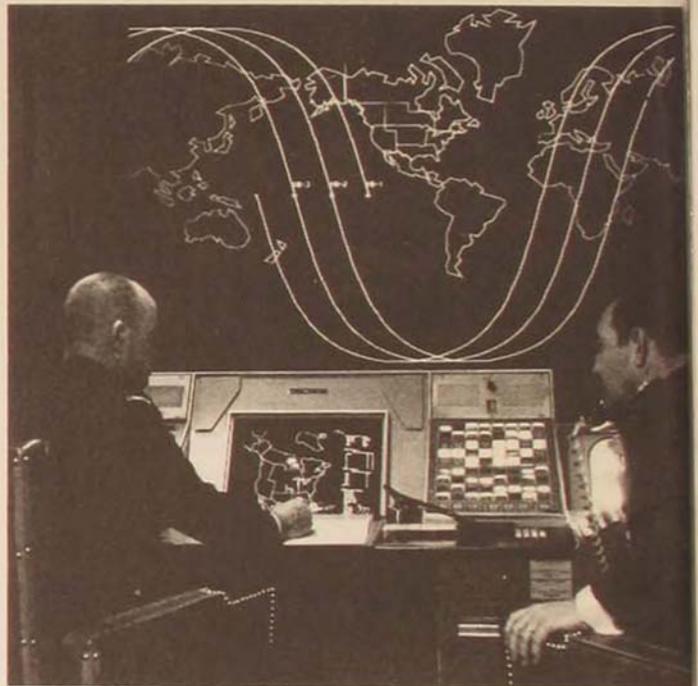
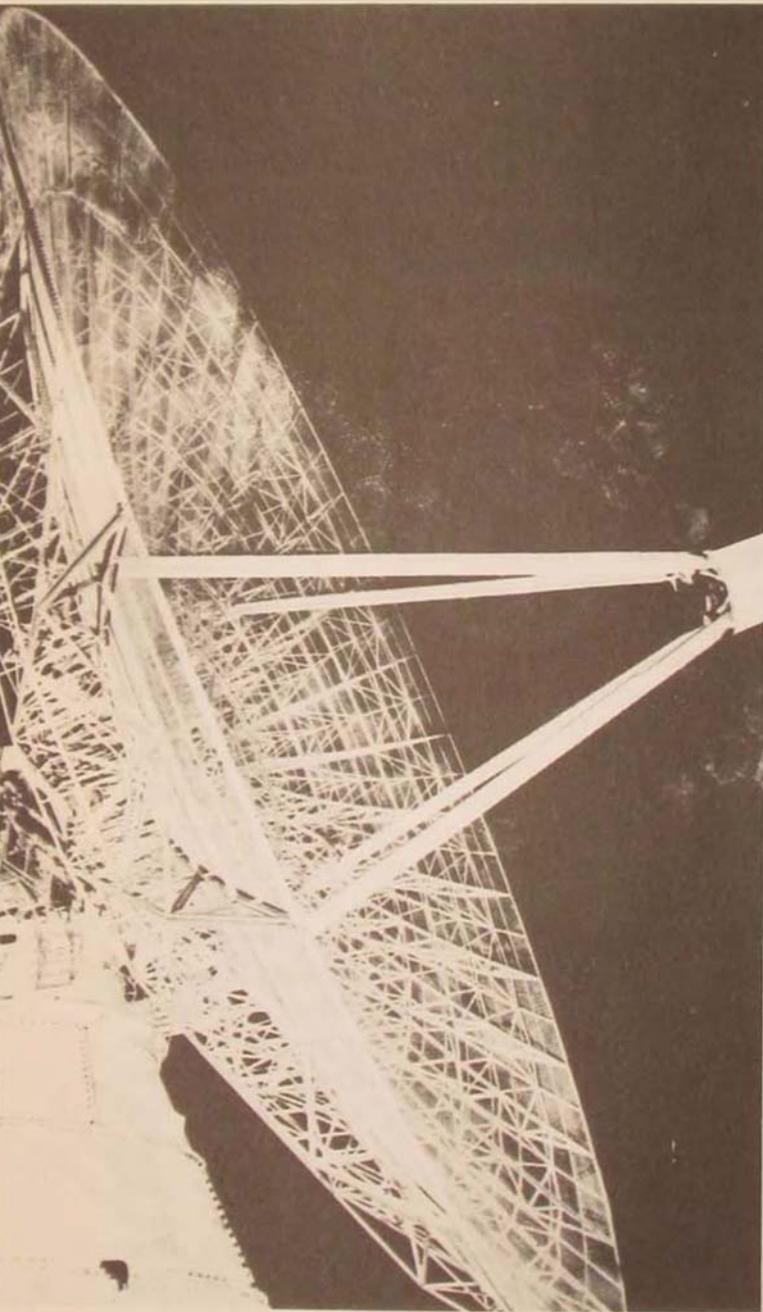
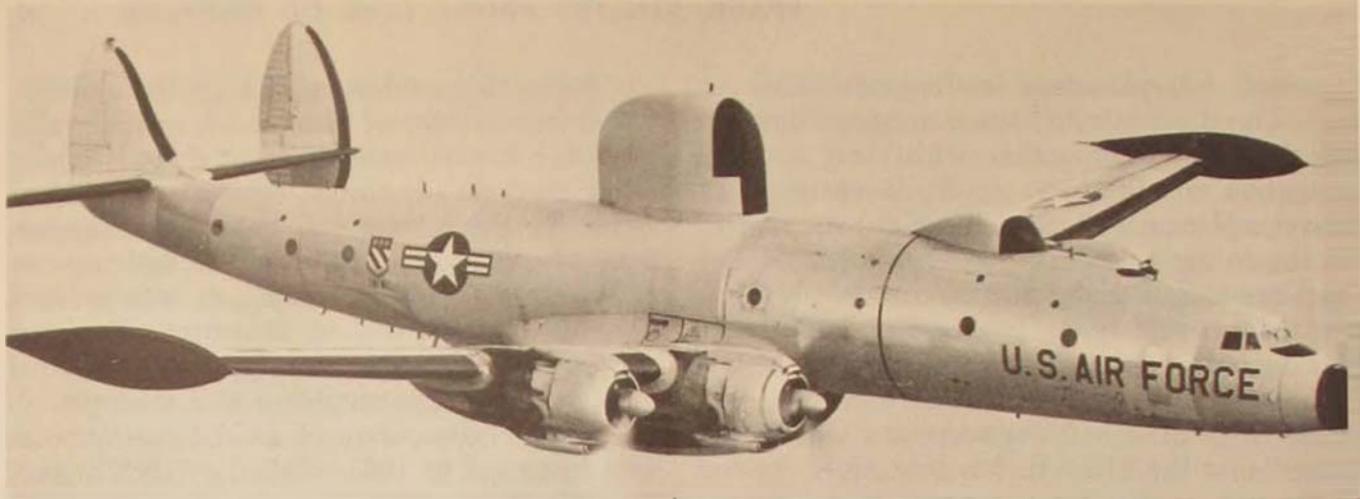
From this modest beginning, the conventional bomber threat was met by radars and interceptors sited near the most densely populated sections. As more equipment became available, the system was deployed more extensively. Since the range of the interceptors exceeded that of the radars, it was seldom possible to complete an intercept using one station. This led to the development of control centers linked by telephone and teletype.

A new generation of air defense systems was triggered in 1953 when the U.S.S.R. successfully detonated a hydrogen bomb and began producing jet bombers. The decreased warning time, increased range, and seriousness of the threat demanded the development of early-warning systems, more sophisticated radars, a semiautomatic ground environment (SAGE) for battle management, and advanced all-weather jet interceptors employing guided missiles. To provide warning time and to remote the air battle, radars were deployed to forward sites. In this way the Pinetree line, mid-Canada line, and distant early-warning (Dew) line came into being. The sea flanks were covered by radar aircraft, picket ships, and Texas Towers.

When fully deployed, these defenses against the manned bomber provided virtually continuous radar coverage throughout the continental United States. An elaborate communications net fed data to control centers, where digital computers produced operating instructions for weapon systems and distributed them via high-speed data circuits (data links). The battle commander and his staff, using the computer-generated tactical displays, could simultaneously control hundreds of interceptors and missiles against hundreds of targets. In addition to providing an effective defense in depth against manned bombers, this air defense system produced general recognition of the four functions basic to aerospace defense operations: detection, identification, interception, and destruction.

anti-ICBM defense

Development of the nuclear-armed ICBM in the 1950s had a major impact on our de-



The EC-121 is equipped with search and height-finding radar for flights over areas of the Atlantic and Pacific adjacent to North America, providing seaward extensions of our radar warning system. . . . The dual-purpose tracking radar at Fylingdales Moor BMEWS site in England can detect and track missiles at ranges exceeding 2000 miles. The radar weighs nearly 400,000 pounds and is enclosed in a protective radome. . . . From past trackings of satellites, predicted routes can be projected on a display screen for viewing by the NORAD battle staff in the Cheyenne Mountain Combat Operations Center, Colorado.

fense capability. Its trajectory enabled the weapon to fly over the existing active defense system and strike with little warning. Even with the best conceivable radars then under development, the maximum warning time was only 15–20 minutes.

The initial response to this threat was the deployment of the Ballistic Missile Early Warning System (BMEWS) to accomplish detection and identification. This system, which consists of three large radar sites in Alaska, Greenland, and the United Kingdom, became fully operational in 1965. The sea flanks will be covered by a Sea Launch Ballistic Missile Detection and Warning System (SLBMD&WS). The additional sites will provide coverage for the east, south, and west coasts.

Detection by the two systems is accomplished by formation of electronic fences (detection fans) which detect re-entry vehicles at ranges from several hundred to several thousand miles, thus providing from 5 to 20 minutes' warning. The identification function for a ballistic target is straightforward and consists of computing launch point, impact point, and time of impact.

To date BMEWS has proven effective and reliable. Additionally, by using supplementary technology, we have increased both the warning time and credibility. One such system uses over-the-horizon (OTH) techniques. Disturbances in the ionosphere created by missiles passing through it can be detected by transmitting high-frequency radio signals across potential launch sites to receivers. Analysis of these signals then provides detection data with a significant increase in warning time as well as preventing the attacker from using global-range ballistic missiles (GRBM) to make an "end run" around BMEWS.

Studies of anti-ICBM (AICBM) systems to accomplish the intercept and destruction functions fall into three major categories. In the first category are the boost-phase intercept systems, which attack the ICBM booster. During launch, the system is moving at relatively slow speeds, is vulnerable to nonnuclear kill, and is relatively easy to locate by use of passive infrared sensors. The aim here is to destroy the weapon prior to deployment of

multiple independent-target re-entry vehicles (MIRV) or swarms of decoys. To engage the ICBM at maximum range seems to be as sound a concept for space defense as it has been for air defense. This approach, however, involves formidable development problems in space-based sensors, homing interceptors, and automated command and control.

In the second category are the midcourse-phase intercept systems, which attack the ICBM re-entry vehicle during the relatively long (20–25 minutes) exoatmospheric part of the trajectory. During this phase, ground-based multiple-object tracking radars could make meaningful predictions and direct ground-based interceptors for a nuclear kill. This approach employs the principle of defense in depth but requires a sophisticated discrimination system to sort out the real warhead vehicles from decoys, chaff, satellites, and orbiting debris.

The third category of AICBM systems consists of re-entry-phase intercept systems. During atmospheric re-entry, objects with low ballistic coefficients (lightweight decoys, chaff, etc.) will be slowed down so that the heavier re-entry vehicles can be identified by multiple-object tracking radars. Kill would then be effected by terminal defense interceptors. Inherent in such systems is vulnerability to saturation attack and engagement of the threat at minimum range. Terminal defense systems have traditionally been the province of the Army.

The problem of developing an active AICBM system has been a matter of prime concern to the Secretary of Defense and the service secretaries. The most advanced system, Sentinel, is aimed at the 1970 Chinese ICBM threat and is projected to become operational in the early 1970s.

In summary, defense against the ICBM/SLBM threat consists of an alerting system (OTH), two warning systems (BMEWS and SLBMD&WS), and Sentinel.

space defense systems

The necessity for a capability to detect and track satellites was triggered by the

launch of Sputnik I in 1957. It was essential to maintain a detailed catalog of orbiting objects in order to be able to detect new satellite launches as they occurred. This led to the establishment of the SPACETRACK system in 1958.

It was determined almost immediately that maintaining a meaningful satellite catalog was a major effort resembling the complexity and operation of a SAGE center. Observations from remote tracking radars are processed on a 24-hour basis by centralized digital computers assigned to the Space Defense Center. There are, of course, some fundamental and important differences.

The air defense system catalogs air traffic through a tracking radar complex with overlapping, redundant coverage. These trackers, with a maximum range of several hundred miles, are supplemented with gap-filler sensors, which routinely acquire and follow maneuvering targets via hand-off procedures throughout their flights.

In contrast, the SPACETRACK system has only four sites capable of tracking satellites up to 2000 miles away. This means that a satellite is under direct observation for only a few minutes at most. Moreover, there is no hand-off capability, and penetration of the next SPACETRACK coverage may not occur for several hours.

The accuracy required to predict penetrations of SPACETRACK coverage gives rise to requirements for precision observations, complex mathematical models, extensive communication and computation facilities, and sophisticated equipment, operations, and technical evaluations. In particular, the narrow beams of our trackers give them only meager capability to acquire space targets. Thus, supplementary detection radars (available at only two sites) or computations based on known orbital elements (unavailable for new launches) are required, to align the trackers to the proper azimuth and elevation at the appropriate time for lock-on. Since several of the 1300 objects currently in orbit may penetrate simultaneously, a complicated system of tasking priorities must be maintained.

To supplement this meager system, con-

sisting of a lash-up of old radars and HF-microwave-cable communications links, there are several cooperating and contributing tracking radars (belonging to missile test ranges) and the SPASUR (space surveillance) facility (a satellite detection fence belonging to the Navy). An additional capability has recently been realized from the BMEWS system, which now contributes one-third of our satellite observations. However, BMEWS siting and equipment were designed for ConUS-targeted missiles on north-south trajectories, and the BMEWS orbital data are limited in both precision and coverage at present.

The identification element in space defense also differs substantially from that in air or missile defense. Satellites are unique targets in that they reappear periodically and predictably. Thus, satellite identification is practically synonymous with prediction.

The first action by both BMEWS and SPACETRACK detection radars is to see if fan penetrations can be correlated with a known satellite. At the present time, the 1300 known objects in orbit make some 400-500 fan penetrations per hour. If a penetration is out of tolerance or if a new object appears, it is automatically handled as an unknown. If a new object cannot be correlated with a friendly launch, then it is considered potentially hostile.

Unlike missiles and aircraft, an unfriendly satellite that overflies the ConUS is not necessarily hostile. Therefore, identification of nationality is not sufficient. Like customs at a port of entry, the investigation must be extended to include inspection. Our capability to do this from the earth's surface is rather limited and consists of radar signature analysis and orbit parameter studies.

future developments

Our capabilities with respect to the ICBM/SLBM threat are incomplete. In particular, current missile defense is limited to detection and identification only of a massive U.S.S.R. attack on the NORAD-defended area. Thus, as we enter the era of space defense, it is apparent that our national strategy of "deter or win" de-



The "Silver Chalice," a giant radar in the British West Indies, is part of the global network of SPADATS, the Space Detection and Tracking System. . . . Space-watching devices of the Fourteenth Aerospace Force help catalog man-made objects circling the earth, determine their orbits, and calculate their future positions.



pends primarily on the ability of our strategic forces to survive and react.

It is very clear that the nation which first deploys a cost-effective space defense system will enjoy a military advantage. It is therefore mandatory that our planners and developers exploit technological advances in accordance with sound operational requirements. Based on our experience in aerospace defense, these requirements can be stated explicitly as follows:

(a) *Detection systems.* Our present capability to detect missile and space launches is limited to alerting information from the OTH system and actual penetration of BMEWS, SLBMD&WS, and SPACETRACK detection fans. Fractional orbit bombardment system, multiple orbit bombardment system (MOBS), and global-range ballistic missiles can approach the ConUS on trajectories that avoid most of this coverage.

What is urgently needed, I believe, is the capability to detect launches on a global basis. By observing launches as they leave the silos and pads, rather than during apogee of the ballistic phase as we do now, we can double the warning time available. This, of course, assumes the existence of automated, high-data-rate, redundant communications — preferably via satellites.

These characteristics can only be met by using a space-based sensor system. The technology for such a system appears to be attainable. If sufficiently sensitive, it could also observe FOBS/MOBS deboost maneuvers.

(b) *Tracking systems.* The number of satellites in orbit is expected to increase exponentially so that the orbit population in the 1970s will approach 3000. In order to avoid saturation, second-generation SPACETRACK sensors with multiple-object tracking are mandatory.

Hand-off capability is vital for tracking spacecraft that possess significant maneuverability. Therefore, a global distribution of precision tracking sites is necessary. These characteristics are best met by ground-based, phased-array tracking and detection radars, currently in test at Eglin AFB.

(c) *Identification/inspection systems.* Currently there are over 50 Soviet payloads in orbit. As the number, size, and versatility of these payloads increase, it will become increasingly important to assess the capability and intent of those spacecraft which will make repeated crossings of the ConUS. When available and cost-effective, an inspection capability using sounding rockets or co-orbital satellites should be deployed.

IT IS ENCOURAGING to note that most of these operational requirements have been under study since 1960. But during this same period there has been much more progress by both the free and Communist worlds in production and deployment of strategic offensive missile and support satellite systems. The inevitable result has been to escalate the arena of general war from the theater limitations of yesteryear to the global dimensions of space.

Recognition of space as today's front line of defense demands commensurate emphasis on studies of defenses for every space weapon we can foresee, designs to counter every space weapon we find the enemy testing, and deployment of defense weapons against the existing space threat just as rapidly as cost-effective systems become available. We must be prepared, since the price of technological and operational surprise in the space age can be disaster. We can, and must, expend the effort to deter or win.

Fourteenth Aerospace Force

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WHAT IS SECURITY IN SOUTHEAST ASIA?

DR. FRANK N. TRAGER

LET'S think first about what security in Southeast Asia is from the point of view of Southeast Asians.

Southeast Asia, let us agree, includes the land areas between the Bay of Bengal and Indian Ocean on its western flank and the Pacific Ocean on its eastern flank. It is an area, contrary to some Asian stereotypes, that is neither starving nor teeming. It has a rich resource base: it supplies 90 percent of the world's natural rubber and 60 percent of the world's tin ores, besides being the rice bowl of Asia. Even today, under war-torn and mainly prescientific agricultural conditions, mainland Southeast Asia feeds its population and exports some four million tons of rice annually. It is rich in timber and other forest products, in oil and other land resources.

With the exception of Thailand, which has never lost its independence, Southeast Asia is an area that at one time or another has been under colonial sway, Western or Asian. Since World War II it has become an independent area once again, reviving in nationalist terms its rich dynastic past. Independent in the sense that it was free, each country adopted some kind of constitutional republic or monarchy as its form of government; each country was rid of colonial rule and was prepared to set sail for whatever independence held in store for it.

In terms of security, there should have been no threat, there should have been no problem. At the time of independence, none

of the Southeast Asian countries any longer had designs on their neighbors. There had been a time when the Thai and the Vietnamese in fact had designs upon Cambodia; and in their centuries-long march down this mainland Southeast Asian peninsula, they had squeezed Cambodia into smaller confines. So, too, the Burmese once had rampant dynasties; and Indonesians may have had ideas of reviving a greater Malayo-Indonesian state. But by and large, at the end of World War II such past "glories" were past. To repeat, in terms of security, after these countries had attained independence, there should have been no threat to the area—*but there was*.

The threat did not come from the former Western colonial powers. Once England determined to give up her Asian empire, she did so peacefully and gracefully. All her former colonies, other than Burma, have remained in the Commonwealth. We had preceded England in getting out of the Philippines on a timetable and by an Act of Congress. The Dutch had been fought out of Indonesia; the French were being fought out of Vietnam. With the exception of the smaller portion of the island of Timor in Indonesia (still possessed today by the Portuguese), the Western colonial powers were gone and had no intentions of returning as colonial powers. But there was a threat and an adversary. These came from Moscow after September 1947 and from Peking after October 1949.

The adversaries brought new revolutions

to Asia, or instigated new civil wars in Asia, or fomented aggression in Asia. Beginning in the late 1940s, Asia was not allowed to develop its newly won independence in its own nationalist ways. It became the scene of turbulence, of disturbance, of violence—any word that conveys the fact that the newly independent governments were under attack. And they were under attack not from the West, not from Japan, which in part cajoled and in part occupied the area during World War II. They were under attack by those whose orders, whose ideology, whose supplies, whose direction, whose manpower either came from, or were directed by, or were trained by Moscow or Peking.

Two recent news items point up this issue of security in the area. One is from the *Chicago Daily News* of April 11, 1968. Remember that Southeast Asia is flanked on the west by the Indian Ocean. This *Chicago Daily News* item is one of the few articles that I have seen anywhere on the defense of the Indian Ocean. I know of no public U.S. study on the strategic importance of the Indian Ocean, especially in light of the fact that the British have announced their defense departure by 1971 and to all intents and purposes have already departed. The Indian Ocean is now a power vacuum. Will it remain in that condition for the short or long term? The answer seems to me to be obvious. There are rumors that the Russians are already there, that the Indians have given them some kind of facilities in their Andaman Islands. We know that Peking has been diligently, if not yet too successfully, seeking a political foothold on the east coast of Africa. We know that neither Southeast nor South Asia has any present capability for defense in the Indian

Ocean area. We also know that somehow between the U.S. Sixth Fleet and Seventh Fleet there is this vast gap of the Indian Ocean.

The second news item, from the March 31, 1968, *New York Times*, reprinted a map from a Communist China story showing the various points of turbulence in the world. Though the Chinese Communists did not describe all these events as a consequence of Mao's "thoughts," they nonetheless seemed to imply a cause-and-effect relationship and certainly regarded them as "most excellent."

The adversaries, I say, are Communist Russia and Communist China. It is they who have been instigating, aiding, and in certain ways participating in the Southeast (and other) Asian revolutions, uprisings, civil wars, aggressions—all to the detriment of Southeast (and other) Asian security and independence. That they have been doing so for some time is evidenced by a brief snapshot of Southeast Asian history. Soon after the organization of the Moscow-launched, -directed, and -controlled Communist Information Bureau (Cominform) in September 1947 at Warsaw, a series of meetings took place in India, first in Bombay in November and December 1947 and then in Calcutta early in 1948. These meetings were under Russian command. Immediately following them, "indigenous" Communists went "home" to start revolutions in the countries of Southeast Asia that had already become independent. They began in Burma in March 1948, in Malaya in May, in Indonesia in September, in the Philippines in December, etc. And, omitting here Korea and Vietnam, some of those revolutions or civil wars or aggressions have continued to today in one form or another. To their number one can add Thailand, Laos, and Cambodia, all aided, fomented, organized, led, controlled, or supplied by Moscow and/or Peking.

In each case the revolution, the aggression, was directed not against colonialist power or imperialist power, it was directed against a newly independent government, sometimes socialist in orientation, sometimes liberal in orientation, and always designing its own role in the world in terms of a strong nationalism that did not necessarily want to

The second annual series of Thomas D. White Lectures at Air University continued on 18 April 1968 when Dr. Frank N. Trager of New York University was the chosen speaker. His informed views, adapted for the Review, are here presented to our readers.

The Editor

wear anybody's hat or carry anybody's spear. Surely one may conclude from this brief historical view that Southeast Asia has not enjoyed its independence; its security from within and without has been constantly undermined.

What did the Southeast Asians do and what did we do in the circumstances? One could succumb to the adversary, but that is what the Asians refused to do and still refuse to do. One could ignore the adversary, and in fact the United States did initially ignore the adversary in Southeast Asia between 1947 and 1950. However, beginning in 1950 and especially after June 1950 (the war in Korea), the United States by incremental involvement once again became concerned with the Southeast Asian area.

We offered two kinds of assistance for its security. The first in time was based on a bilateral agreement for a U.S. economic aid program with every country in free Asia (I was the aid director in Burma between 1951 and 1953). To this day the Congress, by its power of the purse, exercises annual policy control over the amount of economic and military aid that we give or lend to Southeast Asia. In addition to aid, we developed and ratified, from August 1951 to September 1954, a series of mutual defense treaties with eleven Asian countries. These included the bilateral treaties with Korea, Japan, Republic of China, and the Philippines; the trilateral treaty with Australia and New Zealand; and the multilateral Southeast Asia Treaty Organization (SEATO), which added Thailand and Pakistan to three of the foregoing Asian and Pacific Ocean states and extended SEATO's "defense against Communist aggression" to the "protocol states," Laos, Cambodia, and the State (later Republic) of Vietnam.

If anyone were to ask what our commitments are in free Asia, certainly one might respond that these two types of commitment, aid and defense, have not yet been repealed by Senators Fulbright, Percy, *et al.* The United States government, led by Presidents Truman and Eisenhower and with the ratification of the Senate, approved a far-reaching series of treaties in which we pledged ourselves to come to the aid of those countries endangered

by Communist aggression. It should be noted that a treaty ratified by the U.S. Senate acquires, under our Constitution, the force of the law of the land. These treaties, therefore, are among the laws of our country to be carried out faithfully by the executive branch of our federal government. We have implemented or supplemented these treaties and aid agreements with Presidential or executive commitments made by Presidents Eisenhower, Kennedy, and Johnson, with the twice-supported Gulf of Tonkin resolution, and the like. Essentially, therefore, when one talks about U.S. allies, and if (unlike many on the Eastern Seaboard) one is not so European-centered as to exclude Asia, then our allies in Asia and the Pacific include Australia and New Zealand, Korea, Japan, Republic of China, the Philippines, Thailand, Vietnam, and, indirectly, at least until 1971, Malaysia and Singapore through the British alliance. These are allies, not just friendly powers. (I have here excluded Cambodia, whose regime withdrew from the protection of SEATO; Laos, whose regime was withdrawn from SEATO by the 1962 Geneva Agreement; and Pakistan, a member of SEATO. In my view we have not wisely related to Pakistan, a former staunch ally. At present Pakistan may be said to be questioning her role as an ally of the United States.)

Now, why these moves against the adversary? Were these treaties and aid agreements merely pieces of paper? Were we really determined to stop the adversary? One must admit that if the United States enters into defensive treaties and agreements with states that thereby become allies, our design or objective is to thwart the enemy, to stop him, to prevent him from gaining his objectives. This poses at least two major problems. In the first place we must clearly recognize who the adversary is, whether or not for tactical reasons we refrain from always publicly naming him. I have here named and described the conduct of the adversary, in the singular or plural. I have indicated that the adversary has designs on Southeast Asia and has had such designs on Southeast Asia—in the case of the Russian Communists, at least since 1920 and especially since 1947; in the case of the

Chinese Communists, at least since 1950; and in both cases, with their satellite forces whenever these can be organized. So the adversary in the main has been here identified. We, by the treaties and agreements just alluded to, decided with our allies to thwart him, oppose him, prevent him from capturing the prize he seeks. So far, so good.

This leads to the second major problem: How do we go about this? What kind of doctrine do we have with respect to thwarting the enemy? What is the relevance, if any, of the "domino theory," and what about March 31, 1968? [N.B. An allusion to President Johnson's unilateral de-escalation of the war in Vietnam in the hope of getting negotiations for peace.] I would say, at the risk of perhaps offending some of my military friends, that with respect to doctrine we have been rather negligent. I do not think that we have really studied the objective conditions in Southeast Asia with sufficient depth to produce the kind of doctrine necessary to fulfill our specific obligations. As one element in proof of this assertion, I cite the fact that as late as March 1962, when some of us were at the National War College, we received a directive in the name of the President of the United States, then President Kennedy, signed by General Maxwell Taylor, then his military adviser, to introduce into all appropriate service-connected military and civilian State Department schools a curriculum on counterinsurgency. March 1962—not until then had such an order been forthcoming.

I do not mean to say that insurgency had not been studied before then or that guerrilla warfare had not been part of the studied historical experience of our military. I do say that we had not restudied the issue in terms of its current post-World War II Asian context so as to formulate accepted interservice doctrine. As a matter of fact if one reads the U.S. Army official three-volume history of the China-Burma-India Theater he will see that the major military experience in the Southeast Asian jungle environment that might have contributed to counterinsurgency doctrine—I refer to Wingate's Chindits, Merrill's Marauders, and the Kachin Rangers—has been very

much downgraded. It was not particularly compatible with the then military doctrine. If wiser heads than mine were to say that the downgrading was justifiable, I would still say from my knowledge of Southeast Asia that even failures there were worthy of correctional study. Of course, we have had some counterinsurgency doctrine and some guerrilla warfare doctrine, but these in my view suffer from a lack of the contextual experience of Southeast Asian civil war and insurgency and aggression; they lack some of the reality of the kind of warfare fomented in Southeast Asia after World War II. I find, therefore, the need for doctrine eminently necessary—a need to which the March-April *Air University Review* also calls attention.

Let me pursue this issue of doctrine one step further. Mostly as a result of our concern about nuclear warfare in the early 1950s—that is, the belief that reliance on a single strategy of "massive retaliation" was not enough—we then developed a doctrine of limited warfare. Though definitions vary, limited warfare basically meant limited aims or goals at or for the conclusion of a war, to be achieved by non-nuclear, conventional military means. This doctrine of limited warfare and readiness to undertake it—based so much on the Korean experience—was designed to prevent the holocaust of nuclear warfare. As our involvement in Southeast Asia grew incrementally, we seem very quickly to have selected from past doctrine the concepts of both counterinsurgency and limited warfare, expecting that these would apply to the kind of warfare in Vietnam. We applied concepts taken from experience in other Southeast Asian countries, whether or not these concepts fitted the Vietnam situation.

In my view we have not succeeded in developing a doctrine of counterinsurgency, essentially a necessary mix of military and political components that involves analyzing traditional and peasant societies, analyzing the enormous tasks of building the military, political, and economic institutions of newly independent countries having small educated elites and large uneducated masses, all opting for modernization. We have not done this for

Southeast Asia in general and certainly not for Vietnam where we are fighting.

I agree that formulating doctrine with respect to counterinsurgency in Vietnam or elsewhere is a difficult task. It requires a political-military mix to which we have not yet become accustomed. But with respect to the doctrine of limited war I feel less charitable. I believe it is perfectly feasible to have a limited-war aim for the conclusion of war, aims such as those that Presidents Kennedy and Johnson explained over and over again with respect to Vietnam: that we do not mean to destroy the regime in the North; the Communists won North Vietnam—it's too bad, but they did; we do not mean to take it away from them, but we also mean to have them cease and desist in their aggression, civil war, insurgency warfare against the South.

Now in my view such a limited aim is a conceivable one; it is even an acceptable one. Its logic is related to the Hungarian episode of 1956: the Communists keep what they have but are not to be allowed to take more. This limited aim is designed to keep the nuclear powers from using nuclear weapons against each other so long as each stays on his side of the "border." We do not use nuclear power against Hanoi because it would invite nuclear retaliation from Moscow (or Peking). In this sense a limited-war goal for the end of the war is designed to minimize the risks of nuclear escalation. But a limited-war goal in this sense need not—should not—be fought by gradual doses of limited arms. The operative word here is "gradual." To achieve a limited-war goal does not necessarily imply that the conventional means employed should be applied with restraints or other forms of gradualism. Rather, if one seeks to achieve a limited-war goal there is no reason why he should not use his power fully, in the manner of Israel. That is, one should use sufficient conventional power to achieve his goal in the shortest possible time.

I committed this idea to paper at least five years ago. It seemed to me that the doctrine of limited war and limited means to achieve its ends (i.e., nonnuclear means) omitted from consideration the operative concept

of time in the use of power. I have unsuccessfully argued that the *speedy* use of enough conventional power in Vietnam would have been more acceptable at home and less costly on the battlefield.

I have not spent as many years on this issue of doctrine as I have on some of the other Southeast Asian matters that I have discussed here. But I really believe and hope that there is time—I know there is need—for the Air Force to study the problem of counterinsurgency doctrine, to restudy the doctrine of limited-war aims and the conventional means of achieving them, all in relation to the use of power.

As an aside, let me cite my experience in Vietnam in early 1967, my sixth visit to that area. At that time air power was very much under criticism at home and abroad. It was charged with failure for not having done its job in Vietnam; that is, its use against the North had not broken the will of Hanoi; it had not brought Hanoi to the negotiating table; it had not stopped the infiltration; it had only improved the morale of the South. That was the charge. What were the facts?

As late as February 1967 there were six major MIG air bases in North Vietnam that according to orders from Washington were not to be attacked. Thus our Air Force had to fly through a considerable air defense system, suffer the damage, possibly see the MIG's on the ground, but refrain from attacking them until they were aloft, and then if possible shoot them down. In the spring of 1967 such restraints were lifted on three of the MIG bases, but not until October 1967 were they lifted on the remaining three, including the most important one of all, at Phuc Yen. This seems to me to be a grossly inadequate use of available air power. It can be matched by restraints placed on U.S. ground forces in pursuit of the enemy, who then took sanctuary in Cambodia. The original restraint prohibited pursuit within 10 miles of the Cambodian border; later the limit was reduced to pursuit within six miles of the Cambodian border. Finally in 1967 the U.S. ground forces were permitted to pursue up to the border and shoot across it if attacked.

Such restraints on our air and ground forces, usually unknown to the general public, provided undeserved support to those who wish to attack the military—air or ground—in the ways I have pointed out.

Now, I say that is no way to fight a war. If your aim is to make the enemy cease and desist, you incapacitate him, you make it impossible for him to use his power by destroying his power as *speedily* as possible. You do not wait months and years to use your power; after you once decide to “hit him” on his own soil in early 1965, you do not wait until late 1967 to deliver blows.

I cite this to give point to the need for re-examining what we mean by limited-war aims—and the means by which we hope to achieve whatever limited-war aims we have. I know that some will say that the Commander in Chief ordered the way the war should be fought. Agreed. Then he was badly advised by those whose duty it is to advise. There is no record—the future may disclose one—that a united military presented a single doctrine to the Commander in Chief on what a limited war is and how to fight it.

I believe that our aims were always clear, and I support them. The aim of making the enemy cease and desist, without necessarily destroying the regime, merited support in my view because it decreased the risk of nuclear escalation with respect to Moscow and Peking. Not that it eliminated that risk, but it did decrease it. However, I also supported the other half of the doctrine: namely, using the amount of power necessary to achieve your aim in the shortest possible time. So much for the doctrine.

I have suggested that the issue of doctrine and the “domino theory” are “tied” together. It is true that President Eisenhower used the words “domino theory” and “dominoes.” It is also true that such analogies may not be applicable. Nations are not dominoes; they do not necessarily fall in the kind of sequence that a domino game suggests. However, the idea behind these words is not inappropriate, and its substance is, as we shall

see, wholly appropriate. In considering this let us first review some recent events in South-east Asia.

I am rather familiar with Burma—it has become almost a second home. Burma may be characterized as an honest neutralist in South-east Asia, whether under the premiership of U Nu or U Ba Swe or General Ne Win. Her leaders have tried to walk a correct path, entering into no defense pacts, minding, in effect, their own foreign affairs business. In 1960 Burma signed a border-demarcating treaty with Communist China—a good border treaty, be it said. This was accompanied by a ten-year aid agreement, completing the roster, so to speak, of accepting aid from any and all quarters on terms agreeable to Burma. However, on March 20, 1968, the *New York Times* carried a Rangoon story indicating that General Ne Win charged Communist China with giving sanctuary to Burmese Communist rebels. This story in 1968 is a little bit out of date; it has been true at least since 1950. Since then, Kunming, China, has served as a base for Communist cadres from Burma. There they have rested and been trained, resupplied, and then infiltrated back into Burma. These are the so-called “White Flag” or majority group of Burmese Communists under Than Tun; they are avowed Maoists.

This news story comes after a more significant train of events. Just a year ago the Maoists in Peking and in Burma, desirous of stirring things up, decided to utilize the Chinese population in Rangoon—at least that portion of it loyal to Peking—to create additional disturbances. A pretext was found in a school situation predominantly “Chinese” in population. There were riots, assaults, and burnings in Rangoon and elsewhere in Burma. This gave Peking the opportunity to launch a political and propaganda attack on Burma; to avow publicly that it would aid (as it has been aiding) the Burma Communist Party in its rebellion, and also the so-called “Free Kachin” movement, a minor ethnic group, some of whose members have been paraded as an anti-Rangoon-government group since the early 1950s. The Kachins in this Communist-announced movement are in fact collabo-

rators with, if not cryptomembers of, the Burma Communist Party. In October 1967, General Ne Win ended the Peking aid program, sending back to Communist China some 400 Chinese "technicians." The news story of March 20, 1968, merely confirms this conflict.

Indonesia serves as a second illustrative instance. She, too, has been a neutralist. But unlike Burma, Indonesia under Sukarno cannot be categorized as an "honest" neutralist. Certainly Sukarno, after he adopted the 1957 policy of "guided democracy"—in which Indonesia lost both guidance and democracy—opted for the "new emergent forces of Asia and Africa" and joined with Peking in this policy. The 1965 PKI or Communist Party coup, which sought to take over the government, has been defeated. Sukarno is now past. But we still are learning, as in the February-March 1968 trial of the PKI leader, Sjam, the extent of Peking's role in that attempted Communist coup. Indonesia is now at least a neutralist and a more realistic one. General Suharto, now head of its government, is quoted on March 31, 1968, as saying that the U.S. bases in Asia may not be the most desirable things in the world but that they are "realistic." Indonesia has rejoined the United Nations, has ended the Sukarno "confrontation" policy against Malaysia, has joined the Association of Southeast Asian Nations (ASEAN), and has had bilateral talks with Australia on the need for and possibility of some kind of defense arrangement. So much for two leading neutralist states of Southeast Asia.

On the "collective security" side of the picture, when Secretary of State Rusk recently went to the SEATO meeting at Wellington, New Zealand, he deservedly caught "hell" from our SEATO allies who are involved directly in Vietnam (also from Korea though it is not a member of SEATO). Our allies—Australia, New Zealand, Thailand, the Philippines—became concerned that the United States, after President Johnson's move of March 31, 1968, might be "doing a Gavin" or "a Percy" or "a McCarthy." That is, they feared a potential unilateral withdrawal from Vietnam. This they

would regard as a real danger signal to Vietnam and their own security. Remember that our allies, the Australians, New Zealanders, Koreans, Thai, and Filipinos, also have fighting forces in Vietnam.

Let me now tie these Southeast Asian recent events to the so-called "domino theory." The Southeast Asian responses to the threat and aggression of the adversary have been at times ambivalent. Some of them, for example Burma and Indonesia, have trod the neutralist path in various ways: they wanted to avoid entanglements with power blocs. But today Burma, after her recent experience with Maoist operations in Burma, and Indonesia, after a bloody battle with the PKI which cost between 300,000 and 500,000 lives, are concerned for their future in Southeast Asia. They are no longer sure that they will be able to pursue the strictly neutralist path even if they should so desire. Others, among whom are our allies, have opted for security in terms of collective defense. And they too are genuinely concerned as to whether or not we really mean what we say when we pledge our support against "Communist aggression." In this connection I like to cite the smallest and newest of the Southeast Asian states, the state whose prime minister is not especially friendly to us for good reasons. I refer to Lee Kuan Yew of Singapore. On several recent occasions Prime Minister Lee has pointed out that if the Communists are able to advance their frontiers so as to envelop South Vietnam, it will be only a matter of time before the same process of military and political techniques will be employed to overtake the neighboring countries. And, he adds, his "neck" will then "be had"—an event he wishes to forestall.

This is the domino theory, whether you call it dominoes or something else. It is saying that Southeast Asia is pervious to a special kind of threat and aggression. It is saying that its security hinges on maintaining not only South Vietnam's security but also that of the other states in the area. Laos may well be instanced as presently and peculiarly vulnerable to the Communist offensive. Let us not overlook the fact that today Phong Saly, Samneua, part of Xieng Khouang, and Luang

Prabang's eastern reaches as well as the Ho Chi Minh "trail(s)" from Tchepone down to Attopeu are close to being in Ho Chi Minh's hands. This threat has already spread to Thailand's north and northeast provinces, and in one form or another it menaces every other country in Southeast Asia.

If, then, one sums up by saying that the responses of Southeast Asia have been ambivalent in some respects, in others have avoided involvement, it is nonetheless true to say that today, 1968, all current responses voice varying degrees of genuine concern and alarm. Increasingly Southeast Asian states begin to put up chips for the defense of their Asian, Pacific, and Indian Ocean areas.

Now this leads me to present a brief and necessarily unfinished scenario about March 31, 1968. It begins with the preface that the President announced two things on that night: One, that he was no longer a candidate for office to succeed himself; the other, that he unilaterally ordered the cessation of bombing north of the 20th parallel in the hope that this would bring the North Vietnamese Communists to a negotiating table.

As to his second announcement, I would have hoped that instead of unilaterally stopping our bombing north of the 20th parallel he would say to the North Vietnamese Communists that unless they cease and desist in their aggression against South Vietnam we will use our conventional power speedily and effectively to defeat them. There is still a remnant of a possibility that that might happen if time does not run out. Hence my scenario:

What is the North Vietnamese conception of negotiation? It is the same as Moscow's and Peking's. There is nothing new or arcane about it. The Chinese Communists sum it up as "talk, talk, fight, fight." It is what we experienced in Korea when we thought that the fighting would slow down or stop in July 1951, thirteen months after it began. But the negotiations went on for more than twenty-four months, during which there were more casualties than in the thirteen months of war. Next, there was the experience at Geneva in 1954, when negotiations began in March and were

concluded in July with no signed solution other than the cease-fire arrangements between the Vietminh (Communists) and the French (Dien Bien Phu was the biggest battle of that war, and it was conducted by the Vietminh during the negotiations) and the Vietminh and Cambodians. Again at Geneva, negotiations over Laos began in July 1961 and were not concluded until July 1962. Here the Communists, in terms of their conception of strategy and tactics, achieved an ideal solution. They became legal members of a *troika*, the kind of coalition government urged by Khrushchev in which the Communists would have a veto; and simultaneously they retained a base in the provinces of Phong Saly and Samneua contiguous to Communist China and North Vietnam for overt operations against the Lao government, of which they were constituent members.

Now what I am suggesting in this scenario is that our conception of negotiation is *not* like theirs. Their conception of negotiation is based on a political and military mix, a Leninist version of a Clausewitzian formula which at the very least entails a kind of "two steps forward, one step back." It is, to use a more current phrase, a form of protracted warfare. Such a conception of negotiation is foreign to us. We are certainly aware that political negotiation, like economic negotiation, represents fair compromise. We are unaccustomed to the talk-and-fight formula. We hold that if force is being employed by one side, the possibility of political compromise in the talks may be lost in the logical development that the other side will return to the exercise of its power too.

The scenario continues. Two weeks have already been spent seeking agreement between Washington and Hanoi solely on the selection of a meeting site. I predict in my scenario that the site selection will not be settled until the end of April or beginning of May. [N.B. This prediction proved to be accurate.] That means one month will have run out. Then the talks begin—these are not negotiations. The talks are about where and under what terms the negotiating meeting will take place, if it takes place. It will include the

naming of states and parties that shall be at the meeting and its proposed agenda. One can readily predict a long, dragged-out debate on all such items before negotiations begin, if they begin. The crux of the matter will probably be over the role, if any, of the so-called National Liberation Front of South Vietnam; Hanoi will say it has to include the NLF as such, and the South Vietnamese will say no. And so this business of the talks and who will have the right to be in the ministerial-level negotiating meeting that may follow the talks, I predict, will take months. All this will be so planned by the Communists because obviously Hanoi, seeing an outgoing U.S. President, is looking forward to his successor as a new President from whom it might expect easier terms. [N.B. In the spring of 1968 they thought of Senator Robert Kennedy, Senator Eugene McCarthy, and Governor Nelson Rockefeller.] It is in their interest to protract negotiations and wear us down. In the meantime, there will be more casualties; Americans will be expected to become more impatient and to say there must be an end of the killings and an end of the war. They will be expected to say, "OK, let's get it over with. So we'll concede that the NLF as such shall be present, and we'll agree to a coalition government." And nothing could be worse for the South Vietnamese and for our allies who have been fighting alongside us.

If our patience were to seem as if it was at an end before such concessions were made, or if it were to appear as if our stubbornness matched Hanoi's, Hanoi would introduce a new tactic. Hanoi would suddenly appear as if it were on the verge of reasonableness. It would make a gesture such as "We'll exchange prisoners with you." I assure you that this "concession," an exchange of prisoners, will take place after some months. It will be designed to give us the justifiable satisfaction of repatriating some Americans. It will also be designed to give us the illusion of Communist "reasonableness," thereby to soften our resistance in general and on such items as the role of the NLF, and in any event to protract the negotiations until the November elections are over.

The scenario will then continue to be played. And in the meantime our allies will become more and more fearful of the outcome, as well they might, and the South Vietnamese government will be doomed by a coalition government. Doomed *because* it is a *coalition* government.

This kind of pessimistic scenario may well come to pass. The talks and the proposed negotiations have these dangers inherent in their very nature.

There is one other option which, if taken, produces another scenario. It is based on the possibility that Hanoi overplays its hand, that protracted talks and negotiations allow for too many killings, particularly of Americans, so that the President may lose his temper and say, in effect, "Enough of this, Hanoi; we will make you cease and desist promptly and properly."

Those are the two alternative scenarios. The first is based on concession that will lead to defeat, certainly for the South Vietnamese. It will prepare the way for a Communist take-over in South Vietnam. The second is based on an early stiffening of the American back, a disillusionment with protracted warfare, with "talk, talk, fight, fight." It presupposes that we will still adhere to our limited-war aim of "Keep your Communist regime but leave the South alone" and that we will at long last maximize our conventional military power to bring this limited goal swiftly to reality.

These scenarios, variations on war games, are not just games. They are related to the real situation, "estimates of the situation," in Hanoi and in South Vietnam. That the situation is serious cannot be denied. Our casualty rate in recent weeks has been almost at an all-time high. The rate of North Vietnamese infiltration into South Vietnam still persists and mounts. There is as yet no discernible slow-down in response to our unilateral stoppage of the bombing north of the 20th parallel. The logistic ability of North Vietnam to resupply its forces in South Vietnam has improved in the last few weeks. The roads to and from Tchepone down to Attopeu across into the South Vietnamese highlands or across the

duck's bill from Cambodia into the Delta are used more than they were before the "talks" began. Much more of the same can happen in the next few weeks.

What, then, are the Asian options? They are interesting, because they are relatively new. They emerge from what may be the most significant event arising out of this dreadful and drawn-out Vietnamese war.

We knew about Asian regional efforts in times past. They have not been sustained or too successful: the first Asian-New Delhi conference of 1947 and its successor in 1949; the Bandung Conference of 1955; the 1961 Association of Southeast Asian States (ASA), formed by Thailand, the Philippines, and Malaya, which fell by the wayside or was put on the shelf because of the conflictual problems between and among Indonesia, Malaya, and the Philippines in 1963; and others. But ASA has been revived or replaced under a new name; it is now called the Association of Southeast Asian Nations (ASEAN) and includes Thailand, the Philippines, Malaysia, Singapore, and Indonesia—a rather interesting combination. And then there is the Asian and Pacific Council (ASPAC), which includes those five plus Japan, Korea, Taiwan, Australia, and New Zealand, with Laos as an observer. The inclusion of Japan in ASPAC is significant for a variety of reasons. Japan today has attained the third-largest gross national product (GNP) in the world. She has the economic capacity and technological skill for a defense posture yet to be determined. That she will respond positively to this challenge in the light of Communist China's nuclear bomb and primitive though real delivery systems is most probable.

I do not mean to suggest that these regional developments—ASA, ASEAN, ASPAC, and others—are defense-oriented. Much of their

talk is about regional economic and cultural cooperation. But it is also clear that the many regional meetings stemming from these efforts are gradually considering their defense needs along with their desires for economic development. I submit that the Asians, after some twenty years of firsthand experience with being attacked, are beginning to realize what they must do in order to protect themselves. This is a kind of "reverse domino theory"; or, better, it is a potential vision of true collective security so as to avoid the danger of "hanging separately."

And what should the American reaction to this be? Some will say: "Fine; let it alone; let it develop by itself. Don't repeat SEATO, an American-dominated defense pact that did not enlist many of the Asian states." I disagree! We have the longest Pacific Ocean coastline of any power. We are, as World War II clearly established, a Pacific Ocean power. Now, therefore, especially in the light of the British departure from the area, the United States should work cooperatively as *unum inter pares*, "one among equals," toward a Pacific-Indian Ocean Defense Agreement (PIODA). It should be a new pact, not a revision of SEATO. It should be a pact representing a true mutuality of interests, not an American defense oligarchy for the Pacific-Indian Ocean area. The mutuality of interests and capacities in PIODA might be somewhat described by a slogan that was original in an entirely different context: "From each according to his abilities, to each according to his needs."

I submit that, for the security of free Asia in the next five years, some such arrangement as PIODA is not only desirable, it is necessary. Not only necessary for the 250 million people who live in Southeast Asia but necessary also for the 200 million who live in the United States.

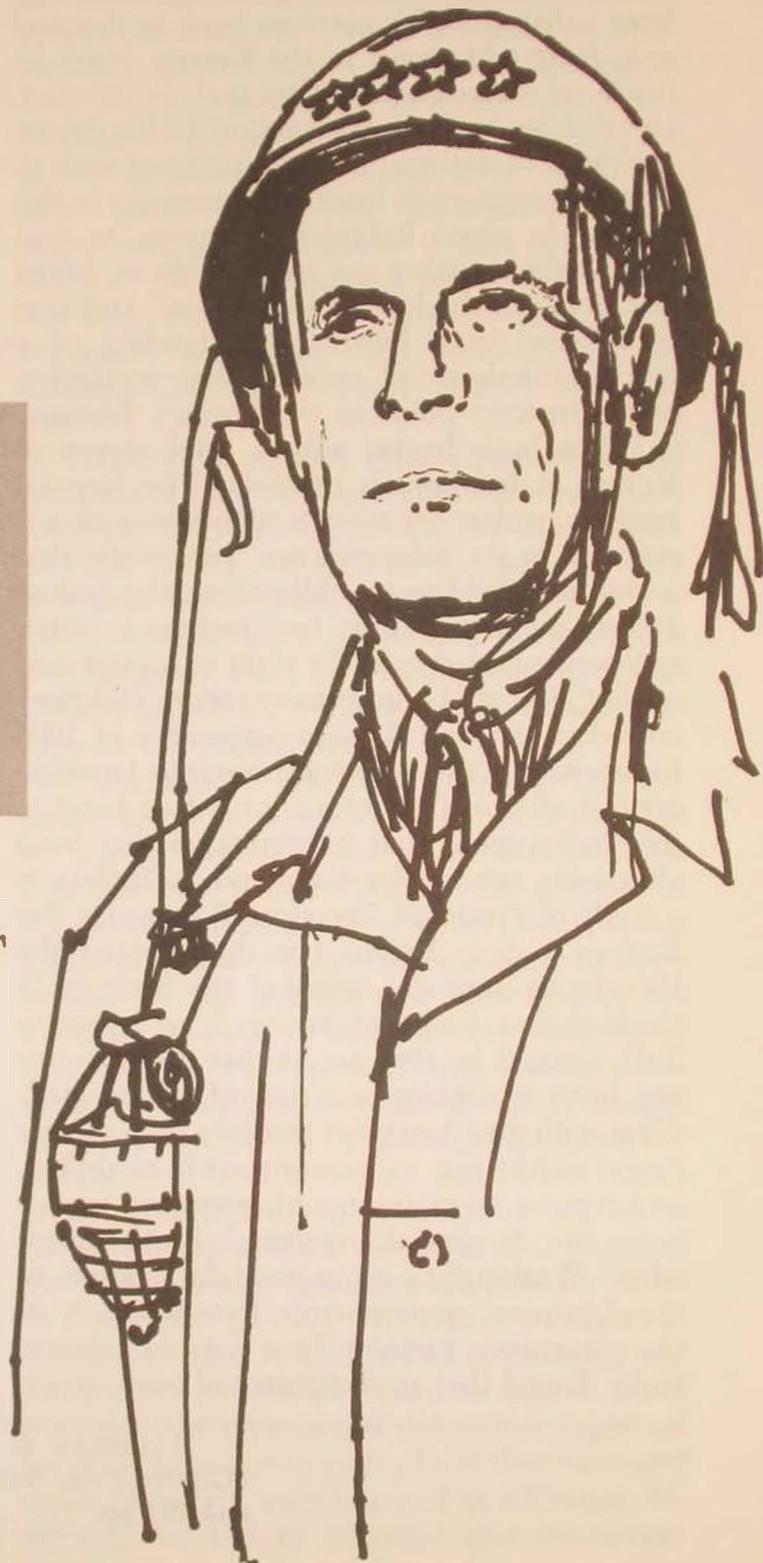
New York, N.Y.

Books and Ideas

KOREA IN RETROSPECT

LIEUTENANT COLONEL GEORGE W. COLLINS

A DOZEN years ago General Matthew B. Ridgway published his memoirs, the career story of an outstanding officer from his youth as an "army brat" on various Western posts to his retirement in June 1955 as Chief of Staff, United States Army. Essentially it was a story of leadership, and in his realistic description of the camaraderie of combat soldiering Ridgway showed himself to be acutely aware of the human hazards of war and to have a genuine compassion for his men.¹



Now he has written another book.† The present one is an elaboration of the earlier reminiscences: a thoughtful analysis by the man who assumed command of the Eighth Army in Korea at a most perilous time and who, through indomitable personal leadership, saved that army and the United Nations effort from collapse. In his previous book he devoted only forty-odd pages to the Korean War: he made no serious attempt to analyze the war, nor did he pay much attention to the larger problems of national policy associated with it. Those shortcomings have been made up in this volume, in which Ridgway endeavors "to shed some light on what we tried to do in Korea and point up the lessons we learned" and thus contribute "to a better understanding of a much-misunderstood conflict that marked a major turning point in the nation's history."

The book begins with a brief survey of United States-Korean relations. The General reminds us that our treaties with Korea always referred to its independence, but, while that nation was held to its obligations, the United States "made no effort to interfere as other nations struggled over the right to occupy and exploit" Korea. As have many others, Ridgway considers the Taft-Katsura agreement of 1905 to represent United States consent to Japanese control of Korea in return for a free hand in the Philippines. That interpretation has been effectively refuted by Raymond A. Esthus in a study of President Theodore Roosevelt's Far Eastern policy. Esthus has documented the President's emphatic denial of any bargain: "I think that a sufficient answer," he wrote to Taft, "would be that we neither ask nor give any favor to anyone as a reward for not meddling with any American territory. We are entirely competent to prevent such meddling, and require no guarantee of assistance to preserve our territorial integrity." Furthermore, when Washington requested clarification of the Japanese government's interpretation of the agreement, Premier Taro Katsura categorically denied that any bargain had been struck.

And, finally, despite the troubled relation with Japan through much of Roosevelt's administration after 1905, there is no evidence states Esthus, in the public or private papers of the government's leaders or in the State Department archives, that the Taft-Katsura agreement was ever conceived of as a *quid pro quo*.²

Ridgway has organized *The Korean War* around four general topics. First, the problems and conduct of the war from its beginnings in June 1950 until late December of that year when he replaced Lieutenant General Walton H. Walker, killed in a jeep accident as Commander, Eighth Army. Thereafter he discusses his work in that capacity; as Commander in Chief, United Nations Command; and, finally, the lessons learned and, unfortunately, sometimes forgotten. In his conclusions Ridgway offers some suggestions for the formulation of present and future national policy.

There are no startling revelations in the book—not that the author has claimed any. As have others before him, Ridgway is critical of the rapid demobilization after World War II which had such a devastating impact upon the nation's ability to conduct anything except nuclear warfare. He seeks no scapegoats for the demobilization and recognizes the heavy pressures exerted on the administration, as well as the nation's "complete confidence in the ability of the United Nations to forestall any serious aggression." Ridgway does, however, strongly state his objections to the nuclear deterrent strategy which so completely captivated the nation.

The General seeks to place the Korean War in proper perspective as "the beginning of an age when it would no longer be possible for our nation to ensure peace merely by avoiding foreign entanglements." It marked the end of "Fortress America," he believes, and forced the nation to decide upon several vital questions. Ridgway is well satisfied with the decisions that were reached: recognition

†Matthew B. Ridgway, General, USA (Ret), *The Korean War* (Garden City, New York: Doubleday & Company, 1967, \$6.95), xvii and 291 pp.

that national policies must be carried out in cooperation with our allies; confirmation of civilian supremacy over the military; and the decision to stand up to aggression—we had to accept the challenge in Korea, he maintains, otherwise World War III would have come.

The war resulted not from intelligence failures but, he states, from too much weight being placed upon interpretations of the enemy's intentions, interpretations which confidently held that there would be no Communist military challenge to the West. The outbreak of war found the nation unprepared not only militarily but psychologically as well. It was the first "limited war," and America was not ready to recognize that "total victory" and "unconditional surrender" were outdated slogans.

The inability of many to accept the new limitations on warfare was evident in the nation's reaction to the Truman-MacArthur controversy, which Ridgway handles excellently. He attributes MacArthur's insubordination to his disappointment in not being able to strike a crushing blow against world Communism. While he is critical of the handling of MacArthur's removal, he fully supports the necessity of it. The Joint Chiefs of Staff were well aware of MacArthur's disregard of orders: Ridgway cites a top-level discussion in the JCS War Room on 3 December 1950, when the Joint Chiefs, although dismayed by the Far East Commander's disobedience, tolerated his actions. Only Ridgway demanded that something be done, and his outburst went unheeded. The issue between the President and the General he correctly interprets as a challenge to civilian control of the military, rather than a question of "limited" versus "total" victory. Nevertheless, the popular support which MacArthur received upon his return indicates that the issue was not clearly understood by many Americans and that they considered his removal a denial of total victory in Korea. In view of Ridgway's recognition of the difficulty which the nation had in grasping the importance of limited warfare, that is a point on which he might have elaborated further.

Of importance are the observations on

MacArthur's conduct of the war. To be sure, the usual accolades are bestowed: "military genius," "brilliant advocate," "deepest respect for MacArthur's abilities, for his courage, and for his tactical brilliance," and "truly a great military man, a great statesman, and a gallant leader." Nevertheless, Ridgway's analysis includes considerable adverse comment on MacArthur's generalship. Criticism is leveled at him for his failure to properly assess the strength of the initial North Korean attack; for failure to unite the X Corps with the Eighth Army after the Inchon invasion—a failure which resulted from faulty terrain evaluation; and for the headlong rush to the Yalu which left the United Nations forces so scattered as to greatly jeopardize their position once the Chinese Communist forces (CCF) entered the war.

Ridgway's position on the possible use of Nationalist Chinese forces in Korea is not made clear. He discusses the Pentagon's lack of faith in their ability, as well as Korean President Syngman Rhee's "firm opposition," but that is all. MacArthur in his memoirs, however, states that Ridgway wrote to Washington urging that Chiang Kai-shek's soldiers be sent to Korea to support the Eighth Army.³

Throughout this book General Ridgway makes frequent reference to the limitations of air power. He takes issue with the official Air Force history, which attributes the collapse of the North Korean People's Army (NKPA) at the Pusan perimeter in September 1950 to its decimation by air attacks and interdiction. He maintains that there had been no lessening of the intensity of the NKPA offense; that the withdrawal was the result of the successful Inchon invasion. The General apparently dismisses the testimony of both American ground commanders and North Korean prisoners of war as to the effectiveness of air power in that phase of the war.⁴ He also dismisses the later air interdiction effort of 1951, Operation Strangle, as ineffective since it neither halted resupply nor isolated the battlefield. It can be argued, however, that the interdiction did reduce logistical support of the CCF to such a level that sustained major offensives were impossible. Although admitting that the air offensive cost the enemy

heavily, Ridgway nevertheless maintains that you cannot defeat a self-sufficient soldier by bombs. In Korea, he points out, the enemy was able to minimize the effects of air strikes by night marches and attacks. Despite the experience of the Korean War, he protests, too many people still believe that air power can accomplish miracles of interdiction.

Of extreme interest is Ridgway's description of how he attacked the problem of the Eighth Army's low morale when he assumed command in December 1950. A quick tour of the battle area, talks with the field commanders, and observations of the soldiers' attitudes gave convincing evidence of the lack of spirit and the bewilderment which existed. Operationally, Ridgway regrouped his forces, organized artillery support between adjacent units, and took the army off the roads, where it was subject to ambush, and placed it in the hills. He acted immediately to improve the soldiers' creature comforts, moving the kitchens forward to provide hot food, obtaining better and larger rations, and procuring gloves to protect them from the bitter cold. Ridgway vigorously drove home the necessity of seizing the initiative: "I repeated to the commanders as forcefully as I could, the ancient Army slogan: 'Find them! Fix them! Fight them! Finish them!'" Meanwhile he took steps to reassure President Rhee that the Eighth Army was there to stay.

Although outnumbered, Ridgway was confident that his superiority in armor and air was sufficient to blunt the impending CCF offensive and that by holding tight at night and counter-attacking with armor and infantry in the day he would be able to severely punish any of the enemy that moved through the gaps. While he was obliged, at first, to develop a defensive position, Ridgway was determined to assume the offensive and destroy the enemy: "... my fundamental concept remained the same, that territory, as such, meant nothing to me except as its occupation might facilitate destruction of enemy forces and the protection of our own." With the new spirit he imbued and with the new tactics he introduced, the Eighth Army was on the offensive early in January 1952; by mid-April it had forced its way back across the 38th parallel; and on 23 June Jacob Malik, the

Soviet Delegate to the U.N., proposed that an armistice be discussed.

As another study of leadership, one might contrast the differing approaches of MacArthur and Ridgway to their direction of the Eighth Army from Japan when each was the Supreme Commander of the U.N. forces. From the beginning MacArthur gave Ridgway a free hand as Army commander: "Use your own judgment. I will support you. You have my complete confidence." "The Eighth Army is yours, Matt. Do what you think best." Ridgway acknowledges that once having given him "full tactical control," MacArthur never violated it. The relationship between Ridgway and his Eighth Army Commander, Lieutenant General James A. Van Fleet, however, was much different. As Supreme Commander, Ridgway retained the final say on the principal tactical plans. His policy was to consult not only Van Fleet but also jointly and separately with the corps and division commanders before passing judgment on Eighth Army plans.

General Ridgway believes that it was wise to settle for a stalemate in Korea. While he has no doubt that the U.N. forces could have driven all the way to the Yalu again, he does not think that the cost would have been worth it. The war, he notes, ended with the achievement of the objectives the United States had set and held except for a brief while late in 1951: "the defeat of the aggression, the expulsion of the invaders, the restoration of peace in that area, and the prevention of an expansion of the conflict into a third world war."

The question arises as to why this book was written. Surely General Ridgway is well aware that his analysis of the Korean War, while of real value because of his personal, important role in it, adds little to our knowledge of the war. The answer would seem to be that the book is intended as a vehicle for applying the lessons of that war, as the General sees them, to the present struggle in Vietnam. As has been mentioned, he repeatedly warns against reliance on air power to effect a settlement. Granted, as in Korea, the net result of the air attacks against North Vietnam is difficult to assess, and air interdiction has failed to halt the infiltration of men and materiel into the

Republic of Vietnam. Enemy strength is at higher levels than ever before, and the ferocity of the fighting, as evidenced during the Tet offensive, had not decreased. It is interesting, however, to note the insistent demand of the Hanoi government that the bombing of North Vietnam cease before the resolution of other matters associated with ending the war will be considered. This would indicate that the bombing has been effective and has led the North Vietnamese government to reconsider the wisdom of fighting for complete victory.

As to the value of air power in the Republic of Vietnam, it is inconceivable that any American or RVN operation would be conducted without air support. The enemy must be defeated in the South, and while that is ultimately a task for ground forces, ground commanders fully recognize the necessity of combined air-ground operations. Air power affords a flexibility, a variety of ordnance—including far heavier types than artillery can supply, and a shock effect of inestimable importance to the outcome of the battle. For all operations where enemy contact is anticipated, advance requests are made for air support so that air strikes will be immediately available. Praises for the effectiveness of air power have come from all ranks of the Army. The saturation bombing by B-52s and other aircraft must be seriously evaluated in determining why the Viet Cong withdrew from Khe Sanh without making the major attack that was so widely anticipated. Prisoner interrogation has revealed that the enemy forces consider air power the most frightening weapon they face.

General Ridgway's observations on the combat capability of South Korean forces

during the earlier war are applicable to many units of the Army of the Republic of Vietnam (ARVN) today. The primary reason for the Republic of Korea army's ineffectiveness was its lack of training, a condition certainly true of ARVN capability in the present war. Any expectation that rapid mobilization of large numbers of young South Vietnamese will permit this nation to withdraw corresponding large numbers of American soldiers, without adversely affecting the conduct of the war, seems questionable.

As to the ultimate solution, General Ridgway advocates neither a pullout nor all-out war; instead, he seeks a settlement similar to that in Korea, one that will "guarantee the permanent protection of the South Vietnamese people." Nevertheless, in regard to the relationship of Southeast Asia and Korea to our vital interests, Ridgway considers the two areas dissimilar. He is not convinced that defense of the former is imperative to this nation's security, and he questions whether we may not be overextended in Vietnam, with consequent lessening of our ability to meet more critical challenges. On the other hand, South Korea is considered to be of strategic importance, although why is not made clear. Ridgway suggests a Far Eastern defense line that would run from South Korea down the island chains to the Philippines. He closes on a sober note, warning that serious challenges to the nation's security will arise and that the nation's highest duties are the "preservation of our freedom" and preparation to meet the supreme test.

United States Air Force Academy

Notes

1. Gen. Matthew B. Ridgway, *Soldier: The Memoirs of Matthew B. Ridgway*, as told to Harold H. Martin (New York: Harper & Brothers, 1956).

2. Raymond A. Esthus, *Theodore Roosevelt and Japan* (Seattle: University of Washington Press, 1967), pp. 102-7.

3. Gen. Douglas MacArthur, *Reminiscences* (New York: McGraw-Hill Book Company, 1964), p. 385.

4. Robert Frank Futrell, *The United States Air Force in Korea 1950-1953* (New York: Duell, Sloan and Pearce, 1961), pp. 134, 138, and 166.



AIR SERVICE RELIVED

ROYAL D. FREY

THE true value of any historical work may be measured by the amount of significant new material which the author has been able to garner from previously unexplored sources. In other words, does the work contain any new facts that extend man's knowledge of a particular subject?

During the past decade or so, interest in World War I aviation has increased tremendously. The commercial writer was quick to recognize the trend and immediately began taking full advantage of it. Numerous books on various phases and personages of World War I aeronautics have been published, but in many instances they have been nothing more than "the same old stories" cast in different writing styles, depending upon the ability of each individual writer to employ superlatives in embellishing his efforts.

Unfortunately, many such books, though well received by most of the reading public, have added little to the store of knowledge of World War I aviation. Hastily written by individuals with a greater interest in profit than posterity, they are riddled with errors, inaccuracies, and half-truths. In reality, however, what more could be expected when their authors elected to rely upon previously published works for their research, books often no better than the ones being written? As a consequence, errors in historical fact have been

perpetuated from one account to the next. Let one author include some of his own assumptions in his work, and a subsequent author would unknowingly accept them as "gospel" and incorporate them in his manuscript as fact. The eventual result—a fable develops.

A perfect example of this kind of historical inflation concerns the death of Lufbery. With the passage of time, writers have made his fatal leap of 19 May 1918 increasingly more dramatic. This fabrication was eventually carried to the asinine degree several years ago by an author who described Lufbery's crawling back along the fuselage of his Nieuport 28 as it fell in flames and then hanging onto the tail surfaces with the fire whipping around him until, no longer able to endure the pain, he leaped for a small creek.

To appreciate how ridiculous this account actually is, one need only read a signed statement which this reviewer obtained in 1962 from residents of Maron, France, where Lufbery died. These people, who actually witnessed the aerial battle over their village 50 years ago, agree that when Lufbery's Nieuport flipped over and he fell from it, the plane was not even smoking. This is substantiated by the cushion on which Lufbery was sitting, the only object to fall from the Nieuport with him. Now on display at the Air Force Museum, it shows absolutely no evidence of ever having

been touched by flames. Moreover, the "small creek" for which Lufbery supposedly leaped was the Moselle River, which definitely is much more than a creek where it wends its way past the village of Maron.

Dr. James J. Hudson, a professional historian and undoubtedly more desirous of imparting knowledge than supplementing his income, has written a book, *Hostile Skies*,† in which he presents a factual and authentic account of America's participation in World War I aerial combat. Such a book has been sorely needed in the half century since that war ended. He is the first professional with sufficient courage to attempt to meet the challenge, and for this alone he is to be congratulated.

It is readily apparent from the published bibliography that the author accomplished a significant amount of background reading, from both primary and secondary sources. Few students of the Air Service, American Expeditionary Forces, will argue with Hudson that the most valuable records of all upon which one could rely are the Correll Reports. Still, these reports are extremely inadequate in various areas, a most unfortunate circumstance for any World War I aviation historian.

Personal accounts from the men who flew in the "hostile skies" should also be of great value to a researcher. However, one would be naïve indeed not to be suspicious of memories clouded with the passage of 50 years, particularly if several of the old warriors tended to disagree on a certain point of historical discussion.

Hudson's style of writing is most appealing. The book is a delight to read, and it is obvious the author made a concerted attempt to keep sentence structure, word selection, and overall story-line organization as basic as possible without offending the more mature reader. This he has accomplished successfully, for *Hostile Skies* should be as enjoyable to the junior high school student as to the aviation buff and the serious scholar. It is a straightforward historical account and fortunately not diluted by philosophical discussions of strategy or logistics, which would more than fill

a book in themselves. Being fact rather than fiction, *Hostile Skies* is not as exciting as one might imagine; still, once the reader gets into the combat story, he will find it difficult to put the book aside in the middle of a chapter.

Since *Hostile Skies* carries the subtitle *A Combat History of the American Air Service in World War I*, the reader quite naturally would assume this is exactly what will be presented to him for his reading pleasure—the history of the 38 U.S. squadrons that got into combat prior to the Armistice. However, the reader is given much more. The first four chapters of the book are devoted to a capsule history of the organization of Army aviation in the U.S. following our declaration of war, the problems involved in airplane and engine production, the training of flying and support personnel, and the organization of the Air Service, AEF.

It would be difficult to imagine a more complex and confused state of affairs than that which involved America's comparatively infantile attempts to arm itself for war in the air. Little has been published on this less romantic aspect of our aviation efforts. Only those who have studied this particular area of Air Service history in the hope of unraveling all the intricacies and contradictions can fully appreciate the magnitude of Hudson's efforts. It is to his credit that he was able to study the issues and problems, clarify them in his own mind, and put them on paper in such a clear-cut manner—probably the best account this reviewer has ever read. However, despite the excellence of Hudson's account, all the organizations and reorganizations that took place, coupled with their attendant assignments and reassignments of personnel, still present a fairly confusing story.

Hudson introduces the reader to the air combat history in Chapter V, which pertains to the initial buildup of fighting units in the Toul area. The next chapter takes the reader to Chateau-Thierry, where the seven U.S. squadrons from the Toul area were employed in the Aisne-Marne campaign. Chapter VII is devoted to the buildup for the St. Mihiel

†James J. Hudson, *Hostile Skies* (Syracuse, New York: Syracuse University Press, 1968, \$10.95), x and 338 pp.

offensive, while Chapter VIII is devoted to a single 24-hour period, 12 September 1918, the first day of the St. Mihiel attack. The next chapter completes the St. Mihiel story through 22 September.

At this point, Hudson interrupts his chronological treatment of the American front and presents in Chapter X an account of the 17th and 148th Aero Squadrons, which flew Sopwith "Camels" on the British front north of Paris to the Channel. Extending this break in continuity, he discusses in the next chapter those Americans who flew with French, Italian, and British units.

In Chapter XII, Hudson returns to his historical account of U.S. Air Service squadrons, this time in operation over the Meuse-Argonne. Following this last chapter is a six-page Epilogue, in which the author summarizes Air Service activities and comments upon their accomplishments in retrospect.

It is to be clearly understood that this reviewer believes Hudson presents an excellent account of nonoperational activities—aircraft production, personnel training, Air Service organization, etc. However, what this did to the announced aim of the book, "a combat history of the American Air Service," is a point worthy of discussion.

Of the twelve chapters comprising the book, the first four are devoted to nonoperational matters. In other words, one-third of the chapters and one-fifth of the pages (61 pages in the first four chapters out of 304 pages of narrative) are not directly relevant to combat history of the Air Service, AEF. This is a luxury which Hudson could ill afford. Assuming he was somewhat limited by his publisher in the total number of pages, each page of non-combat history is at the expense of an equal amount of operational history, the announced theme of the book.

The Air Service in World War I forged a great heritage in combat. Numerous examples of courage, humor, pathos, elation, fear, tragedy, and personal sacrifice can be found in a thorough study of the relatively short period when our nation's fliers fought in the skies over Europe. There is the story of Rickenbacker and Chambers burying the crushed re-

mains of their buddy, Ham Coolidge, in the midst of the battle area under a flag of truce. Equally impressive is the story of Bill Vail of the 95th Aero Squadron, who, if any man ever deserved the Medal of Honor, certainly should have been awarded it for taking on nine Fokker D. VII's to save the life of a buddy a deed that maimed him for life.

For humor, there was the fighter pilot "blind as a bat," who reportedly had to cheat to pass his eye examination, who could not see an enemy airplane until after it had pulled within firing range, and who refused to give up combat until, one day, he finally got shot down behind his own lines by a plane he never knew was there. Then there was the Spad XIII pilot who painted a gunner's cockpit on the turtleback of his plane so it would appear to be a Spad XI or XVI two-seater, hoping to persuade enemy pilots not to make a diving attack on his tail, and on one of his first flights in the plane he got attacked from underneath and took a bullet in his rump because his ruse was so effective.

Probably one of the most heartrending stories to come out of World War I concerns the father of W. W. White of the 147th Aero Squadron, who, one bleak and stormy night, trod through the rain and mud of the devastated front searching for the unmarked burial place of his son and who, upon finding what was left of the remains, suffered one of the most anguished and grief-stricken experiences a man could ever be expected to endure.

These are the facets of history which breathe life into a book. Hudson undoubtedly became aware of many such examples in his research, but unfortunately he included very few, for some unexplained reason. Regardless of the purpose for having four chapters of the book devoted to fairly extraneous material, there is no doubt that Hudson's work suffers from his not having included in it a greater number of vivid and inspiring accounts of individual performance.

In general, Hudson's research was thorough and accurate. There are, however, some significant errors that should be noted for those who wish to use the book for reference purposes.

In two instances Hudson refers to the 94th and 95th Aero Squadrons flying their gunless patrols over the Toul sector from their aerodrome at Villeneuve-les-Vertus. By his own definition, he limits the Toul sector to the area between the Meuse and Moselle Rivers. The village of Villeneuve is located south of Reims, approximately 65 miles west of St. Mihiel on the Meuse and far removed from what possibly could be identified as the Toul sector. Not until the units moved from Villeneuve to Epiez were they considered as being behind the Toul lines. (pp. vii, 64-66)

Two other geographical errors pertain to the locations of Mars-la-Tour and St. Mihiel. They are west of Metz and Pont-à-Mousson, respectively, not east as stated. (pp. 70, 77)

At least two inferences were noted as to the ease with which the de Havilland 4 reportedly caught fire in the air as a result of enemy action. This is in line with the popular World War I misconception that resulted in the plane's being dubbed "the Flaming Coffin." In *The Measure of America's World War Aeronautical Effort*, Gorrell presented statistics on U.S. aircraft that went down in flames and concluded with the statement: "No greater percentage of D.H. 4s were lost in flames than was true of any other type at the Front"—an apparent refutation of the misconception. (pp. 19, 189)

With reference to the development of the Liberty engine, Hall and Vincent were still civilians in late May 1917 when they prepared the design drawings for the engine; they were not commissioned until later. Another error concerning the Liberty engine pertains to the 8-cylinder version being installed in D.H. 4s. All production D.H. 4s used the 12-cylinder version; the 8-cylinder engine was experimental only. (pp. 15, 21)

The statement about Rickenbacker's being an instructor at Issoudun is questionable, particularly in view of the fact that he has always been most emphatic in discussions with this reviewer that he was the field's engineering officer because of his knowledge of reciprocating engines. (p. 36)

It is correct that when the 94th and 95th Aero Squadrons received their Nieuports, the

planes had no guns. However, when guns were received at Epiez, they were Vickers, not Marlins. Further, photos of Nieuports of the 1st Pursuit Group at Touquin and Saints clearly show the Vickers were still installed on the Nieuports at that time. The only Marlins were used by the 27th for several days early in July in an unsuccessful experiment. (p. 94)

Referring to the deaths of Lieutenants Bowyer and Johnson of the 135th Aero Squadron, Hudson states that the other crews of the unit continued flying their missions on the first day of the St. Mihiel offensive, 12 September 1918, although shocked at the manner in which their friends had died. In reality, the 135th did not definitely learn that Bowyer and Johnson had been killed in action until 14 September; for two days nothing was known of them, and the various surmises as to their fate included the possibility that they had become lost and landed behind German lines or even in Switzerland. (p. 150)

Hudson also refers to Lieutenants Suiter and Morse of the 135th being shot down over their own aerodrome by a Fokker D. VII. On their last mission, Suiter and Morse flew back across the line from German territory and dropped a message containing a report of their observations of the enemy. They then decided to return to German territory, and in the area between Thiaucourt and Pont-à-Mousson they were attacked by a flight of Fokker D. VIIIs. Their D.H. 4 burst into flames and began falling, when its wings suddenly tore loose and the fuselage crashed to earth one-half mile southwest of Vilcey-sur-Trey. The village of Vilcey is located several miles northwest of Pont-à-Mousson and approximately 25 miles northeast of the 135th field at Ourches. (p. 176)

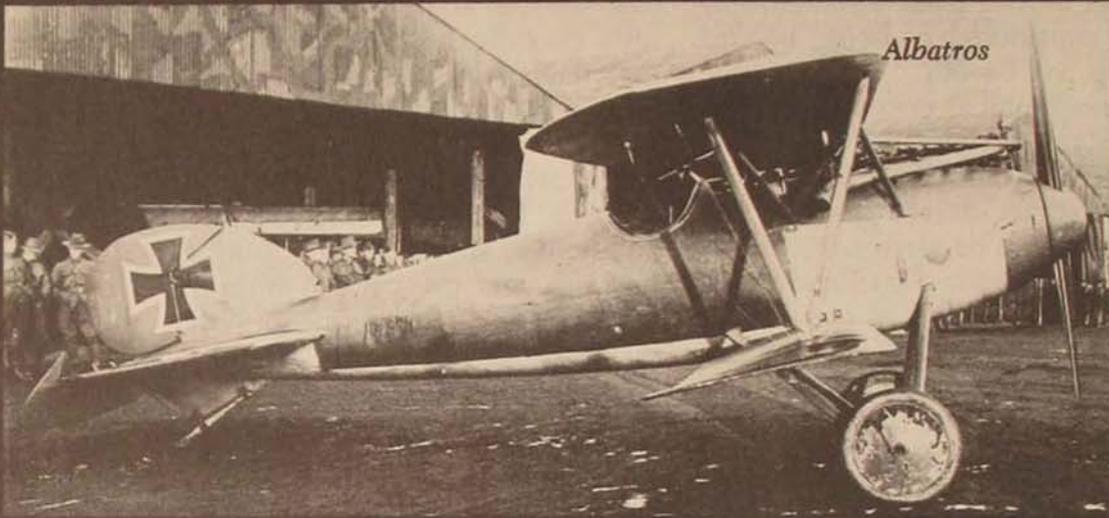
In discussing the first day of the St. Mihiel offensive, Hudson states that because of inclement weather the 94th Aero Squadron did not get its first mission off the ground "until nearly noon." This does not agree with the Gorrell Reports, which indicate that the 94th's first patrol of five planes took off at 7:35 A.M. (p. 168)

In the chapter on the 17th and 148th Aero Squadrons is a statement that Elliott White

Rumpler



Albatros



S.E. 5



Nieuport 28



Fokker D. VII



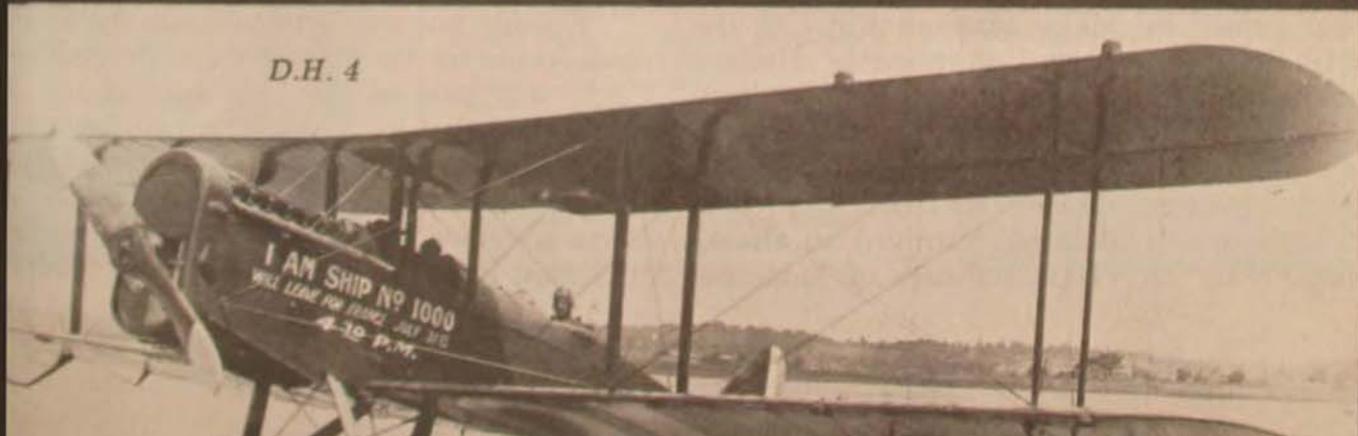
Spad XIII



Bréguet



D.H. 4





BRIGADIER GENERAL ROBERT F. McDERMOTT (USMA; M.B.A., Harvard) was Dean of the Faculty, United States Air Force Academy, from 1959 until his retirement on 1 August 1968. Rated pilot two months before graduation from West Point in 1943, he served as a fighter pilot and assistant group operations officer until February 1944, and then until September 1945 in Europe as Operations Officer, 474th Fighter-Bomber Group. Other assignments were as a personnel staff officer in Hq USFET to 1947 and in Hq USAF to 1948; as instructor, Department of Social Sciences, U.S. Military Academy, from 1950 to 1954, when he joined the new Air Force Academy as Professor and Head of the Department of Economics, with additional duties, successively, as Vice Dean and Faculty Secretary. General McDermott is author of *Principles of Insurance and Related Government Benefits for Service Personnel* and *Principles of Personal Finance for Service Personnel* and has edited *Readings in Personal Finance*. His academic accomplishments have been widely acclaimed and attested to by two honorary doctorates (St. Louis University and Saint Bernard College).



COLONEL JESSE C. GATLIN, JR. (USMA; Ph.D., University of Denver) is Permanent Professor and Head, De-

partment of English, USAF Academy. After West Point (1945) and flight training, he served in Austria and Germany as a P-47 pilot, 1946-47; as a radiological survey officer at the Nevada Test Site, 1950-53; and as an exchange officer, Royal Canadian Air Force, Ottawa, 1954-55. After earning an M.A. at the University of North Carolina in 1957, he went to the Academy, where he has remained except for 1959-61 at the University of Denver. Colonel Gatlin spent March and April of 1968 in South Vietnam and Thailand, completing a study for the Seventh Air Force Directorate of Tactical Evaluation. In addition to military studies, Colonel Gatlin has published articles on contemporary drama and fiction.



COLONEL RICHARD F. ROSSER (M.P.A. and Ph.D., Syracuse University) is Permanent Professor and Head of the Department of Political Science, USAF Academy. Before joining the Academy faculty in 1959, he had been a communications intelligence officer and Russian linguist with the USAF Security Service. He served as Chairman of Instruction for courses in political theory and as Director of the Graduate Program in International Affairs. He has given numerous presentations, including lectures at the Air Command and Staff College, on Soviet foreign policy. His articles have been published in *Russian Review* and *Series Studies in Social and Economic Sciences*.



BRIGADIER GENERAL ROBIN OLD (USMA) is Commandant of Cadets U.S. Air Force Academy. After pilot training in 1943, he was assigned to the European Theater of Operations where he flew 107 missions, with 24.5 official victories, and became Commander, 434th Fighter Squadron in March 1945. Other assignments have been as base, group, or wing commander in the U.S. and in England (3 years), Germany (13 months), and Libya (26 months); at Hq USAF, Air Defense Division, 1958-60; as a member of the Joint Staff, Joint Chiefs of Staff, 1960-62; and as student, National War College, 1962-63. As Commander, 8th Tactical Fighter Wing, Ubon RTAFB, Thailand (PACAF), from September 1966 to December 1967, General Olds flew 100 combat missions over North Vietnam and was credited with destroying four MIGs in combat.



COLONEL GAGE H. CROCKER (Ph.D., University of Michigan) is Commander, Frank J. Sciler Research Laboratory, Office of Aerospace Research. After graduating from Massachusetts Institute of Technology in 1943 he was commissioned in the Army Air Corps and assigned to the Aircraft Laboratory, Wright Field, Ohio. He earned an M.S. at California Institute of Technology in 1944 and another in 1948 at the University of Michigan in aeronautical engineering. He served in the Guided Missiles Section at Wright Field as project officer on air-to-air missiles until 1952, when he was assigned to Hq USAF, Directorate of Requirements. After graduating

om Air Command and Staff School and work at Michigan, in 1959 he was assigned to the USAF Academy, Department of Aerodynamics. He was professor and Head of that department from 1962 until his present assignment in 1965. Colonel Crocker is author of papers on turbulence associated with blunt body flow.



MAJOR PHILIP D. CAINE (Ph.D., Stanford University) is Associate Professor of History, USAFA. Since completing pilot training in 1957, Major Caine has served as an instructor pilot and instrument examiner, 3537th Navigator Training Squadron, Mather AFB, California, 1957-61, and studied at Stanford University under Air Force Institute of Technology, 1961-63 and 1964-66. He joined the Academy as an instructor, Department of History, in 1963 and has held his present position since 1966.



MAJOR GENERAL BURL W. McLAUGHLIN is Commander, 834th Air Division, Tan Son Nhut Air Base, Vietnam. He completed flying training in 1941 and served with the armed forces until 1946. In 1947, he returned to active duty and served with Strategic Air Command until 1957. Deputy Director of Operations at SAC's "X-Ray" headquarters, Tokyo, Japan; as Commander, 19th Bombardment Squadron, March AFB, California; and in staff positions at Fifteenth

Air Force and SAC headquarters. Other assignments have been as student, Air War College, 1958; Chief of the Colonels Group, DCS/P, Hq USAF, to 1961; student, National War College, 1962; Commander, 516th Troop Carrier Wing, Dyess AFB, Texas, to 1965, participating in Exercise Swift Strike III; Commander, 838th Air Division, Forbes AFB, Kansas, to 1966; and Commander, 322d Air Division at Chateauroux AS, France, later at High Wycombe AS, England, until his present assignment in November 1967. While in Europe he served as Air Force commander during Exercises Southern Arrow and Pathfinder Express.



LIEUTENANT GENERAL ARTHUR C. AGAN (B.B.A., University of Texas) is Commander, Aerospace Defense Command, Ent AFB, Colorado. Commissioned after flying training, 1937, he obtained a regular commission through competitive examination, 1939. He served as Chief of Tactical Operations, Hq Eighth Air Force, England, 1942-44. As Assistant Air Chief of Staff for Operations, Mediterranean Theater of Operations, and Commander, 1st Fighter Group, he flew 45 missions before being shot down in March 1945 and interned as a POW. Postwar assignments have been as Chief, Personnel Services Division, Hq AAF, 1946; Deputy for Personnel and Administration, ADC and Continental Air Command, to 1949; Commander, 4th Fighter Wing and 33d Fighter Wing, to 1951; Commander, 32d Air Division; Chief of Personnel and Administration, Air Command and Staff School; student, Air War College, 1953; Commander, 58th Fighter Bomber Wing, Korea, 1953; Deputy for Operations, later Chief of Staff, Continental Air Defense Command, Eastern Region, 1954-57; Commander, 26th Air Division; Commander, New York Air Defense Sector, 1958-59; DCS/Plans, Hq ADC, to 1963; Commander, 26th Air Division (SAGE), to 1964; Director of Plans, DCS/P&O, Hq USAF, 1964, and ADCS/P&O, to 1966; and Vice Commander-in-Chief, U.S. Air Forces, Europe, until he assumed his present duties, August 1967.



MAJOR GENERAL WILLIAM DUMONT GREENFIELD is Commander, Central Region of the North American Air Defense Command, and Tenth Air Force, Richards-Gebaur AFB, Missouri. After graduating from Miami University in 1936 and from flying training in 1940, he served with the 8th Pursuit Group, Langley Field, Virginia, later in England; next with the 80th Pursuit Squadron, Australia and New Guinea, 1942; then as Commander, 313th Fighter Squadron to November 1943; Commander, 50th Fighter Group, in Florida, England, and France, to October 1944; as Chief, Combat Analysis Branch, Evaluation Division, Army Air Forces Board, to September 1945; as Chief, Allocations Branch, Operations Division, Hq AAF, 1946-49; Chief, USAF Mission to Venezuela, to 1952; student, Air War College, 1953. Except for a tour as Commander, 316th Air Division, Rabat, Morocco, 1958-60, General Greenfield has been continuously in Air Defense command or staff assignments since 1953.



MAJOR GENERAL ORIS BAKER JOHNSON (B.S., Northwestern Louisiana State College) is Commander, 9th Aerospace Defense Division, Aerospace Defense Command, Ent AFB, Colorado. After pilot training in 1941 and serving as instructor and pilot, he commanded the 348th Night Fighter Squadron and 422d Night Fighter Squadron in Florida and Europe. Postwar assignments have been with Tactical Air Command, 1946-47; at Hq USAF in DCS/Operations, 1950; as Chief, Training Division, DCS/O, Hq Eastern Air Defense Force, 1951; in DCS/O, Hq Far East

Air Forces, 1953; as Commander, 56th Fighter Group, O'Hare International Airport, 1956; at Hq Air Defense Command as Chairman of DEW Operations Group and Director of Systems Integration, 1957; at Hq USAF, as Chief, Air Defense Division, DCS/O, 1960; as student, Imperial Defence College, 1960; at Hq USAFE, in IG and DCS/O, 1963; as Commander, Washington NORAD Sector, 1966; and Director of Operations, DCS/O, Hq NORAD and CONAD, until he assumed his present position, August 1966.



DR. FRANK N. TRAGER (Ph.D., New York University) is Professor of International Affairs at that university and Director of Studies, National Strategy Information Center, Inc., New York. He was instructor in philosophy, Johns Hopkins University, 1928-34, and then held various government positions. He served in the U.S. Army Air Forces, 1943-45. In 1951 he became Director, Technical Assistance Administration, Burma. Since 1953 he has been with New York University, in his present position since 1958. He directed a Southeast Asia project for the RAND Corporation, 1956-57, and a Burma project for the Council on

Foreign Affairs, 1957-58. He has served as visiting professor at Yale University, 1960-61, Army War College, 1959-62, and National War College, 1961-63. Professor Trager is the author of *Burma's Role in the United Nations* (1956); *Burma* (3 volumes, 1956); *Building a Welfare State in Burma* (1958); *Southeast Asia: Laos a Pivot* (1963); *Furnivall of Burma: An Annotated Bibliography of the Works of John S. Furnivall* (1963); *Burma's Independence* (1965); *Burma from Kingdom to Republic* (1966); and *Why Vietnam* (1966).



LIEUTENANT COLONEL GEORGE W. COLLINS (Ph.D., University of Colorado) until his recent retirement was an Associate Professor of History, United States Air Force Academy. He completed flying training in 1944 and was a B-17 and B-29 navigator until 1945. He re-entered the service in 1951 and flew as a B-29 navigator in the Korean War with the 28th Bombardment Squadron. He was assigned to SAC as a navigator, later as a logistics officer, 1953-58. At the Air Force Academy since 1958 he has taught in the Departments of Navigation and History. He headed an Academy team that studied close air support in Vietnam during the summer of 1967. Colonel Collins has published articles on navigation in *Aircraft Observer*

and *Navigator* and on history in *Colorado Magazine* and *Rocky Mountain Social Science Journal*. He is now an Assistant Professor of History at Wichita State University.



ROYAL D. FREY, LT. COL., AFRes (Ret), (M.S., Ohio State University) is Chief, Research Division, Air Force Museum, Wright-Patterson AFB, Ohio. After flying training in 1943, he flew P-38s with the 20th Fighter Group from England and was credited with two Me-110s destroyed before being shot down, captured, and held prisoner for 15 months. In 1950 he became historian, Hq Air Materiel Command. Recalled to active duty in 1951, he flew F-84s with Air Defense Command for two years. He was Command Staff Editor, Hq AMC, 1953-58, and has been in his present position since 1959 except for a year as a logistics staff officer in France. Mr. Frey is author of official USAF histories, including *Evolution of Maintenance Engineering 1907-1920* and *Case History of the C-119*, and a contributor to *The Airman*.



The Air University Review Awards Committee has selected "The Techniques of Modern Recruiting" by Brigadier General Joe T. Scepanzky, USAF, as the outstanding article in the September-October 1968 issue of the *Review*.

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