AIR UNIVERSITY REVIEW

PROJECT FORECAST...THE YF-12A INTERCEPTOR WEAPON SYSTEM...JOINT EXERCISE GOLD FIRE I

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the cover

Known during its developmental phase as the A-11, the YF-12A, shown here in majestic ascent, has become widely renowned for its unique performance. Colonel Allen K. McDonald is concerned with both its development and capabilities in his article, "The YF-12A Interceptor Weapon System."


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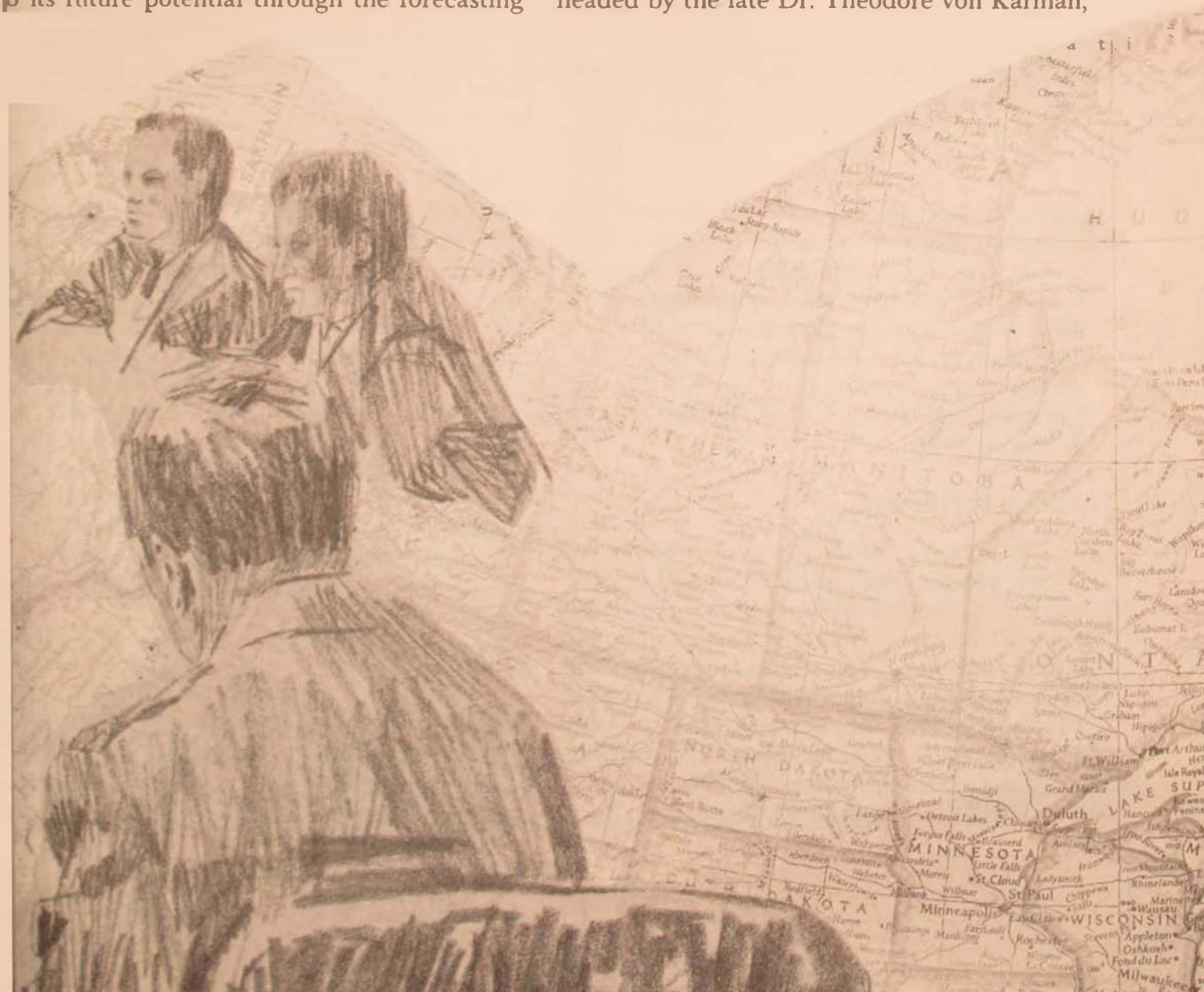
FORECAST

General Bernard A. Schriever

Science and technology are having increasing influence on the defense posture of nations. The pace of technological change affects in a major way the near and long term complexion and strategic planning activities of the Air Force. It is quite evident that there is an urgent need for a comprehensive study and analysis of the Air Force structure projected into the 1965–1975 time period.

THIS STATEMENT by the Chief of Staff, General Curtis E. LeMay, in March 1963, set in motion an Air Force study of major proportions which came to be known as Project FORECAST. Even before the Air Force became a separate service almost 20 years ago, it had established a tradition of taking stock of its current capabilities and looking to its future potential through the forecasting of technological possibilities. Periodically since then the Air Force has called on scientists and engineers for concentrated studies of the state of the art and the exploration of what lay ahead through technological progress.

Project FORECAST is the latest in this series of long-range technical planning studies, which began with the monumental work of a group headed by the late Dr. Theodore von Kármán,



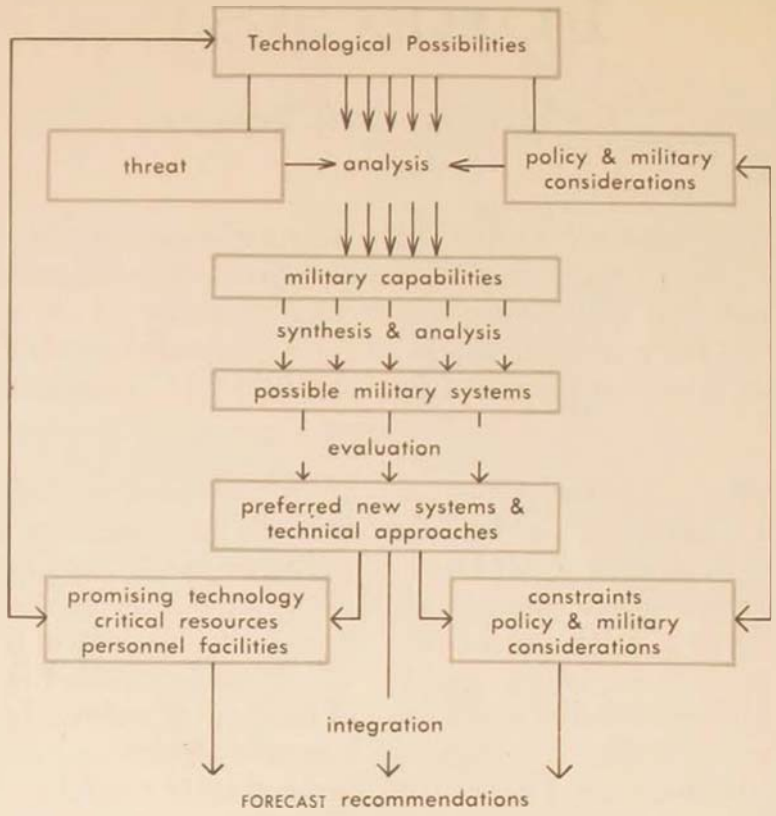


Chart 1. Project FORECAST approach to long-range technical planning

published in 1945 under the title, *Toward New Horizons*. Since then there have been other studies. In the early 1950's there were the studies of nuclear weapon capabilities and ballistic missiles led by the late Dr. John von Neumann and in 1957–58 the Woods Hole studies jointly sponsored by the Air Research and Development Command and the National Academy of Sciences.

the nature of the project

In spite of the magnitude of these past efforts, Project FORECAST was the most comprehensive exploration of our national position in science and technology yet conducted by the military services. Top technical people in many fields explored the thinking and work of literally thousands of U.S. scientists and engineers as well as the work of foreign specialists. Forty Government activities, including twenty-seven Air Force organizations, the Army, Navy, Marine Corps, and ten other Federal agencies, participated in FORECAST. Likewise twenty-six universities and colleges furnished members from their faculties and research staffs. Seventy U.S. corporations and ten nonprofit organizations also provided panel memberships and consultant services.

Synthesizing the collected knowledge of the several hundred military specialists, their civilian associates in the Government, and their counterparts from the national scientific and technical community was in itself a task of enormous proportions. The systematic approach that was used is shown in Chart 1.

the important inputs

There were three primary inputs to the project, shown on the chart as Technological Possibilities, Policy and Military Considerations, and the Threat.

A prime determinant of the role the Air

Force will play in national security a decade or more into the future is the offering of technology. Thus a chief aim of the study was to assess the impact of technological advances on Air Force capabilities. The first step in this assessment was the work of twelve Technology Panels, which consisted of the following:

Flight Dynamics
Propulsion
Power Generation
Materials
Bioastronautics
Geophysics
Weapons
Detection & Surveillance
Communications
Data Processing & Display
Navigation & Guidance
Electronic Countermeasures and
Electronic Counter-countermeasures

These panels examined all fields of science and technology that were considered to be of potential interest to the Air Force. Their initial outputs were projections of the state of the art in terms of weapon/support systems applications in the post-1970 time period. In addition, their job was to identify those technical possibilities which might yield high achievement in military technology. These were called the "high payoff" areas.

Compared with previous long-range, technical planning studies, Project FORECAST was unique in having a special panel to conduct an extensive study of defense policy as expressed by the decisions and actions of our national civilian leadership. In Project FORECAST a major effort was undertaken to go far beyond the traditional expression of general objectives of our democratic form of government. FORECAST was very specific in identifying those factors of national policy which should influence development decisions required now to ensure the long-term defense posture of the United States. Exhaustive studies were made of the factors involved in the military response to political decisions, the influences which determine how foreign policy is made, our policy position vis-à-vis the rapidly changing technological competition, and a comprehensive definition of those specific policy goals of the Federal Government which should govern long-term Air Force planning.

The definition of a threat as an essential input to a military planning study is fairly straightforward. In FORECAST, however, the activity of the Threat Panel went far beyond the traditional projection of numbers and types of forces deployed. This panel also concerned itself with the efforts of foreign countries in science and education, the development of laboratories, research institutes, major testing facilities, production facilities, etc., particularly in major Communist countries. The objective was to see where our opponents might be going in the decade ahead and where they might be in relation to their present state of the art at any particular time in the future.

starting the flow process

These inputs were used by another group of panels concerned primarily with the application of the projected technical advances. These were designated as Capability Panels in the areas of:

General War
Limited War
Continental Defense
Intelligence & Reconnaissance
Support (including subpanels for Command and Control, Logistics, and Space)

They dealt with long-range capability requirements and with the translation of the technical possibilities into primary offensive and defensive weapon systems and supporting systems for Intelligence and Reconnaissance, Communications, Command and Control, and Logistics. Their range of interest encompassed the full spectrum of conflict from general war to counterinsurgency.

Thus far we have been discussing four basic FORECAST groups: one group which developed the policy environment in which the future Air Force will play a role; a second group which studied the threat against which the Air Force will operate; a third which

projected the important technological advances of the next decade; and a fourth group which examined these and other factors in terms of the projection of military capabilities required.

The next step in the process was to synthesize from the developed material the kinds of military weapon systems and support systems which could provide the military capability to fight in the future environment. The goal here was to postulate every conceivable type of system which could be made to do the jobs specified. It was not expected that all of the systems initially identified would ever reach final consideration. The idea was not to overlook any possibilities in our initial considerations and to develop as many options as possible.

After all the candidates were identified, the selection process began. Since the funds likely to be allocated for defense have a limit, the "shopping list" had to be reduced to those expected to provide significant enhancement of military capabilities. At the same time it was desired to identify those approaches which appeared to have the maximum payoff in terms of improved military technology. The objective was to point out those areas of advanced technology which could be considered especially important, even though not necessarily tied to any specific military system. These were possible "cornerstone areas" which might serve as foundations for a much broader and more rapid technological advancement. They could be classed as key elements in the achievement of a new level of system capabilities in the 1970's irrespective of specific design considerations now.

In addition to the Technology and Capability Panels, recognition was given to several specialized areas. A special Personnel Resources Panel was established because of the critical nature of the human resources in the Air Force. This panel considered more than quantity; it examined the human skill requirements and what the Air Force might do *now* to acquire them.

The question of technical facilities was examined throughout the entire process of Project FORECAST by a technical facilities representative. His function was to work with all active panels and to identify the technical facilities implications which have a bearing on the projected technological advances or become a pacing factor in achieving new military capabilities.

Another very essential group was the Cost Panel. It operated continuously to provide cost estimate data to all panels needing this information and participated heavily in the evaluation process leading to the identification of preferred system concepts or approaches.

An Analysis, Evaluation and Synthesis Panel selected preferred systems through consideration of the relative costs and relative effectiveness of alternative systems and concepts. It developed a cost/effectiveness basis for consideration in arriving at system choices. Whenever a proposed system, concept, or technical approach was found deficient from either a budgetary or policy point of view or was otherwise assessed as a high-risk item, it was fed back through the system, where it was re-examined and then either retained or dropped finally.

policy goals

FORECAST established conclusively the absolute necessity that technical planning for military programs take place in the context of national policy clearly developed and explicitly interpreted for study purposes. As a result of the Policy Panel studies, the members of the FORECAST group produced a tentative synthesis of the politico-military situation as they saw it. The function of the panel was not to make policy, but they tried to define and interpret higher-level policy.

They believe that the recognized first objective or goal is *deterrence* through the maintenance of superior strategic forces. This concept has been successful in preventing a general nuclear war. However, in the levels of conflict below nuclear holocaust — limited wars, so-called "wars of national liberation," insurrection, and civil unrest—other objectives also become important in shaping the kinds of forces required. As derived by the Project FORECAST members, these objectives are providing *multiple options* and *flexibility* of forces for *crisis management* under varying conditions of in-

volvement; maintaining the *survivability* of forces against uncertainties; *realistic arms control* measures which do not leave us vulnerable; *controlled response* and *damage limitation* such that there can be no mistaking the intent of prescribed military action; and the establishment of *negotiating thresholds* and methods of *war termination* which will ensure protection of U.S. interests when our forces prevail.

Defining these policy goals provided the underlying principles for the assessment of presently planned forces. They also became criteria against which various FORECAST proposals could be tested and evaluated. The work of the Capabilities Panels established that our existing force and the currently planned forces will require numerous improvements to make them capable of responding properly to all the policy goals.

The stated policy goals are translated into military systems capabilities in many ways:

—To provide the President with as many different options as he would desire in a multiplicity of conflict situations requires alternate weapon and delivery systems, versatility for retargeting, and combinations of forces for varying tactics and strategy.

—Our current intercontinental ballistic missiles are not well enough suited to surgically extracting military targets, with limited collateral damage to the surrounding area. New systems must stress very precise target location and on-target controlled delivery.

—At the lower levels of limited war, particularly in underdeveloped areas, the Air Force is not as well prepared as technology will permit to support crisis management which directly involves military forces in remote areas.

—The worldwide pattern of potential conflict zones dictates a degree of global air mobility which does not now exist. New capabilities must avoid the inherent lack of flexibility in intermediate bases and prepositioning policy. The quick response possible through global air mobility can reduce reaction time in bringing United States forces to bear during the brief, crucial, decisive period for managing crises.

—The capability for very close air support in the combined air/ground operations is essential in achieving the flexibility of forces required.

—Theater operations could, if necessary, be made less dependent on forward airfields.

—With the improvement of local defenses, particularly short-range, surface-to-air missiles employed by potential enemy forces, our delivery systems will require standoff strike capability to survive in both the general-war and limited-war applications.

—Low-yield clean nuclear weapons and improved nonnuclear weapons with very accurate all-weather and night-delivery capability are essential to a concept of controlled response.

—A most important element of our defense potential is the defense of the United States power base. In view of our total exposure to ICBM attack, the members of FORECAST stated that an anti-ICBM capability is essential to ensure strategic deterrence.

—In recognition that general war below the threshold of nuclear holocaust could be the product of the standoff in nuclear missile exchange, vital importance was placed on a long-range, high-performance system with extreme versatility and multiple usage throughout a wide scale of conflict intensity where ballistic missiles would perforce not be used. It would give credibility to forces in support of a policy of controlled escalation and controlled response in the spectrum of conflict where the existence of negotiation thresholds implies that means do exist to prevent all-out nuclear exchange.

—The submarine-launched ballistic missile threat was identified as an area where increased deterrent capability will be needed. A number of new systems were found to offer significant potential against a projected increase in this threat.

—Members of FORECAST stated their belief that the ability to cope with the problem of potentially hostile space satellites was a force requirement.

Outstanding Technological Possibilities

While we do not now possess the military technology to fulfill all the defense policy goals identified in all situations, it is the FORECAST

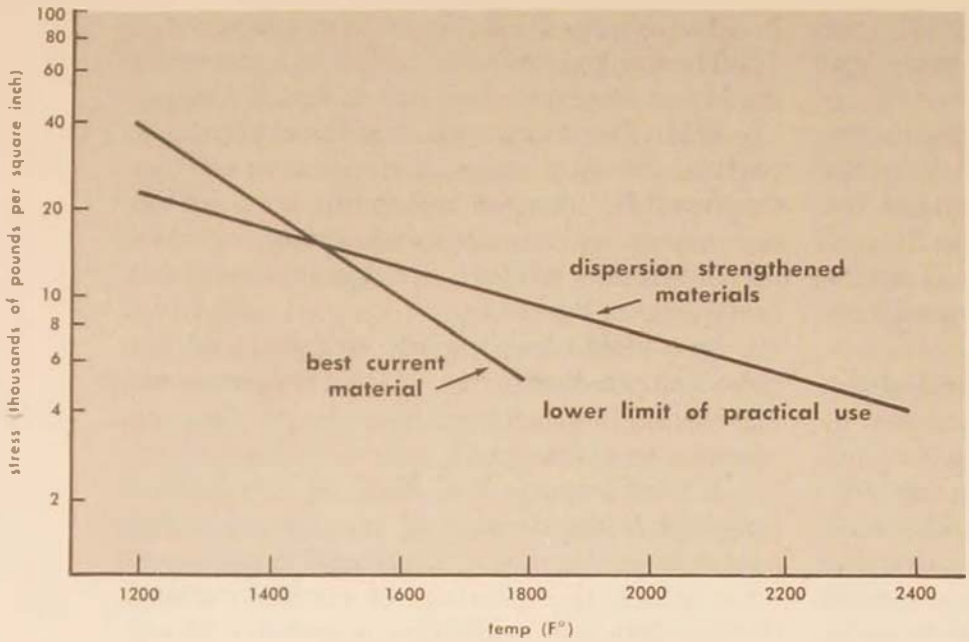


Chart 2. New high-temperature metals—stress/temperature comparisons

estimate that the technological potential exists in some cases for immediate application. If there is a single theme which emerges from the vast technology study of FORECAST, it is that we have not reached a technological plateau. Rather, we are on the threshold of unprecedented technological achievements in a number of areas. Advances in these fields during the next ten years can be more significant than those which have occurred in the past decade. All twelve Technology Panels found many new technological possibilities to enhance Air Force capabilities in support of defense policy goals.

materials breakthroughs

Materials have always been a major limiting factor in the development of improved military systems. Materials problems are made increasingly difficult by the extension of the temperature ranges from close to absolute zero to the glowing red of re-entry phenomena. Especially difficult problems exist with present materials in turbine applications where high temperatures combine with rotational forces and an oxidizing environment to impose severe design limitations. Three developments in materials have the potential of combining benefits to solve these kinds of problems and thereby support many technical advances:

- oxide-dispersion-strengthened metals
- metal and metalloid fiber techniques
- new families of organic and inorganic polymers.

Materials scientists have known for years that dispersion techniques could give significant strength increases at elevated temperatures. The theory of dispersion strengthening is that by the introduction of foreign particles in the layers of atoms of a base metal, the slippage or shear of one layer with respect to the next is made more difficult. In recent years the problems of making sufficiently finely divided particles and uniformly dispersing them in the base metal have been solved. This means that new materials for high-temperature application are now available. Increases of several hundred degrees in operating temperatures will be possible as we learn to design and fabricate using these new oxide-strengthened materials (Chart 2). This improvement can be classed as a breakthrough. For example, in turbojet engine applications this advance and other improvements offer the possibility of a *single* increase in operating temperature which is equivalent to *all* prior hard-won increments of temperature rise since the earliest jet engines for aircraft

The result will, of course, contribute greatly to operating efficiencies and improved thrust/weight ratios of turbo engines.

In today's technology the use of fibers in structural applications is confined largely to glass fibers used in composite structures. The most widely used structural composites today are glass-fiber-reinforced laminates of epoxy resins used in molded plastics of many forms. They have only limited use in aerospace structural applications because of low modulus (stiffness) of the fibers and low strength characteristics of the resins, which degrade rapidly with elevated temperature. Tomorrow's technology offers a host of new materials for composite structural applications with vastly improved characteristics over an increased temperature range.

Recent successes in making metallic and metalloid fibers have led to materials with tensile strengths exceeding those of glass fibers and of all bulk metals commonly used in flight vehicle structures. They also possess extremely high modulus, and some of them are very light in weight. Currently, continuous fibers are being made in diameters suitable for use in laminates, with consistent strength properties of over 400,000 psi and a modulus of elasticity in excess of 60 million.

In the composite the binder or matrix material is very important. Without it, the desirable properties of the fiber cannot be utilized. New families of polymers are becoming available, with characteristics which far surpass materials now in wide use. One of these is polybenzimidazole (PBI). Chart 3 illustrates some typical characteristics of these materials. They offer properties which potentially double the strength of glass laminates at elevated temperatures, give a fourfold increase in shear strength when used as an adhesive, and when made into fiber form have no competition at temperatures of 700°F and beyond.

When used as a matrix with metal and metalloid fibers in composite structural materials, these new polymers offer advances which exceed all man's prior accomplishment in the improvement of structural materials. Since the Bronze Age, the strength/weight ratio of structural materials has little more than doubled from .5 million to 1.2 million. With the new composites it will be possible to triple the present state of the art and attain strength/weight ratios of about 4 million. In previous

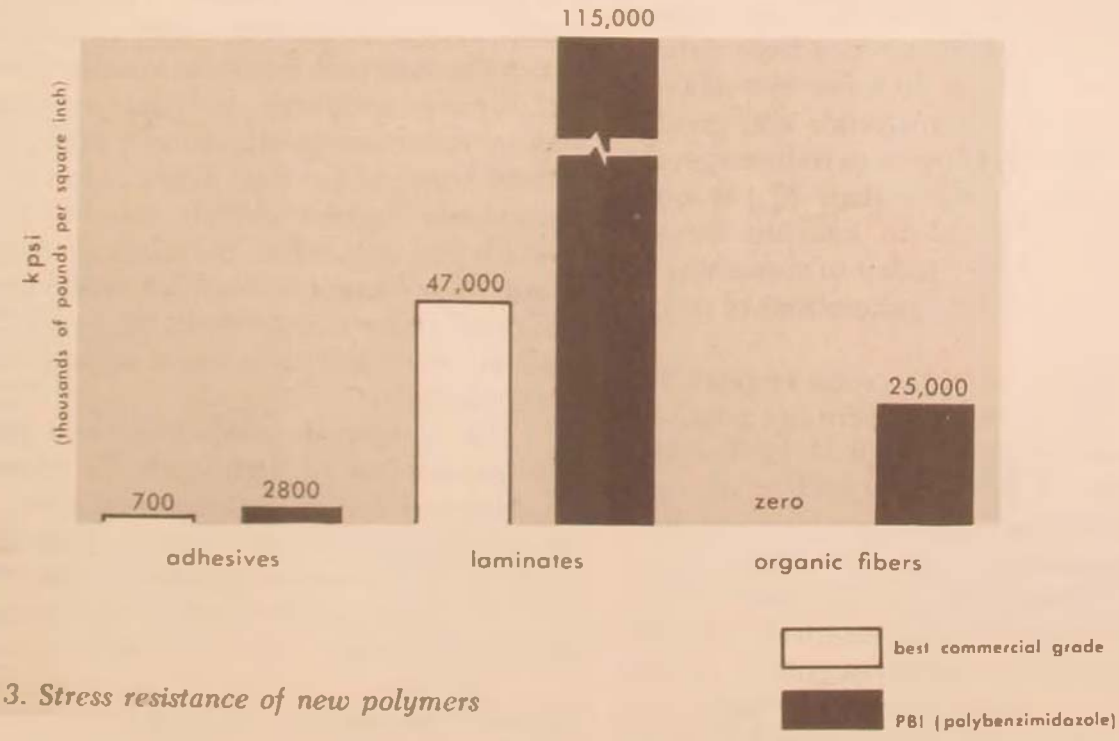


Chart 3. Stress resistance of new polymers

materials development, increases in strength or stiffness have always brought a weight penalty. We are now released from this straight-line relationship (Chart 4). In specific stiffness we can project a fivefold increase, which overshadows the improvements of centuries. These are projections with fibers and polymers now becoming available. Laboratory experiments have shown the possibility of even greater increases in the characteristics of fibers and polymers. If these can be successfully achieved, the properties of composites become truly phenomenal. Many structures can then be made at a fraction of their current weight. With the new materials, entirely new design concepts emerge, offering tremendous advances in propulsion and flight vehicle performance. Project FORECAST made a comprehensive examination of these possibilities.

propulsion

The application of these new materials, combined with advanced design concepts, can lead to a whole new era of air-breathing propulsion technology, including turbofans, lift engines, lift/cruise engines, and multiple design point turbo operation. The use of lighter, stronger materials in the fan and compressor section can increase bypass ratios from today's values of about 1.4 to 1, to those exceeding 6 to 1. High-temperature materials and greater rotational speeds will allow us to reduce specific fuel consumption by more than 30 per cent. The total effect will be to increase thrust/weight ratio from 5 to 1 today to something in excess of 10 to 1 in future generations of turbofan engines.

In lift engines and lift/cruise engines, the picture is much the same. There are possibilities for increasing thrust/weight ratios to values exceeding 20 to 1 or even 40 to 1 in the case of pure lifting engines. These can be made short for vertical mounting, with few stages at low compression ratios, and can be designed for short periods of operation at relatively low altitudes. Beyond these improvements in hydrocarbon-burning engine technology, new avenues are opened up for high-energy fuels such as hydrogen. The use of liquid hydrogen would allow us to surpass greatly the theoretical limits of hydrocarbon fuels. High-chamber-pressure rocket-engine advances could provide major improvements in rocket-engine technology.

flight dynamics—flight vehicle design

Examination of individual advances in separate technical fields does not reveal the performance which can be attained by the integration of many technologies. FORECAST studies of flight dynamics and flight vehicle design showed clearly the "cascading" effect—the extra performance gain which is achieved when the many individual gains are examined all together.

In figuring range and payload possibilities for large, long-range cargo aircraft, three factors work together to produce the performance attainable. These are the specific fuel consumption (SFC), aerodynamic efficiency as expressed in lift over drag (L/D), and the fuel or payload weight fraction. Range is increased proportionately as the specific fuel consumption is reduced, as the aerodynamic efficiency is increased, and as a function of the fuel or payload weight fraction. These factors are multiplicative rather than cumulative. Thus when the gains already discussed in propulsion efficiencies are reinforced by major improvements in L/D through such means as laminar flow control, variable geometry, or higher aspect ratios and by reduction in structural weight, ranges several hundred per cent greater than those of present-day logistic aircraft can be realized. Not all this gain need be taken in range increase; new range/payload trade-offs are possible, and today's large loads, dense loads, and outsized loads will all be less critical problems to the designer.

The combined possibilities can provide new generations of flight vehicles which can be designed for near-global range or vastly improved payloads, for vertical take-off and landing, for economic operation over a wide span of mach numbers, or for combinations of these capabilities.

other technologies

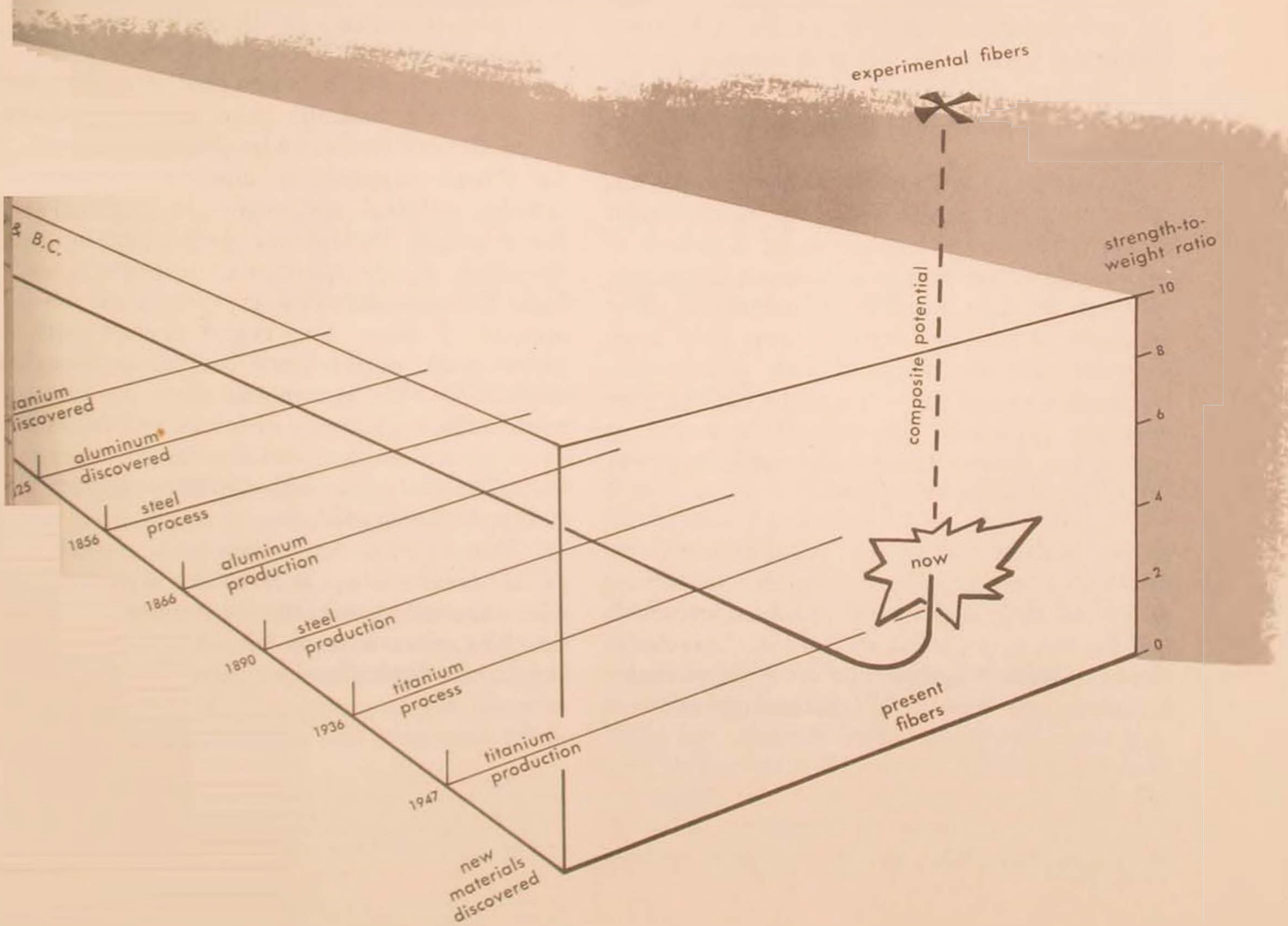
Many of the significant technological ad

vances found by the twelve FORECAST Technology Panels cannot be discussed because their specific applications are classified. They are not limited to aircraft or air vehicle operations. They may be applied to ballistic missiles, space vehicles, and command and control systems, to cite a few. One unclassified example is the field of computer technology.

Computers are revolutionizing almost every aspect of military operations: the computer has become an indispensable tool of defense management. The twelve years from 1952 to 1964 saw the number of Air Force computers grow from a single general-purpose digital computer—used in Headquarters USAF for mobilization planning—to a total of nearly 500. Such systems as the SAC Control System 465L and the Air Defense SAGE System are built on large digital computer systems. In the future, Air Force demands for computational power will increase exponentially. Paradoxically, however, computers create new problems almost as rapidly as they solve old ones.

The most serious problem is in programing and in the growing army of programmers needed. Today the Air Force requires over 5000 man-years of direct in-house support of computers, excluding those for scientific and engineering use. A typical program of the central SAC 465L system has over 600,000 instructions. This requires thousands of man-months of programing time. There is an increasing number of programs of this size. Moreover, as program size increases, the productivity of the

Chart 4. Structural metal trends. Historically, metals increased from 0.5 in 400 B.C. to 1.2 in current production methods.



programmer drops off, making the cost rise approximately as the square of the ratio of the program sizes.

The Air Force cannot continue to sustain the exponential increases in programing costs and lead times, which may even tend to outweigh the cost and efficiency of the computers themselves. The solution lies in a reorientation of the computer hardware development to evolve a new class of data processors with general program structures, user-oriented languages, and tailored hardware. The objective must be to reduce dependency on programmers in the loop between the user and the machine. It is the FORECAST estimate that advances in computer technology, if given the proper orientation, can permit users with little knowledge of the computer technology to make effective, direct use of the machine, thus bypassing the programmer. The most promising technological possibility is the "preprogramed" or "implicitly programed" computer. Its advantages are that the user has command of his machine; he communicates with it directly to make changes or get answers; and he controls the growth of his hardware to meet the needs of problems as they occur.

Among the advances which will make implicit programs possible are the enlargement of memory storage capacities by 2 orders of magnitude and reduction of the cost of memory elements by 2 to 3 orders of magnitude. New concepts of machine organizations have been explored and experimented with, giving positive indications of the value of the implicit programing approach. Means will be found to permit simultaneous users, and machine power limitations will be overcome.

IN THE FORECAST study, technical experts have made specific projections of the state of the art and have identified technical advances which will have a major influence on the characteristics of military forces beyond 1970. While major advances are seen in all technology areas, a specific result of this effort has been the identification of five areas of technology with potentially enormous payoff. FORECAST found it urgent that we expand and accelerate our current programs in these high-payoff areas to ensure that the technology will mature in time for effective use. Toward this end, specific high-priority, advanced development programs are being proposed in the technical fields of materials, propulsion, flight dynamics, navigation and guidance, and computer technology.

The Capability Panels identified many weapon and support systems which can significantly enhance the ability of the Air Force to respond to national security policy. As these systems capability projections span a decade or more, they are objectives for sequential rather than simultaneous development. In some cases immediate procurement can begin for systems entirely within the current state of the art. In other cases further study and further technological advances will be necessary before the ultimate military worth of the system will be determined with the certainty which justifies the major expenditures involved.

FORECAST findings have national significance. Beyond the broad implications for future Air Force capabilities involved, there are broader political and economic implications. For example, the technological opportunities identified in the materials, propulsion, and flight dynamics areas make practical the development of large, long-range aircraft with a global-range performance heretofore thought impossible. This, in turn, can affect our current worldwide deployment of forces and therefore have political implications in crisis management as well as international economic impact on U.S. gold flow problems.

Project FORECAST envisions a new era of military technology. It identifies the advances which can give the Air Force superior capabilities. The task now is to take the actions necessary to transform these projections into realities.

Hq Air Force Systems Command

THE YF-12A INTERCEPTOR WEAPON SYSTEM

COLONEL ALLEN K. MCDONALD*

INTERCEPTOR development in the past has been characterized by a series of small, incremental improvements. The performance of each new interceptor exceeded that of its predecessors by tenths of a mach number, a few thousand feet of altitude, and a small increase in combat radius. Radar detection ranges and air-to-air missile launch ranges likewise advanced in small steps, and each new interceptor continued to depend heavily upon the close control provided by the ground radar environment. By comparison, the YF-12A and its armament system represent a giant step forward in capability and independence of operation.

The stringent security precautions which surrounded the YF-12A until it was well into flight test understandably generated some misconceptions as to its mission and how it would be employed. This weapon system was designed to accomplish the continental air defense mission using a completely different concept of

*Colonel McDonald, as Deputy Director of Aerospace Weapons, DCS/Plans, Air Defense Command, was ADC's project officer for the YF-12A interceptor. He was the principal briefing officer for the first public showing of the YF-12A at Edwards Air Force Base, California, on 30 September 1964. This article is based on that briefing.

operations from current interceptors. The purpose of this article is to dispel any doubts as to the YF-12A's air defense mission and to describe the new tactics made possible by the performance of this weapon system.

The advanced aircraft development project that produced the YF-12A was a product of Kelly Johnson's famous "Skonk Works" at Lockheed Aircraft Corporation. The aircraft originally carried the company designation A-11; however, the Department of Defense recently assigned it the military designation YF-12A, the "Y" standing for prototype. As the President stated in February 1964, it has been tested in sustained flight at more than 2000 miles per hour at altitudes in excess of 70,000 feet, and its range is measured in "thousands of miles."

The YF-12A is powered by two Pratt and Whitney J-58 engines. The J-58's successful development and its qualification for sustained afterburning at high operating temperatures were made possible by the development and application to the engine of several new high-temperature alloys.

Hughes Aircraft Company produced the advanced fire-control and air-to-air missile systems for the YF-12A. Actual development of the ASG-18 pulsed Doppler fire-control system and the AIM-47A air-to-air guided missile was initiated as a part of the F-108 interceptor program. They were continued as a separate development effort after the F-108 was canceled.

Flight-testing of the fire-control system and armament was begun at Edwards Air Force Base in early 1960, using a modified B-58 as a test-bed. Many flight-test hours were accumulated over a four-year period, and a number of guided air-to-air missile firings were accomplished. Flight-testing of the armament system in the B-58 has now been terminated but continues in YF-12A test aircraft. The armament system is an integral part of the YF-12A and incorporates improvements which accrued from the B-58 test-bed program.

The YF-12A was designed to provide an

Sparsely settled areas of Mojave Desert afforded security for the YF-12A "mystery plane" while it was being flight-tested prior to the President's announcement of its existence.

effective defense against the manned bomber threat throughout the North American Air Defense (NORAD) area of responsibility. This vast area covers the whole North American Continent. There are two approaches to this air defense problem. If the defensive weapons lack long-range and/or high-speed performance, a large number of them must be deployed geographically to cover all possible enemy attack routes. If, on the other hand, the weapons possess a high cruise speed combined with long range, as does the YF-12A, a smaller number is required, since they can be rapidly deployed to any area where they are needed.

In defending the North American Continent against air attack, future air defense systems must be able to operate effectively in an environment that may be degraded by ballistic missile attack. They also must be capable of destroying low-altitude penetrators, because as high-altitude defensive weapons have become more effective, offensive forces have turned to low-altitude tactics for survival.

The addition of air-to-surface missiles (ASM) to older bombers in effect gives these bombers a supersonic dash capability equal to the range of the ASM. The small radar cross section of an ASM makes interception extremely difficult once it is launched. It is highly desirable for future air defense weapons to be able to destroy the bomber before it is close enough to its target to launch its ASM. It should also be capable of destroying ASM's in flight in the event the bomber is not destroyed prior to launching them.

The following characteristics determine the ability of any interceptor to meet these air defense needs:

• *Speed*, with the emphasis on sustained cruise speed, and *combat radius* at sustained high speed are the two critical factors. These two characteristics determine the ability of an interceptor to arrive at the desired location at the proper time.

All current fighters are designed to cruise most economically at subsonic speeds and utilize external drop tanks for extending their radius. A maximum-radius mission requires subsonic cruise speed and consumes considerable time. When required to go out fast at supersonic dash speeds, with a subsonic return, the current fighter's radius is drastically reduced. If supersonic speed is used for return to base also, its radius is even further reduced.

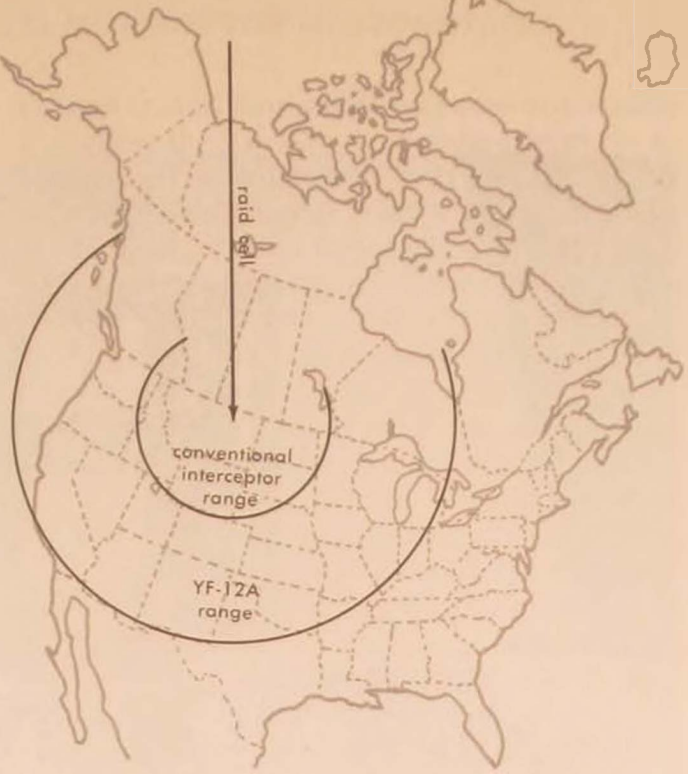


Figure 1. Operational range of the YF-12A

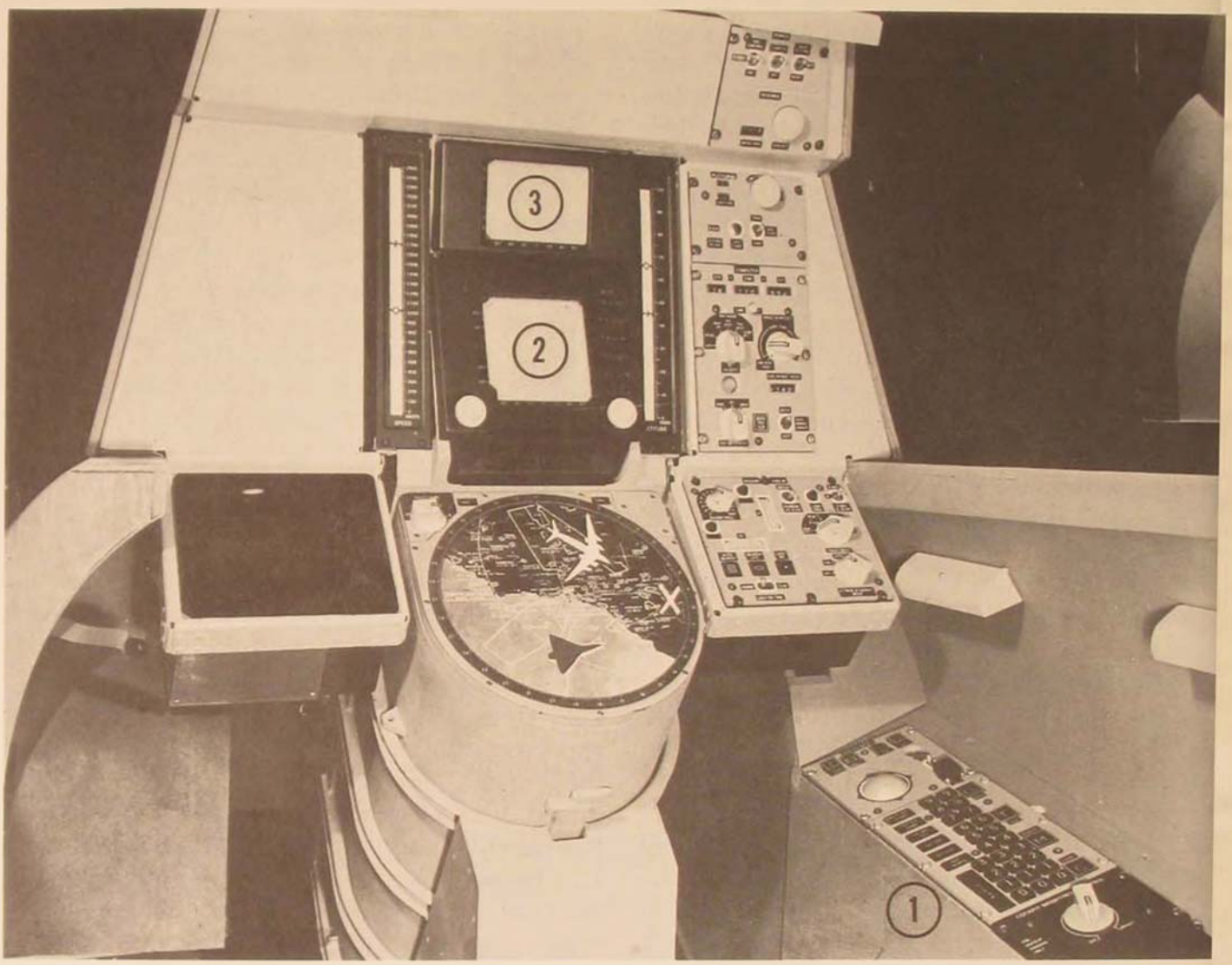
In contrast, the YF-12A flies at a sustained speed of mach 3.0 and has the capability to perform more than three long-range sorties while conventional interceptors perform one.

The operational advantage provided by the combination of high-speed cruise and long range is shown in a tactical example (Figure 1). A raid cell penetrating the NORAD area could be attacked by conventional-type interceptors from bases within the small semicircle prior to crossing the U.S. border. Under identical conditions, YF-12A's from any base within the large semicircle could be employed against this raid.

To summarize the speed/radius factors, the combination of a high cruise speed and long range permits intercepts to be made much farther out from the target area and requires fewer weapons.

• The *fire-control system* is the heart of any interceptor weapon system. Detection range of the fire-control system and its low-

Figure 2. ASG-18 rear cockpit display



1 manual computer keyboard

2 radar display

3 infrared display

target

interceptor

X intercept point

altitude capability relate directly to effectiveness against low-altitude targets and operation in a degraded environment. The ASG-18 fire-control system features a long-range search capability and detection of low-flying targets down to ground level. With this capability, the speed and combat radius of the YF-12A enable it to cover a much greater area in its normal search pattern than current interceptors, such as the F-106.

- *Armament system* performance relates directly to aircraft maneuverability requirements. The air intercept missile AIM-47A carried by the YF-12A has a very long range and is highly maneuverable. It can engage high-altitude or low-altitude targets down to ground level while the YF-12A remains at its optimum cruise altitude. It can also be fired at targets on either side of the interceptor's flight path. Whereas current interceptors must maneuver very precisely to get the target within their relatively small missile launch zone before they

can fire, the YF-12A takes advantage of the range and maneuverability of the AIM-47 and requires only gross steering.

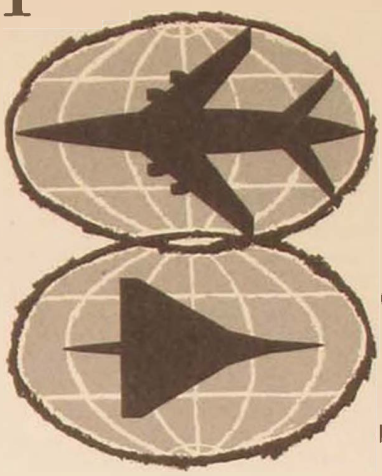
Because of their relatively short-range fire-control and armament systems, current interceptors require accurate control from ground radars. They are directed to the proper altitude, speed, and heading for intercept. At relatively close range, the interceptor acquires the target on its own radar and makes the attack. The pilot must accurately steer the interceptor to aim at the precise point in space computed by the fire-control system where the missile will destroy the target. In contrast, the ASG-18/AIM-47 subsystems were designed to operate with a minimum of ground control. The YF-12A's position is automatically displayed by its self-contained navigation system, as indicated in Figure 2. Target information from any source having raid intelligence can be inserted into the ASG-18 computer automatically or manually, and the position of the target relative to the YF-12A will be displayed for the crew on a tactical map display. When the target is detected by the interceptor's long-range radar and the fire-control officer obtains a lock-on, steering information is displayed. Because of the performance designed into the missile, the YF-12A is required to make only gross azimuth steering corrections during attack and need not change altitude at all. The combination of long-range search radar, inertial navigation, onboard computer, and long-range maneuvering missile will allow the YF-12A to operate effectively in a degraded environment.

While interceptor maneuverability is not as important during the attack phase with the YF-12A as it is with current interceptors, it becomes important for reattack. The speed of the YF-12A, coupled with its radar detection range and missile launch range, actually allows it to reattack sooner than current interceptors despite its larger turning radius. Against a subsonic bomber raid, the YF-12A would be in position to fire a second missile in one half the time required by the F-106. Against a supersonic dash bomber, it could reattack in something like one fourth the time of the F-106.

THE YF-12A indeed represents a tremendous increase in capability for continental air defense. With only very rough raid intelligence, it can intercept and destroy hostile airborne forces farther out from their targets, in less time, and with more deadly accuracy than any weapon system heretofore envisioned. Its high speed and long range coupled with its advanced armament system give the defense force commander great operational flexibility in the employment of his weapons. Let there be no doubt that the YF-12A is an air defense interceptor of the first order.

Hq Air Defense Command

DO WE WANT A SUPERSONIC TRANSPORT



OR AN $89 TRIP TO EUROPE?

LIEUTENANT GENERAL WILLIAM H. TUNNER, USAF (RET)

DO WE WANT the supersonic transport, known as the SST? Eventually. But presently there is another transport plane that we would like to have and really need a great deal more. In getting into the problem the first question is, Who are "we"? We are many different people and organizations—the riding public, the large part of the public that hasn't flown but might like to, the aircraft manufacturers, the airlines, the Department of Defense, and the shippers of our American industry.

Well, what do all these many groups want in an airplane? Which ones want an SST and which ones would prefer at this time something else?

What are the different characteristics of an airplane that are really desirable to the public? Speed, safety, reliability, economy or low cost, and comfort seem to be the principal ones to consider.

The speed which we have today in our new jets, the Boeing 707, Douglas DC-8, and Convair 880 or 900, is just below the speed of sound. Anything more in speed means penetrating the sound barrier, with its attendant major engineering problems. But just about everyone who flies today or ships his cargo by air wants speed. That's why he uses air in the first place—to get there faster. The public, i.e., the customers, airlines, and manufacturers, still seem somewhat awed with existing speed and have difficulty adjusting to it. At present, there are just a few complaints about lack of speed. The complaints one hears are lack of service, lack of comfort, lack of reliability, and high costs.

All agree that more safety and its close associate, reliability, would be desirable to have. We merely need to recall the disastrous aircraft accidents of the past year to remind us that flying presents a risk. More constant reminders are the prominently placed and *well used* accident insurance concessions and accident policy vending machines found in air terminals, which will insure your flight for a sum. Much of the air riding public is somewhat fearful and has generally accepted the fact that there is a greater risk in air travel than in other modes of travel.

As for reliability, who hasn't been delayed

General Tunner wrote this article some months prior to Secretary of Defense McNamara's announcement of plans to proceed with the development of the C-5A, the huge Air Force cargo experimental—heavy logistics system (CX-HLS).

if he travels often, because of weather or maintenance problems or has not had to "hold" over destinations for one reason or another? Who hasn't missed connections because of delays? Of course the airlines hate delays as much as the customer because it throws their operations scheduling and maintenance scheduling out of kilter, and, worse, it costs them money—it hits them in the pocketbook. Reliability materially affects economy. Poor service or lack of it is usually an internal airline problem—but all the service you get costs an airline money and subsequently costs you the user money. Lack of comfort is also built in—seats jammed together, no room to stretch, boredom are problems unpopular but accepted which come about generally from economy reasons.

Passengers want safety, reliability, reasonable speed, and comfort. Cargo by air doesn't need comfort, but it does want the others. But both passengers and cargo want economy. Passengers want a cheaper ticket. To prove this, have you noted the number of people who ride "economy class" or "tourist class" compared to the so-called "first class"? Because of demand the lower-class seats frequently take up nine tenths of the total space in a plane. People don't like the crowding and lack of service in the lower class but they put up with it for economy reasons. So, the public likes economy in air travel, but so do the cargo shippers, so does the Department of Defense, but most important of all so would the 75 per cent of the people who don't fly at all and the shippers who don't ship by air. In the cargo area it should be noted that shippers still send 99.9 per cent of their cargoes across the Atlantic by boat; only 1/10 of 1 per cent goes by air.

Today about the cheapest air ticket one can buy from New York to Paris which would be in the economy class, unless he goes on an excursion with all sorts of gimmicks or trick limitations as to time of travel and return, is about $200 one way. First-class passage to Paris is $450. Why are fares so high? The airlines are quite well run, and they are not making exorbitant profits. The problem is that operating costs are high. What can be done, then, to reduce costs and thus reduce the price of the ticket and open up the great untapped markets for passengers and cargo? Labor and salaries can't be reduced. Costs of gasoline and facilities probably won't change much. But there is a place where we might make the breakthrough: we can reduce the overall cost by reducing the cost of the airplane itself and also by reducing the costs necessary to maintain it and to keep it flying safely. We can build a plane which will take less money per ticket or pound of cargo to fly each mile if we make it very large, three times the size of today's big jets, and if we design deliberately with the thought of economy in mind.

But this nation needs to keep its world prestige among its neighbors, and that is where the SST comes in. The distant future no doubt will have mach 3 or 2000 miles per hour as the routine standard speed for air travel. Internationally it is sound thinking to keep up with one's neighbors. If we are to stay ahead of or keep up with other countries in the airline business, we should at least keep our fingers in the SST pie. However, we are well ahead, as we should be, with our military combat planes, in the supersonic field. I believe our military will keep us ahead. But I believe that neither the public nor American industry wants the very high speeds of the SST in preference to safety, reliability, economy, and comfort. And the SST will, at least in the early stages, probably give us less of these merits than we have today in the jet airliners.

A recent study revealed that the SST will leave in its wake along the ground a most devastating (to the public eardrums) sonic boom. The effects of this wide-area, continually physically damaging sonic boom will surely bring the wrath of the people against the Government. As in the case of the military sonic booms, the excuse can no longer be, "But it is in the best interests of the national defense."

Instead, let's slow up the promotion of the SST. Let's give the public what it wants. Let us use the state of the art as we know it today, in manufacturing and operating airplanes, and instead of penetrating into the unknown world of 2000 mph let us use our scientists and engineers to refine our techniques, build a new plane, yes, but instead of one with extremely high speeds, use our great technology to provide greater safety, greater reliability, and greater economy.

It can be done.

Let's call this airplane that the public wants, that "we" want, the CX-X. This happens to be the name the military are using to indicate a new but still nebulous and undeveloped transport plane. Now the question is, What should this CX-X do and what should it look like? What would be different about it? What should be its new, outstanding, and principal characteristics?

Certainly it should be a plane acceptable to the Department of Defense and the commercial world alike. It is important to get quantity purchasing of the plane, if it is to be economical. The number made could make the difference between 14 to 20 million dollars for each (versus 40 to 60 million for the SST). The military has a requirement to carry very large pieces of equipment and to transport thousands of our men with all their military paraphernalia overseas, both in peace and in times of crisis. A very large airplane is essential to carry this big and heavy equipment. The commercial world and the military as well have a dominating requirement, and obligation too, for economy in shipping. So, large, heavy, and "outsized" cargoes may be transported, and lessened overall unit shipping cost should become the order of the day.

Some, no doubt, will scoff at the idea of designing for greater safety, economy, and reliability alone, saying that we are doing everything in this area today that is possible. I don't think so. Consider just a few points: The numerous accessories found in any airplane—are they as simplified as our best engineers can make them? And then, are they located in readily accessible places in the plane so that maintenance or replacement of worn units is easy?—and also so that unloading of the plane is not essential if the plane goes out of commission? Have we solved the problem of lightning strikes? Are flight instruments positively guaranteed to operate in all weather conditions and temperature ranges? Are the newly planned jet engines the most efficient and as breakdown-proof as we can make them?

As I see it, the plane should be made by one of our most experienced and major transport manufacturers, that is, either Boeing, Douglas, General Dynamics, or Lockheed as the prime source, with assists from the ones not selected. The plane should carry 250,000 pounds, 3500 miles. (Thus it would be three times the size of any previous jet transport built, so that one crew can take the place of three, and three maintenance and support men can take the place of six.) It should have an all-out range of 5000 to 6000 miles, far enough to fly nonstop from Honolulu to New York City. It should be double-decked, with a removable and adjustable mid-floor. Although it would be large enough to have a separate section for movies to be shown as a standard item, the CX-X would not be large enough to have a swimming pool.

In its military version it should be able to carry the many vital pieces of a regular Army division's ordnance that can't now be airlifted—heavy tanks, large guns, and specialized vehicles, while for the Air Force it should be able to carry large missiles and even our fighter planes. Its usable cabin space could really be a novel feature, for in this plane the cabin would be 18 feet high (enough to carry our large missiles) and 18 feet wide (enough for two large Army trucks side by side), perhaps 150 feet long with openings to the cabin at both ends. Its lower deck should be at truck-bed height.

The CX-X should be capable of landing in 6000 feet and taking off with a full load in 8000 feet. Neither our commercial nor military airports should be required to undergo again another expensive and protracted airfield lengthening program as was the case with the modern jet transports and bombers.

The commercial version of this plane could be quite revolutionary and very interesting. For example, the bottom deck could be used to carry 300 tourist passengers or cargo or a combination of both passengers and freight. The top deck with 75 super first-class passengers could well resemble a large Pullman with club car or a first-class passenger steamship, with several Pullman-type bunks available (as we once had in our pre-World War II DC-3's), a dining room and cocktail bar along with comfortable lounging seats. Room and space could be provided for passengers to get up and walk around, sleep on a bed, dine, sip cocktails, play

cards, or see movies—real comfort and a doing away with the crowded, claustrophobic atmosphere of today's air transport—and all at a price below the first-class fare of today.

This plane, which could appear in our skies in 1970, the same time as the projected SST, could well cause a revolution both in military and civilian transportation, a transportation revolution so long sought after but never achieved. The dream of C. R. Smith, head of American Airlines, when many years ago he wrote in the *Saturday Evening Post*, "What this country needs is a good 3-cent airline," may finally be realized—an $89 flight from New York to Paris. The price of a tourist ticket might be as little as $89 from New York to Europe, or a shipper could move a ton of cargo at no more than 7¢ per ton-mile, stepping down into the area of surface prices. It could reduce military costs by hundreds of millions of dollars, open up new markets for passengers and cargoes for the airlines, and thus speed up the flow of international commerce, develop new industries, and bring our little world even closer together.

To build this CX-X we must decide that we, the public, want it in preference to the SST at this time and that we are willing that our best aeronautical brains and scientists get onto this job. Will the public desires get ample consideration from the airlines—as well as the Government? Will the military make the small compromises in design that it must in order to get a plane which is commercially adaptable? If the answers to these questions are yes, and I believe they are, then I believe that the manufacturers can use their great experience to produce a larger, safer, more dependable plane, and one considerably cheaper to operate. Certainly a new look at this problem by all the "we's" should be made.

Ware Neck, Virginia

EXERCISE GOLD FIRE I

MAJOR ROBERT G. SPARKMAN

THE AIR/GROUND maneuvers in the fall of 1964, designated Exercise Gold Fire I, were expected to go a long way toward writing a final chapter in the disposition of the controversial recommendations of the Howze Board.

These recommendations, generated from a body of Army opinion that the organic tactical air capabilities of the Army should be substantially enlarged, took formal shape in 1961 when the Secretary of Defense directed the Army to make a complete re-evaluation of its requirements from 1963 to 1975 for land war mobility with particular emphasis on the greater utilization of air vehicles and related systems. General Hamilton H. Howze, selected by the Army to conduct the study, recommended Army air assault divisions and strong implements of organic aircraft. At the direction of the Secretary of the Air Force, General Gabriel P. Disosway was chosen to head a board to review the Howze Board recommendations. The Air Force board concluded that the Howze Board provisions, if adopted, would lead to duplication of equipment and capabilities already possessed by the Air Force for joint action with ground forces, in which it had long and successful experience.

For the third round the Secretary of Defense called upon the Joint Chiefs of Staff to plan tests and demonstrations relative to the aerial movement and supply of troops in the battle area. The JCS in turn directed CINCUSSTRICOM to conduct field exercises and collateral studies for the purpose of (1) testing and evaluating for suitability in joint operations the units and procedures by which the Air Force would use aviation to enhance the mobility of Army units, and (2) obtaining maximum information and data applicable to the following six JCS requirements:

- To eliminate areas of unnecessary overlap or undesirable duplication of capabilities
- To determine the best methods of exploiting the mutually supporting capabilities of the services involved
- To determine the best methods for coordinating and controlling the operations of air/ground forces involved
- To determine the survivability and suitability for various combat environments
- To determine the advantages and/or limitations inherent in the Army mobility concept, including deployment, employment, and logistical support of the proposed units (not applicable to Gold Fire I)
- To provide data for use in determining total force structure, logistical requirements, and supporting requirements.

Secretary of Defense McNamara authorized almost 16,000 extra personnel for the Army to establish the experimental 11th Air Assault Division at Fort Benning, Georgia, to test the

air assault division theory. The division was organized somewhat although not exactly in line with the ideas of the Howze Board recommendations and concepts of how aviation can best be used in support of and to improve the mobility of ground forces. This organization is continuing training in employment of these Army concepts.*

The Air Force was directed to prepare for Exercise Gold Fire, a maneuver in which Air Force concepts would be put into practice. Before these methods and techniques could be demonstrated, however, much planning and work had to be done. The Air Force late in 1963 organized, under the Tactical Air Command, with personnel principally from TAC, the Tactical Air Warfare Center (TAWC) at Eglin AFB, Florida. Commanded by Major General Gilbert L. Meyers, TAWC was to practice and test Air Force concepts and doctrine in the employment of all forms of aviation in support of ground warfare. The overall objective of TAWC is to improve all phases of tactical air warfare, from strategic deployment on through logistics, communications, reconnaissance, mobility, and close air support. This objective was to be accomplished through field exercises, engineering tests of new equipment on a continuing basis, analytical tests, and war gaming. Rehearsal of

*Early in January 1965 it was announced that the 11th Air Assault Division would not be budgeted beyond the present fiscal year.

General Curtis E. LeMay, U.S. Air Force Chief of Staff, and General Walter C. Sweeney, Jr., Commander, Tactical Air Command, are briefed by a forward air controller during Exercise Gold Fire I.

methods and techniques for improving the Air Force concepts was conducted from June through September 1964 in a series of three field exercises called Indian River. The objective of these exercises was to plan, practice, and perfect methods and techniques of implementing Air Force concepts in providing better and closer integration of Air Force capabilities with those of ground units of the United States Army and to determine the extent to which tactical aviation techniques and methods of employment can enhance the mobility and combat effectiveness of joint combat forces. Elements of the Army's 1st Infantry Division, a standard ROAD (Reorganization Objective Army Division) with its normal complement of organizational aviation vehicles, were used in these exercises. The number of Army troops participating was increased in each successive exercise, theoretically going from the simple to the complex, as the air and ground units were molded into a team for use in Gold Fire I. The basic reason for the Indian River series, then, was to design and develop, in coordination with Army commanders, a joint training program that would be responsive to Air Force concepts and doctrine.

In carrying out his responsibility for gathering data and evaluating these concepts, CINCSTRIKE in the summer of 1963 had organized the Joint Test and Evaluation Task Force (JTETF), which was employed for the first time in Exercise Gold Fire I. Under the command of Major General William B. Rosson, USA, the JTETF in this exercise assisted in the test and evaluation of concepts for using aviation to enhance the mobility and combat effectiveness of all participating forces in a joint operation. The objectives of JTETF paralleled those requirements handed down by the JCS. The data collectors used specially designed forms to record the facts which they obtained. Data were collected in the key areas of fire support, tactical air reconnaissance, strategic and tactical mobility, logistical support, and command and control. Other factors considered in the evaluation related to flexibility, supportability, and vulnerability of tactical air units in combat actions. Two methods of data collecting were used by the Army and Air Force fact gatherers. The first involved completion of forms designed so that the data are easily transferrable to cards for processing by a computer. The second procedure called for selected personnel to complete questionnaires on tactics, techniques, procedures, equipment, and problem areas encountered or observed throughout the maneuver area. Air Force and Army photographers augmented the data with still and motion pictures in both black and white and in color. The film coverage was then catalogued on computer cards for easy reference and study. Over 850 personnel, including photographers, were used in this task of gathering data. (Controllers were not a part of JTETF.)

The comprehensive and intricate nature of the data-collection system required a thorough and complete training program for data-collection personnel. The course was of sufficient length to permit testing and corrective action. The proper collection of essential data and then proper evaluation of the data collected were such a vital part of this immense undertaking that the training program had to be designed so as to ensure that data-collection personnel could attain a state of understanding and proficiency which permitted and made mandatory the successful completion of the data-collection mission. The classroom instruction and exercises thoroughly familiarized all personnel with the proper method of observing events as well as the procedure for accomplishing the data-collection forms. It was emphasized and reemphasized that the validity of the overall evaluation depended to a large extent upon the completeness and accuracy of the data collected.

All data and photo documentation produced during the exercise provide a factual basis for close examination and study by General Paul D. Adams, Commander in Chief, USSTRICOM, and Director, Exercise Gold Fire I. Following this study, the data collected and USSTRICOM's evaluation and recommendations will be forwarded to the Joint Chiefs of Staff in Washington, D.C.

To stress the importance of Gold Fire I to the Army and the Air Force and how it bears on methods of waging ground warfare, it might be well to emphasize that the exercise was a

test of a concept or idea of moving a portion of a standard ROAD division a distance of some 2200 nautical miles and landing it on unimproved airfields in sufficient strength – some 10,000 men and their equipment—to fight a sustained war and then to provide complete logistic support of this force by air delivery. In no previous exercise has this capability been demonstrated by air movement of units in the type of exercise where the men had to be fully equipped for a tactical situation upon landing. In Exercise Big Lift, for example, which took an armored division to Germany, only personnel were airlifted into the area. This present type of accomplishment has not been possible before because we did not have the right kind of aircraft. Now we do—we have the C-130. It can transport a payload of 16 tons 3000 nautical miles at a speed of over 300 miles per hour and land on a 2000-foot dirt strip, which can be constructed by personnel and equipment air-dropped by C-130's after flying the same distance.

Today the Air Force has an additional capability, which has undergone testing and refinement by TAWC, of delivering supplies by extraction methods into small areas where it is not practical or possible for various reasons to build assault landing strips. In addition to delivery of supplies and equipment by the time-tested conventional parachute method, in Gold Fire I tons of fuel, rations, and other supplies were delivered into small delivery zones from C-130's using the low-altitude parachute extraction system (LAPES), ground proximity extraction system (GPES), and parachute low-altitude delivery system (PLADS). With both LAPES and GPES, the C-130 passes over the extraction zone at an altitude of about 5 feet and a speed of 120 miles per hour. With LAPES, a parachute deploys, extracting the load and allowing it to a stop. With GPES, the load is extracted by a hook engaging a cable stretched across the extraction zone. In the PLADS technique, the load is pulled by parachute from the cargo compartment of a C-130 flying at 200 feet. By use of any of these three methods the delivery can be pinpointed into a very small area. Returning from the forward battlefield areas, the C-130 carries battle casualties—rapidly and with in-flight medical attention—directly to rear-area hospitals without intermediate stops. It also carries prisoners and transports materiel to the rear for maintenance and repair.

Thus the C-130 gives a tremendous potential to our tactical ground and air forces of Strike Command to make swift reactions to any part of the world. The moving of large forces, such as an entire battalion, over enemy lines and the exploiting of air mobility in supply and evacuation are the delight of any ground commander.

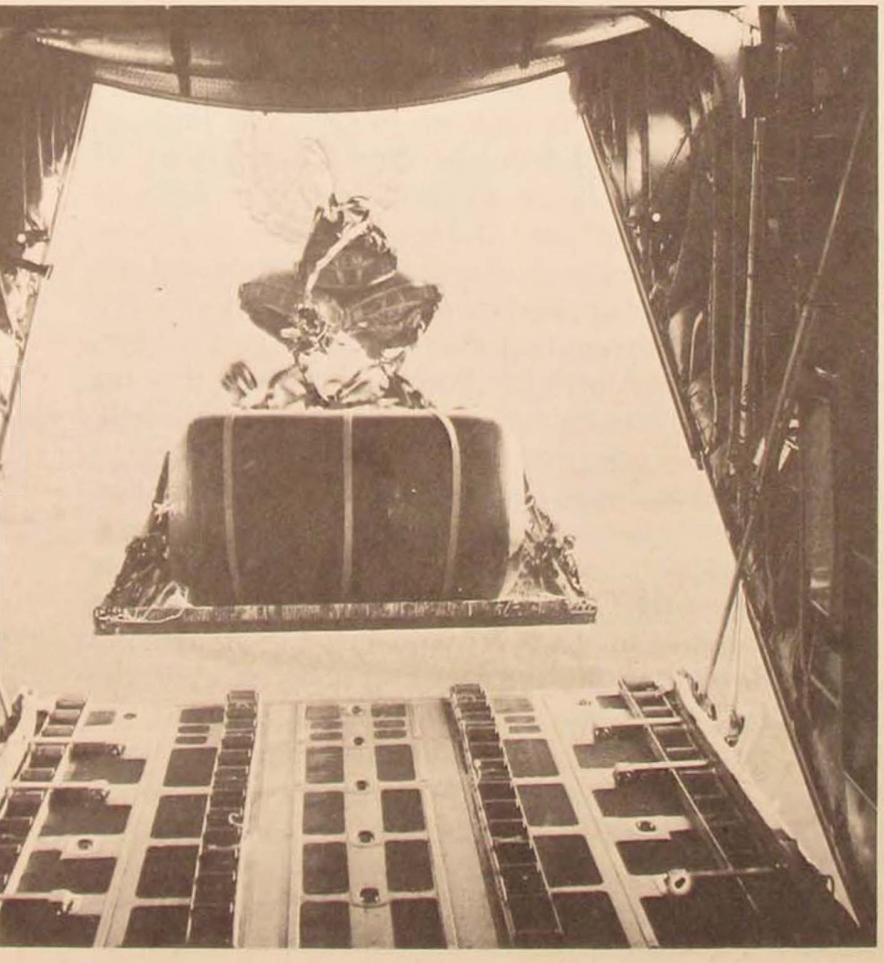
The heart of the Army's air mobility concept is helicopter movement of combat forces in the general battle area to achieve increased tactical mobility for a portion of the force at any one time by overcoming the obstacles of terrain, mud, dense foliage, and slow surface transportation. The Air Force has always considered that this approach to increasing mobility has merit when properly used and controlled and worked with the 1st Infantry Division to improve and test joint techniques, procedures, and equipment. During this exercise TAC CH-3C helicopters were employed for the first time in an auxiliary role to extend the air line of communication right up to the front lines.

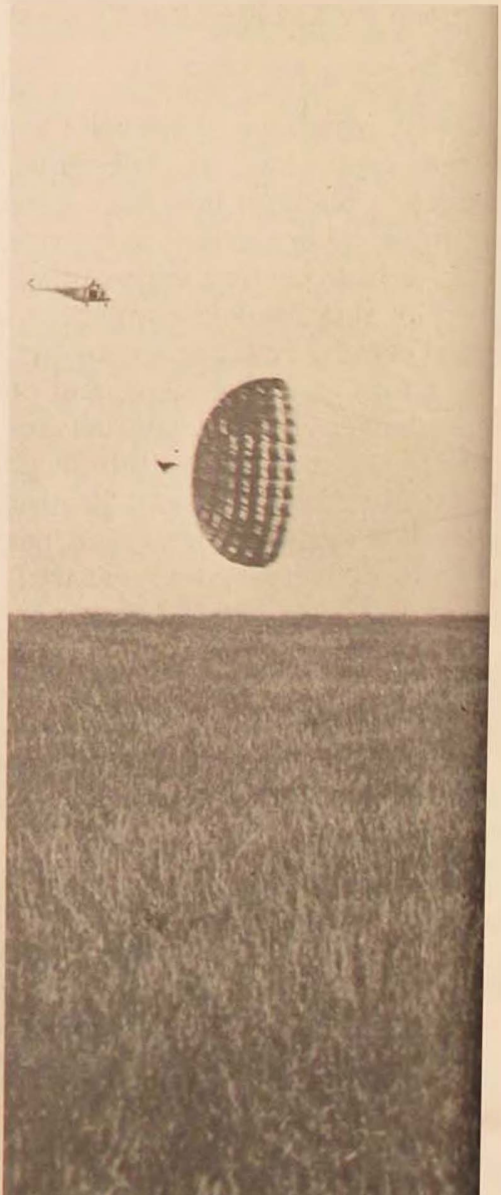
Standard Army divisions are authorized 97 helicopters in an aviation battalion. Fifty of the craft are troop and cargo carriers. This integral helicopter-borne assault force provides a significant improvement in mobility. It was with this equipment of the 1st Infantry Division, integrated with Air Force helicopters, that the test was conducted utilizing the support of helicopter-borne assault forces. A search is being made to find a system for increasing Army mobility in the battle area through use of Air Force capabilities and resources. The Air Force wants to test the C-130 thoroughly, not only in getting supplies to the battlefield but also in actually depositing the supplies and equipment on the battlefield. TAC believes that it can put the armies and their full equipment, including vehicles, tanks, trucks, and other heavy equipment, into the battlefield and provide mobility on the battlefield as far forward as any aircraft can possibly go.

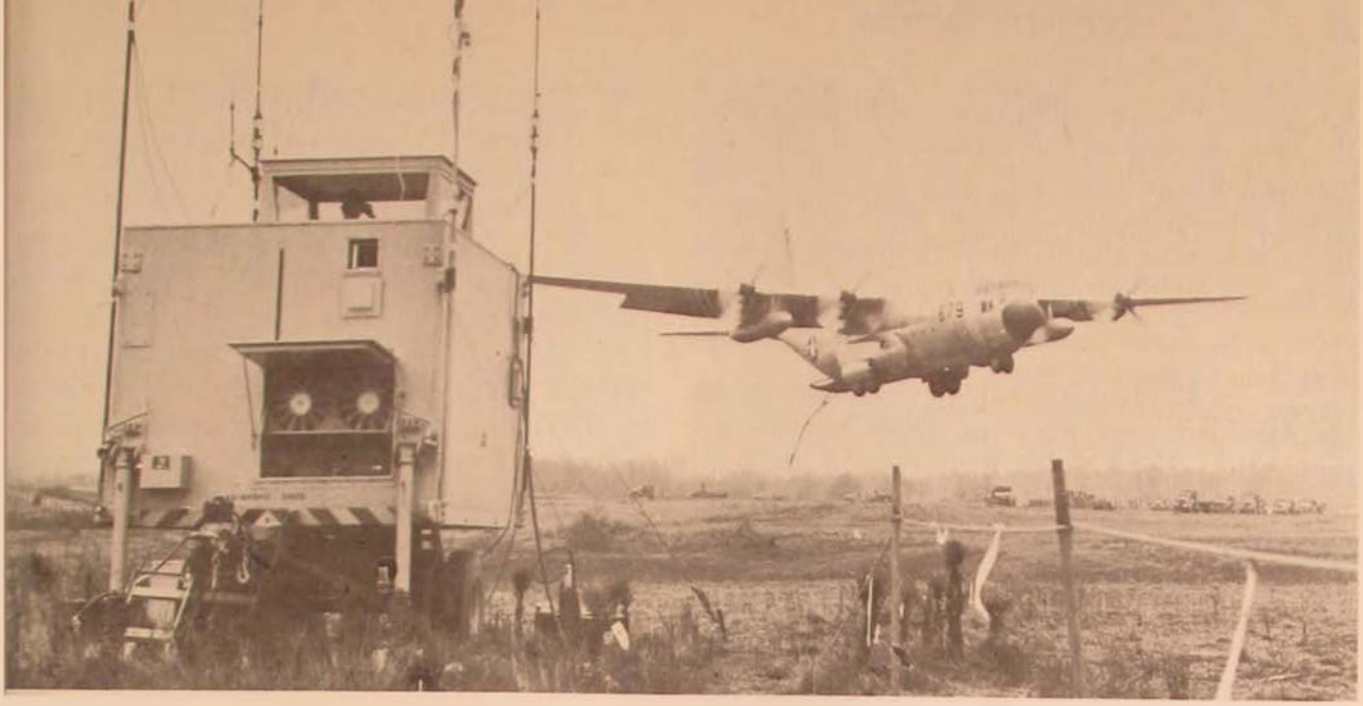
The Air Force is fully aware that the test program may bring to light some gaps in the

On Time and in Place Delivery of Cargo

A load of four fuel cells is extracted from the cargo compartment of a TAC C-130 Hercules assault airlift aircraft over a drop zone in Joint Task Force Ozark territory. The 500-gallon fuel bladders, weighing a total of 14,000 pounds, are dropped on a pallet from 1500 feet using three heavy cargo parachutes. . . . An assault airlift aircraft (right) approaches a cargo extraction zone in an air line of communications resupply mission. Trailing behind the aircraft is the hook which engages a cable on the ground to extract the cargo from the aircraft on a pallet. In the foreground is a mobile control tower which was airlifted into the assault zone earlier for this combat-simulated operation. . . . A cargo pallet is "yanked" from the rear compartment of C-130 (lower right) using the low-altitude parachute extraction system (LAPES). With this cargo delivery method, the aircraft flies five feet over the extraction zone at 120 miles per hour. The parachute deploys, pulls the load from the open cargo hold, and slows it to a stop.







total capability to fulfill responsibilities within the joint command and is ready to fill the gaps with additional or totally new equipment and improved techniques. These tests are looked upon as an opportunity to work toward an even more successful air/ground team.

FUNDAMENTAL to and underlying the Air Force concepts is the belief that the current Army divisions such as the 1st Infantry Division, with their full complement of combat equipment (including 97 helicopters), teamed with Air Force units with first-line aircraft, provide the optimum in combat strength and staying power, significant increases in mobility, and the ability to engage the most capable of potential enemies. With tailored weapons, equipment, and forces, this flexible team can handle threats from any enemy. The Army should be provided all possible support that will increase combat effectiveness, and this means increased mobility on the battlefield. There are indications that helicopters will prove effective for forward and lateral movements within the area controlled by friendly forces, when properly planned and controlled. The helicopter has never before been used in this manner in a tactical situation, and therefore techniques and methods must be tried and tested.

The USAF concept of assault airlift uses the helicopter to the fullest extent possible to deliver and recover personnel, equipment, and supplies to, within, and from an area of operation, utilizing all available aircraft (including Air Force organic helicopters when available) and supporting elements. In providing the optimum in logistic support, the Air Force maintains control of all its units and equipment, a point at issue between the Army and Air Force for many years. Effective air logistical support of combat forces by tactical air forces consists of the following tasks:

a. Establishment and maintenance of an air line of communications to effect the delivery of personnel, supplies, and equipment on a sustained basis to Army depots, division supply points, and combat units, regardless of their size or location.

b. Intra-combat-zone movements of units.

c. Aeromedical evacuation operations.

d. Emergency supply and resupply.

e. Movement of special forces.

When a request is received from the Army for air support, an evaluation is made by experienced personnel and the decision is made as to the type of air vehicle most suitable for the job, whether it be a helicopter or C-130 aircraft. Tactical Air Force units, personnel, and equipment must be responsive to experienced Air Force commanders if these tasks are to be fulfilled.

The Air Force has the role and mission of providing air support of all types to the Army, and it has the capability to fulfill this responsibility when put into action through Air Force concepts of how air power should be used in air mobility requirements and close air support of ground forces. In modern warfare highly trained and skilled technicians are needed to man intricate and expensive machines, and no single service can be self-supporting in combat situations. Instead, the requirement calls for the best efforts of each service woven into fighting teamwork through joint command arrangements, thus integrating all capabilities and avoiding costly duplication of capabilities.

These, then, were the Air Force concepts of supporting ground forces that constituted the framework for much testing of new techniques and methods of providing this support in the Indian River exercises preparatory to Gold Fire I, which was conducted between 29 October and 11 November under the scrutinous eye of trained testers and evaluators. The following coverage of the actual play in Gold Fire I does not indicate in any way the extent to which the Air Force concepts were successful. It is intended as an indication of the tremendous effort by both Air Force and Army and a glimpse of the many, many intricate details that must be worked out step by step in improving Air Force support of ground forces and making Air Force concepts into proved doctrine.

For a mythical political and military situation as the background for Gold Fire I, the south central part of Missouri was divided into the fictitious countries of Argentia, north and west of U.S. Highway 66, and Oroland, south

and east of Highway 66, extending southward to U.S. Highway 60 and encompassing Fort Leonard Wood. Argentia's military force was Joint Task Force Sioux. Oroland had Joint Task Force Ozark for allied U.S. military support. The ground maneuvers were conducted within the country of Oroland. The Trigonist political party in Oroland had been gaining strength for a number of years, and recently Oroland had accused Argentia of aiding militant Trigonists in attempts to overthrow the Oroland government. Trigonist party members then rioted and were said to be aided by Argentian provocateurs. In addition to the rioting, other internal events caused further upheaval in the Oroland government, causing it to apply to the United States for military aid. The U.S. Government approved the request and indicated that aid was forthcoming.

Argentia, faced with increasing agricultural problems, blamed its plight on economic sanctions by Oroland. This brought the people of Argentia to the support of the Trigonist party in Oroland. After the rioting in Oroland, Argentian citizens attacked both the U.S. and Oroland embassies, causing extensive damage. They also presented the Argentian government recommendations for a declaration of war, telling the U.S. to keep hands off. By a prearranged and secret plan, at 1530 on 27 October U.S. troops secured Oroland's Houston Airport at Houston, Missouri, southeast of Fort Leonard Wood. At 1600 the commander of Joint Task Force Ozark arrived by helicopter at the airport. There he consulted with Oroland's Prime Minister E. Romines and the American Ambassador. They discussed the terms of the 1948 Civil Affairs Agreement between the United States of America and Oroland. This agreement was designed to govern the relationship between U.S. troops and the civil authorities and the people in Oroland, but it had been inoperative since 1955. All parties present at the airport signed a Memorandum of Understanding which reaffirmed and allowed either party to implement the terms of the 1948 Civil Affairs Agreement.

The commander of the test force, Oroland's Joint Task Force Ozark, was Air Force Major General Jamie Gough, who is Director of Plans, USSTRICOM. Marine Corps Brigadier General Lowell English, Deputy for Plans, USSTRICOM, was commander of Argentia's Joint Task Force Sioux. JTF Sioux used standard organizational equipment and normal methods of waging ground warfare.

A neutral force, under the command of Major General Lyle E. Seemands, USA, commanding general of Fort Leonard Wood, provided administrative services to the combatant players in the ground maneuver area. This arrangement relieved the task force commanders and staffs of many administrative details, leaving them free to concentrate on exercise problems and actions.

In testing the deployment and redeployment phase of movement to and from the exercise area, the Military Air Transport Service (MATS) provided all strategic airlift of personnel and logistic support of Task Force Ozark. This strategic airlift consisted of moving all personnel and equipment into intermediate staging bases near the maneuver area. Oroland, for exercise and testing purposes, was considered a country separated from the United States by water, necessitating movement of all manpower and materials into the country by MATS airlift. All flights were loaded as if for long-range airlift into exercise areas, simulating overseas deployment of combat-ready forces capable of immediate engagement with the enemy. As MATS aircraft landed at intermediate staging bases, troops, equipment, and supplies were offloaded and immediately loaded onto JTF Ozark (or Tactical Air Command) C-130's for the final leg of the airlift into hastily prepared assault strips in the combat zone. There they moved initially into a marshaling area and subsequently into an assembly area.

Free play in the exercise was encouraged to the utmost and was allowed to the maximum extent consistent with test objectives. When it was necessary to apply control, it was applied first to the aggressor Sioux forces. In this way the test force, Ozark, had the freedom of response to the tactical situation created. Controllers and umpires had to simulate combat conditions and actualities by marking artillery fires, fighter strikes, and ground actions and assess the resulting casualties and damage to equipment.

Casualties and equipment assessed as damaged or destroyed were withdrawn from player control and held by neutral forces for a realistic recycle time as determined by the controllers. If the free play of total integrated combat in a fast-moving situation did not induce the desired test, then measures had to be taken to cause a demonstration of the procedure and technique being tested.

The strategic deployment phase of JTF Ozark forces in Gold Fire I began on 25 October 1964 as some 4000 military personnel and 7000 tons of cargo were airlifted into Walnut Ridge Municipal Airport, Arkansas. Landing and taking off in a steady stream every ten minutes, MATS aircraft delivered communications vans, trucks, tents, food, and even helicopters into the intermediate staging base. This part of the deployment was completed in a 63-hour period as the personnel and equipment were flown in from eight different Army and Air Force installations in C-130 Hercules, C-124 Globemasters, and C-133 Cargomasters, all assigned to MATS. The airlift was carried out under "bare strip" operation, terminating at a simulated overseas deployment area for U.S. Strike Command personnel and equipment. On the initial deployment into the overseas area, TAC C-130's loaded with personnel and cargo were used under control of MATS. They were flown from stateside bases directly into the assault landing strips near the battle area, after which they began operations from intermediate staging bases under the control of the JTF Ozark commander.

The proposed Air Force concepts under consideration during Exercise Gold Fire I were command and control, reconnaissance, close air support, and assault airlift. All these proposed concepts and systems were used by the forces assigned to Joint Task Force Ozark, the tested force.

Centralized command and control with resulting fast responsiveness is the key factor for operations of the air line of communications (ALOC), which means delivery of supplies, troops, and equipment by assault airlift aircraft (C-130's) from the immediate staging bases into battle zones as far forward as assault landing strips can be constructed. If assault landings are not possible or practical, other delivery systems as discussed earlier will be used. Assault airlift officers are located in the field at battalion and division level to assist and advise ground commanders in planning and coordinating requirements and determining the best mode of delivery for any given mission or items of equipment. Aeromedical evacuation of casualties is also an important part of ALOC.

In the support area, the Air Force employed a system of linking all Air Force assault strip headquarters, forward fighter operating bases, rear bases, and various exercise headquarters together by a Tactical Air Support Force (TASF). The TASF carried out the logistic and housekeeping functions necessary for the success of assault-airlift, fighter, and reconnaissance operations.

The Tactical Air Support Force for JTF Ozark was located at Houston, Missouri, in the midst of rural communities on the edge of the Ozark Mountains. The TASF, an important link in the ALOC, was in contact by telephone with its combat support groups located in Illinois, Tennessee, Kentucky, Missouri, and Arkansas. This new organization of some 323 personnel had been further developed during the Indian River series of tests. The TASF was in telephone contact with all combat support groups, all assault landing strips, forward fighter operating bases, rear bases, and other headquarters. Courier service between the headquarters and the support centers was maintained by use of U-3 and C-47 aircraft.

The heart of TASF was the Logistic Readiness Center (LRC), which provided the Air Force forces commander with a control point for all aircraft, equipment, personnel, and funds available to his command. The LRC supports command and control of all Air Force units and serves as a focal point of coordination for actions necessary to accomplish planning and logistical support for the operational commitments. It is made up of a communications network and a materiel section, which is itself subdivided into additional sections for supply and services, maintenance, petroleum, oil and lubricants, transportation, and munitions. The LRC is in operation around the clock, manned by shifts of 4 officers and 12 airmen equipped with field

telephones and status boards. During a headquarters relocation, the center stays behind until the Air Force commander sets up a new command post, thus providing continuous control over logistical operations. The TASF includes administration, comptroller, judge advocate, personnel, chaplain, and security and law enforcement to carry out logistical and housekeeping functions necessary for the support of air operations. Thousands of tons of blank ammunition, equipment, food, and petroleum were airlifted into the assault landing zones.

Performing a major role and somewhat of a counterpart to TASF was the Airlift Task Force (ALTF). It was responsible for carrying out all airlift in support of Joint Task Force Ozark. The key agency of ALTF was the Movement Control Center (MCC), through which the commander controlled the movement of troops, supplies, and equipment throughout the battle area, by assault airlift operations of transports and helicopters. Through the centralized direction and planning of the MCC, the Air Force forces maintained an air-line-of-communications flow of logistical requirements. Two important agencies of the Airlift Task Force were Combat Airlift Support Units (CALSU) and Aerial Port Squadrons.

The CALSU is a functional troop carrier organization, established to provide support to air elements at an air facility. Normally it includes an operations function such as movement control and communications, a support function which relates to the air facility itself, and a liaison function with appropriate airborne and other air or support units.

The Aerial Port Squadron functions to shorten the ground turnaround time for the aircraft through rapid processing and handling of cargo, equipment, and troops to be airlifted. The development of new procedures to meet the requirements of new modes of delivery places further demands on the Aerial Port Squadron's functions. Units of this squadron are manned and equipped to ensure accomplishment of their functional responsibilities, which lie in two areas: First, the Combat Air Delivery Section loads and unloads cargo. The service shipping the cargo is responsible for packing and crating. (Equipment for paradrop in support of airborne operations is rigged by organic units of the ROAD airborne division.) Second, the Combat Control Teams (CCT) are jump-qualified and precede any paradrop or assault landing of troops and supplies, to mark sites for airdrops and provide direction for assault airlift aircraft. This team reports directly to and is controlled by the MCC but is administered by the Aerial Port Squadron.

Air activity of both Oroland and Argentia Air Forces increased on 1 November as aerial border reconnaissance missions continued, while fighter aircraft flew air-alert missions throughout the area.

The political situation continued very tense, and troop buildup continued at a rapid pace; however, there were no open infractions of the Oroland-Argentia border agreements reported by either side. The only hostile acts reported were continued harassments by guerrilla elements in Oroland, mostly during the hours of darkness. Announcement was made by the Prime Minister of Oroland that he had "every confidence in the loyalty of the people and in the ability of his government with the aid of incoming U.S. forces to maintain order." The Prime Minister also announced at this time the details of a speechmaking tour to demonstrate his confidence and to show his interest in the welfare of the populace.

The first air action of the exercise took place on 3 November as a number of JTF Sioux reconnaissance aircraft were observed over Oroland, and one of them, an RB-66, was destroyed by an Ozark F-100 fighter.

As the tension continued to mount between Oroland and Argentia, JTF Sioux was reported to be taking hurried action to strengthen the country's air forces by adding a number of F-84 Thunderstreak and F-100 Super Sabre tactical fighter aircraft and RF-101 Voodoo and RB-66 Destroyer reconnaissance aircraft along with support personnel and equipment.

The political situation became even more tense on 3 November as guerrillas made repeated attacks on a motorcade of the Oroland Prime Minister as he and his official party departed on an automobile tour of guerrilla-infested areas. At several points on the tour, from Marshfield to Houston, the Oroland leader

was heckled by guerrilla sympathizers during his speeches, and the motorcade was fired upon several times. Scores of Ozark Army and Air Force helicopters, along with Ozark jet fighter and reconnaissance aircraft, flew escort overhead continuously along the entire route.

Strategic deployment of JTF Ozark ground forces from Fort Riley, Kansas, into intermediate staging bases in Kentucky and Arkansas was also completed on 3 November. During the deployment MATS flew 1300 missions over an eight-day period, airlifting approximately 8300 soldiers of the 1st Infantry Division, supporting troops, and approximately 17,000 tons of cargo. From the intermediate staging bases JTF Ozark C-130 assault airlift aircraft took the U.S. military aid forces into the objective area immediately after they were offloaded from MATS aircraft. In this phase of the exercise the C-130's moved some 5300 men and about 7000 tons of equipment into the Fort Leonard Wood vicinity.

Army engineers completed another assault landing zone which served as the primary Ozark assault landing and cargo extraction facility. In addition supply parachute drops of heavy equipment were made at this location. Ozark C-130's delivering supplies into this area were unloaded by special Air Force trailers equipped for rough-terrain offloading by use of the 463L Materials Handling System. This system forms part of the forward aerial resupply operations for front-line troops and can handle considerable quantities of cargo with maximum efficiency and in minimum time at unimproved operating locations. Designed to optimize the C-130 assault airlift aircraft in loading and unloading cargo, the system includes the rough-terrain loader, which is a tracked vehicle resembling a half-completed tank; four-wheeled dollies to carry 10,000-pound loads; a 25,000-pound-capacity loader; a 40-foot-long flatbed trailer; and a 10,000-pound-capacity forklift. The supplies were then delivered to their final destination by Ozark CH-3C helicopters with cargo slung underneath and in Army vehicles. These methods of aerial delivery of cargo and personnel to forward combat areas formed what was known as the Ozark Air Line of Communications.

An advance squad of Joint Task Force Sioux crosses the Osage Fork River after the bridge had been destroyed by retreating Ozark forces

463L Materials Handling System

Ground personnel unload a pallet of supplies from a C-130 at an Ozark assault landing zone. The supplies are unloaded onto specially designed Air Force cargo handling equipment of the 463L rough-terrain loading and materials handling system. . . . Drums of "Coherne," a chemical used for dust suppression, are loaded aboard a 463L rough-terrain materials handler from a forklift, also part of the 463L system. The drums had been paradropped moments before from a C-130. The rough-terrain loading system was developed by the Air Force for handling cargo on rough dirt assault strips where normal vehicles cannot operate. The system is a combination of trucks, tractors, forklifts, and cargo pallets.

In performing the mission of tactical air reconnaissance, TAC has available a wide range of facilities, equipment, and aerial reconnaissance aircraft capable of performing any requirements from the prehostilities phase, when information is gathered to form intelligence for potential combat operations, to the hostilities phase, which is concerned with continuous identification and location of known and suspected military objectives. The general categories of reconnaissance are visual, photographic, electronic, and weather.

To perform the reconnaissance mission in Gold Fire I both JTF's had RF-101 and RB-66 aircraft, which may have as many as four cameras working at one time—some forward-looking, some to the side, and others straight down. The vertical cameras on the RF-101 can photograph from 45,000 feet a strip 217 miles long and 8 miles wide, and the oblique cameras can produce an area mosaic covering 20,000 square miles. The F-100 aircraft were capable of delivering aerial surveillance data to ground force commanders. This method involves the use of a canister equipped with a small parachute and mounted beneath the wing of the aircraft. It is released by the pilot over a marked area in the field and paradropped to the field commander.

Another reconnaissance technique executed during the exercise was called "See Fast." Two such missions were flown. Two highly modified RB-66 jet aircraft used combinations of side-looking radar (SLAR), infrared (IR), photo-transmission equipment, and a television sur-

Map 1. Invasion. The situation as of 1600 hours 4 November.

oint Task Force Ozark forces crouch in oncealed positions forming a perimeter efense against JTF Sioux night attacks. . . A Joint Task Force Sioux ¾-ton uck fords the Osage Fork River after itial contact with Joint Task Force zark forces during the early morning ours of Wednesday, 4 November.

veillance camera. This system is designed to relay both visual and printed photo intelligence to ground commanders instantaneously. A "read-out" van on the ground receives the information directly from the aircraft and permits commanders to observe, in their command post, just what the reconnaissance crewmen see from the aircraft.

JOINT TASK Force Sioux of Argentia invaded the country of Oroland on 4 November, meeting little resistance and slashing more than 24 miles into the heart of the country by 1900 hours. The invasion was spearheaded by units of motorized infantry, crossing the border near Lebanon and moving across the country virtually unchallenged during the first few hours of the two-pronged attack. Shortly after the ground attack began, Sioux tactical fighter aircraft in multiple attacks hit JTF Ozark air bases at several locations. Striking at dawn, the Sioux aircraft destroyed six Ozark aircraft on the ground while losing one in air-to-air combat. Other Sioux fighters made repeated strikes against the Ozark ground troops in support of

Three loads of cargo, dropped by assault airlift aircraft in support of JTF Ozark forces, descend to the ground in the vicinity of Fort Leonard Wood, Missouri.

TF Sioux advances. As the battle progressed, Ozark fighters responded rapidly, coming to the upport of Ozark ground forces. Ozark aircraft osses were assessed at six, all from air combat.

Behind the forward battle area, Ozark forces ontinued to receive supplies in the ALOC. In an ffort to keep the forward air terminals operaional. Ozark forces began to relocate. AFSTRIKE -130's flew supplies and cargo from the "Norandy" assault landing zone to other locations.

Ground forces of JTF Sioux repeatedly met ith success on 5 November as they drove eeper into Oroland. The swift advances brought the front-line units to the outskirts of Houston, 46 miles from the Argentian border. As the action drew closer to the capital, JTF Ozark forces' resistance stiffened as they went into defensive positions along the Big Piney River. Contributing to the defensive strength were the additional troops and supplies continuing to be flown into the exercise assault landing zones by AFSTRIKE C-130 assault airlift aircraft and helicopters.

An added feature of the close air support by the Sioux Air Force was the latest in smoke-screening devices, termed a cluster bomb unit

roops of JTF Ozark race toward waiting C-130 aircraft at an ssault landing strip in southern issouri. C-130's moved troops to critical areas to help bolster zark positions. . . . C-130 assault airlift aircraft carry out perations on a forward dirt assault landing zone, bringing in pplies and equipment for Ozark rces. Trucks in the foreground, reviously airlifted in for the 1st nfantry Division, are typical the cargo carried in these rcraft during the exercise.

(CBU). It is a series of small smoke-producing "bomblets" airdropped from an aircraft, creating a smoke screen to reduce the ability of opposing forces to observe a specific action.

The air activity intensified, many missions being flown by both JTF's and aircraft of both sides engaging in air-to-air conflict in an effort to control the skies. Ozark aircraft losses to 5 November were placed at 15, while Sioux had lost nine.

In other phases of the air action, reconnaissance aircraft of both forces were called on continuously to provide vital intelligence data. RF-101's and RB-66's crisscrossed the area of combat operations photographing vehicle movements, troop concentrations, and installations.

The JTF Ozark commander started flying reinforcements into the battle area by Air Force CH-3C and UH-1F helicopters. Helicopters were also used to ferry supplies and ammunition in support of the Ozark defenders as the final link in the ALOC.

The entire airlift effort of JTF Ozark was planned, coordinated, and closely followed by the Movement Control Center. This large-scale operation involved AFSTRIKE C-130 assault airlift aircraft flying continuously in and out of the objective area and helicopters moving back and forth within the battle zone.

The MCC was the key agency of the Airlift Task Force for command and control of the Air Force operation which deployed troops, supplies, and equipment throughout the Missouri battleground. When an Army field unit needed aerial resupply or transportation from the Air Force, it went to the MCC. When a turboprop transport or helicopter flew these missions, it operated on orders of or by specific direction from the MCC. This was the heart of the entire airlift effort in this important phase of the exercise. Through the centralized direction and planning of the MCC, the Air Force sustained Army field elements and its own units with an ALOC flow of logistical requirements.

A certain number of assault transport and helicopter missions were given each day to both the Air Force forces and Army forces by the JTF Ozark. It was the job of the MCC to ensure that the ground unit received support in the quantity and quality desired and render immediate airlift support even though not foreseen or planned. The MCC answered requests for delivery of emergency supplies of blank ammunition and for evacuation of casualties and prisoners of war to the rear. In these emergency situations, a specified Army/Air Force channel of communications led to the MCC. The Army field commander radioed his request to the Army assault airlift coordinating officer in the MCC. If it had been determined that the Air Force could best answer this need, the Army told the MCC what was needed in the way of equipment and transportation and where in the battlefield area the delivery was to be made. MCC planners and controllers then determined what aircraft would be used and the types of delivery systems needed. The assault airlift crews used any of the four techniques of aerial delivery.

The MCC followed the missions throughout from the initial request to the detailed planning to the scrambling of the crews at their bases to the final accomplishment of the mission.

On 6 November in a fast air mobile counterattack using CH-3C helicopters, Ozark Army forces aided in halting the invading Sioux forces after they had made a quick thrust across the Big Piney River. Four of the jet assault choppers landed near the river and unloaded 88 troops to reinforce the Ozark position. This mobile reinforcement helped to stop the enemy advance toward Houston, the capital of Oroland.

The big helicopters took off from the Houston Airport moments before two Sioux F-84F's of the 480th Tactical Fighter Wing operating from McConnell AFB, Kansas, came over the field in an attack on the forward command post. As the jet fighters approached, an F-105 Thunderchief of the 333d Tactical Fighter Squadron operating out of Little Rock AFB, Arkansas, was flying in close pursuit and destroyed one of the F-84's. The other broke from the air action and knocked out the forward air controller operations. Shortly after this encounter, C-130 aircraft were rapidly unloading supplies at a assault landing zone, using the various low altitude delivery systems, when four Sioux F-105's roared over the assault strips, destroying one of the Hercules assault airlift aircraft dur

ap 2. Turning point. The situation as of 1600 hours 8 November.

g an extraction run and a UH-1F helicopter the ground. The F-105's returned seconds er. knocking out the strip's control tower, dar compiex, and medical staging facility.

Ozark F-100 Super Sabres penetrated ep into enemy territory to seek out and stroy Sioux Hawk missile sites. One Super bre destroyed six missile launchers and sev- al missiles, as the battery shot down one of e attacking fighters. Some of the Ozark F- 0's were able to stay in the air for as long as ir hours with the aid of aerial refueling by rategic Air Command KC-135 Stratotankers. e aerial tankers orbited near F-100 tactical hters, which destroyed 21 Sioux aircraft on ground. The F-100's were of the 308th Tac- al Fighter Squadron, operating from Blythe- le AFB, Arkansas. These same aircraft had flown fighter support missions late the night before, using the "Night Owl" technique. In this tactic flares make the area to be attacked as bright as day for the fighter strike.

The ground war also saw the use of several armed helicopters for the first time on both sides. One such attack against the Ozark forces found two HB-1B helicopters pouring rockets and machine-gun fire into the defending troop positions. The attack netted the Sioux warriors several pieces of Ozark equipment destroyed or damaged.

Although the adverse weather conditions limited the use of C-130's during the day, except for some vital resupply missions, the ALOC was continued as AFSTRIKE CH-3C helicopters ferried supplies and equipment to Ozark forces from intermediate supply bases. The In-Flight

Station Keeping System was used aboard C-130 Hercules aircraft. This radar aircraft positioning system provided a capability of maintaining close spacing during formation flying under adverse weather conditions. The scope of the radar indicates the location of all other aircraft in the formation and their distance from each other, thus enabling more mass over drop areas because of the safety of very close aircraft intervals. (This equipment was on board the aircraft used in this exercise and was tested and checked. However, no actual weather missions relying only on this system were flown.)

The action in Gold Fire I took a different turn on 9 November as the superior air power of the Ozark side began to take a heavy toll of Sioux troop units and equipment. High on the Ozark priority target list for their aircraft were Sioux Hawk missile batteries. In several attacks F-100 aircraft struck with napalm and cluster bomb units, inflicting casualties and damage on the Hawk batteries. Destruction was so heavy that the missile units were declared completely ineffective. The use of the CBU accounted for a heavy proportion of the casualties.

In similar action on the Ozark side of the lines, one of the Hawk missile units was heavily damaged by two Sioux F-105 aircraft of the 561st Tactical Fighter Squadron.

In close air support (CAS), all tactical aircraft, as well as all other military resources within the combat area, are under the management and responsibility of the joint forces commander and respond to his direction. The broad plan of action by the joint forces commander, based upon the enemy threat, establishes mission priorities which determine where and how the weight of effort of the Air Force forces will be applied. The Air Force forces commander then must perform specific tasks which will aid in completion of the joint forces commander's plan.

The actual assignment of tactical fighter sorties is made through coordination between the air component commander and the ground component commander. Tactical pilots are in the field attached to the Army from battalion level on up as tactical air control parties. The TACP's are composed of forward air controllers and other air liaison officers, who advise and assist ground commanders in the use of close air support and provide close control of the air strike. Sorties are allocated through the Direct Air Support Center, which is a highly mobile, air transportable facility to provide fast reaction to surface force requirements for immediate close air support and tactical air reconnaissance. This vital part of close air support in AFSTRIKE has a counterpart in ARSTRIKE, and the combined personnel plan and commit close air support missions required by the ground commander.

The ground action in Gold Fire I was limited to local skirmishes, resulting in the restoration of Ozark battle positions around Houston. All Sioux units were forced to pull back to the west side of the Big Piney River. Ozark forces assumed strong blocking positions all along the battle line, with action being limited to holding current positions while trying to inflict casualties on the enemy. The ground troops suffered heavily on both sides as they were hit time and again by jet fighters. F-100's and F-105's on the Ozark and Sioux sides respectively poured simulated napalm, CBU, and 20-millimeter cannon fire into the ground force positions.

The air action reflected the pounding which the Sioux forces had received in the preceding two days. Flying a greatly reduced number of missions and continuing to lose planes on these, the Sioux Air Force found itself hard pressed to meet the ever increasing attacks of the Ozark units. Ozark fighters flew close air support, interdiction of the battlefield and counter-air missions to bring the war home to the Sioux forces. Repeated air attacks against the Sioux Hawk missile units by the Ozark pilots netted them two of the ground-to-air defense systems.

As the fighters inflicted blow after blow both in the air and on the ground, C-130 aircraft of the 516th Troop Carrier Wing continued to fly supplies to the Ozark ground units from the staging base at Walnut Ridge, Arkansas. The assault airlift aircraft used two assault landing zones to deliver the valuable supplies. Ozark CH-3C helicopters also provided assist

ance to the logistic supply line as they brought vital cargo into the forward area.

In a predawn attack on 10 November, Ozark ground forces slashed across the Big Piney River to begin an all-out counteroffensive to drive the Sioux invading forces from Oroland. At several locations along the river, Ozark units penetrated Sioux lines. As dawn broke, other Ozark troops took to the air in UH-1B helicopters for objectives behind the Sioux lines in a vertical envelopment. The helicopter-borne troops soon seized their assigned objectives and linked up with the attacking Ozark forces that had breached the river in the early morning actions.

Another helicopter-borne action took place in the vicinity of Fuson, Missouri. In this attack nine CH-3C helicopters teamed with 13 UH-1B's in the afternoon to helilift more than 400 troops and 23 vehicles into the objective area. The initial successes were supported by F-105, F-100, and F-4C jets, which provided column cover and suppressive fire for the attacking helicopters. Ozark airmen also struck beyond the border to hit Sioux ground and air units deep in their homeland. Many Sioux planes, caught on the ground, were heavily damaged.

Close air support missions by the Ozark tactical fighters kept the Sioux forces pinned down, allowing the attacking Ozark forces free movement in the battle area. The Ozark attacking forces hit with such speed and force that they were able to drive a wedge 28 miles deep

Map 3. Invaders driven out. The situation as of 1600 hours 10 November.

Helicopter Operations

A U.S. Air Force UH-1F helicopter sets down supplies in support of Joint Task Force Ozark. Helicopter delivery to front-line troops is the final link in the aerial resupply system (ALOC) being employed. . . . In a night operation, a U.S. Air Force CH-3C helicopter hovers with a cargo load prior to airlifting it to a forward location in support of JTF Ozark. The downdraft from the whirling rotor blades had raised a cloud of dust and chaff around the aircraft. This action was carried out during an ALOC mission in the southern Missouri area.

nto Sioux positions. In support of this counter-ffensive C-130 aircraft poured vital supplies nto assault landing zones. During this period he planes were programed to bring in over 000 tons of supplies to maintain the all-mportant ALOC.

In the first air action involving the new nach 2 F-4C jet fighter, a kill was recorded by ne operating out of Scott AFB, Illinois; how-ver, Sioux F-105's downed four F-4C's in air ction. Sioux forces were hit hard not only on he ground but also in the air as the fighters nd Hawk missile batteries of the Ozark air and round forces continued to take their toll.

A number of reconnaissance missions were own by Ozark RF-101's and RB-66's. All Sioux econnaissance planes were inactive until late n the day because of earlier enemy action.

The C-130 Airborne Command and Con-ol Center flew a mission for the Ozark forces. he aircraft contains a capsule accommodating 2 people and all necessary equipment for con-ucting combat operations and allows the com-nander to observe the action at first hand from he air. The communications package is de-gned to receive radar, television, and elec-onic reconnaissance intelligence information.

Exercise Gold Fire I came to an end at 700 hours on 11 November as JTF Ozark forced TF Sioux to withdraw into its homeland. A oordinated air and ground attack by Ozark nus brought to a close the war fought during he previous 14 days throughout the area of outh central Missouri.

The final action took place four miles outheast of Lebanon, Missouri, in the morning, hen Ozark's 2d Battalion, 28th Infantry, made ontact with Sioux front-line units, the 2d Bat-lion, 16th Infantry. Both battalions are part the 1st Infantry Division, Fort Riley, Kansas. he Sioux forces withdrew across the U.S. ighway 66 "border" in a maneuver to preserve he integrity of the forces.

AFSTRIKE fighter aircraft were in the air onstantly in close air support of the Ozark round elements, and Ozark reconnaissance ircraft flew a number of missions. C-130 as-ult airlift aircraft carried out several aerial elivery sorties, in a final ALOC resupply opera-on.

A platoon of paratroopers armed with a 106-millimeter recoilless rifle mounted on a jeep moves into position. Airborne troops of the 101st Airborne Division responded to a call for reinforcement of JTF Ozark forces and arrived in time to help repulse a determined enemy attack. A battalion was flown to an assault landing zone at night and deployed for the following day's engagement.

There was virtually no Sioux air activity on the final day, since most of its fighters and all its reconnaissance aircraft had been destroyed.

As the maneuver ended, civil affairs action came to a climax when the Prime Minister of Oroland, E. Romines, returned triumphantly to the capital city of Houston.

Ozark's offensive action on the ground, backed by almost complete air supremacy during the final offensive phase of the exercise, brought the maneuver to a conclusion somewhat earlier than originally anticipated. Data collectors assigned to gather extensive information throughout the exercise garnered the desired data in all key areas under consideration.

THE OFFICERS and men who make up the Joint Staff of U.S. Strike Command at MacDill Air Force Base, Florida, observed Exercise Gold Fire I with great interest. They are approaching

the business of building joint task forces with the combined best efforts of all personnel and services. They look upon exercises such as Gold Fire realistically and think of them not as tests of service roles and missions nor as competition between Army and Air Force aviation but as an excellent chance to discover how air power can *best* support ground forces. Various proposed methods and techniques will be tried and tested with objective analysis and evaluation of all data possible to obtain, and then the best methods will be selected. The people who make up Strike Command and Tactical Air Warfare Center know that improvements and advancements are being made in methods and techniques of waging ground warfare and that, regardless of which service wins points, increases will be made in the deterrent structures of our fighting forces. With this spirit of teamwork, there are greater chances of survival for all.

Air University Review

AMERICAN SPACE POLICY

Civilian/Military Dichotomy

Dr. Robert H. Puckett

THE civilian/military dichotomy in the American national space program has created a serious policy confusion which has kindled recent political charges that the United States might face a "military space gap." This confusion has also encouraged a certain degree of general political opposition to the entire system of priorities in the Nation's space policy. The purpose of this article is to trace the development of our present space policy by analyzing the political implications of the dominant stress on "peaceful" space activities, the political implications of military space policy, and the attempt by the Kennedy Administration to forge a "national" space policy.

Stress on "peaceful" space activities

In the months immediately after the launching of the Soviet Sputnik on 4 October 1957, political discussion concerning the organization of the American space program proceeded on the assumption that this program would be developed under civilian control. There was no significant political debate concerning civilian versus military control; both the Congress and the executive branch preferred, and even took for granted, the concept of civilian control. There was a general political consensus that space should be reserved for peaceful purposes. For example, one Congressional resolution maintained that it was ". . . the devout wish of all peoples everywhere, in every nation, in every environment, that the exploration of outer space shall be by peaceful means and shall be dedicated to peaceful purposes."[1]

In addition, President Dwight D. Eisenhower stated on 2 April 1958:

> I recommend that aeronautical and space science activities sponsored by the United States be conducted under the direction of a civilian agency, except for those projects primarily associated with military requirements. I have reached this conclusion because space exploration holds promise of adding importantly to our knowledge of the earth, the solar system, and the universe, and because it is of great importance to have the fullest cooperation of the scientific community at home and abroad in moving forward in the fields of space science and technology. Moreover, a civilian setting for the administration of space function will emphasize the concern of our Nation that

> outer space be devoted to peaceful and scientific purposes.[2]

The National Aeronautics and Space Act itself affirms this attitude in Section 102 (a):

> The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind.[3]

The act did, however, make provision for military space activities:

> . . . activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States (including the research and development necessary to make effective provision for the defense of the United States) shall be the responsibility of, and shall be directed by, the Department of Defense. . . .[4]

Since the potential of space activities was almost entirely speculative in 1958, the fact that both the National Aeronautics and Space Administration (NASA) and the Department of Defense carried on space programs created no serious political dilemmas. However, as the uses of space became clearer, conflicts arose between the civilian and military branches of the space program concerning the assignment of space projects and the allocation of funds. In the Kennedy Administration significant political opposition emerged, primarily from segments of the Air Force, the Republican Party, and certain Democratic Congressmen who were interested in military space activities. As will be noted later, this opposition attacked the dominant stress on "peaceful" aspects of space and urged that more attention be given to military space activities.

Several basic assumptions entered into the political consensus favoring civilian control of the American space program. These assumptions seemed to fit the political and budgetary purposes of the Eisenhower Administration. The principal assumption was that civilian control of our space program would demonstrate to the world America's concern for peace. Eisenhower Administration advisers conceived of the space program as analogous to our attempts to internationalize atomic energy; thus they believed that the foreign policy aspects, rather than the defense aspects, would be dominant in future space policy. Administration officials also maintained that civilian control would be conducive to the fullest realization of the scientific and economic potentialities of space as well as to the highest degree of international cooperation in peaceful space activities.

Another assumption was that there are many potential applications of space which are simply not military in nature and that these long-term applications should not have to compete for funds with military programs. A final assumption was that the American space program could develop its own system of priorities only if it were a completely separate entity.

Administration spokesmen advanced several reasons for downgrading the military role in space. The desire of President Eisenhower to conduct the Presidency as a "man of peace" rather than as a "man of war" certainly influenced his conviction as to the proper setting for the space program. Throughout his Administration he often expressed his desire that the United States should do everything possible to prevent an arms race in space. Also he stressed the need to demonstrate to the world that America was principally interested in the peaceful and scientific uses of space. He believed that excessive military activity in space would be inimical to that interest.

Another important reason advanced for downgrading the military role in space was that if the space program were under military control it would be necessary to "prove" the military requirement for each space project. This would presumably stifle long-term scientific investigation as well as commercial and cultural space programs. A final contention was that the military demands for secrecy would hamper potential international cooperation in space activities; such demands would exclude many foreign scientists and might irritate those American scientists who tended to distrust the military.

Before the launching of the Soviet Sputnik, the American satellite program—one of the activities of the International Geophysical

Year—was viewed by the Administration as purely scientific. Virtually no attention was given to the propaganda and military implications of satellites. Administration officials were concerned lest the satellite project interfere with the ballistic missile program.[5] The Soviet Sputnik, of course, forced the Administration to increase efforts to launch an American satellite and give consideration to the propaganda and military implications of satellites. From the beginning of the American space effort the scientific space programs were dependent upon military missiles and facilities.

From a technical standpoint, there is very little difference between civilian and military space programs. Virtually all the major space activities have at least potential military value. However, in terms of budgets and organization, it is possible to distinguish broadly among primarily civilian, exclusively military, and identical civilian/military uses of space.

The political implications of the stress on the "peaceful" aspects of space have been significant, since these aspects have fashioned the whole tenor of American national space policy. The dominant political conception of outer space has been that it is a new frontier, a "blank page" totally free from the influence of international "power" politics. Therefore the Government has seemed to believe that in outer space the world has a last chance to reach toward the goal of peace. In accordance with this view, the United States has continually attempted to prevent an arms race in space by seeking to bar the use of weapons of mass destruction there and to reach various international agreements regulating the use of space.

These U.S. efforts have given rise to a serious policy confusion which has undercut the premises of our national space policy. The Government has assumed that if the "peaceful" aspects of space are emphasized and the military role in space is downgraded, the Soviet government will not feel impelled to concentrate on military space systems. Such an assumption seems highly questionable. In actual practice both the United States and the Soviet Union have adhered to a dual code in space policy.[6] Both nations accept the notion of space for "peaceful" purposes, but they have often emphasized the military aspects of space for political purposes. The Soviet government has on many occasions pointed out in threatening terms the military potential of its space activities. The United States has often used the expectation of military applications from civilian space exploration to gain political support for increased expenditures on Project Apollo and other space programs.

Such policy confusion has resulted in ambiguities in American proposals for international control of outer space and in difficulties in the coordination of the military and civilian space programs. To a great extent this confusion is based on a misinterpretation of the word "peaceful."[7] In the sense of the United Nations Charter and in international law, the term "peaceful" is used in contradistinction to "aggressive." In this sense, defensive military space systems would be "peaceful." However, the average public attitude often regards the concept "peaceful" in the sense of "nonmilitary." Indeed this meaning was accepted in the agreement establishing the International Atomic Energy Agency. As will be pointed out later, the Kennedy Administration attempted to ease the confusion created by the terms "military" and "peaceful" by proclaiming a "national" space policy.

military space policy

In the early and mid-Fifties the military services were interested primarily in missile development, but they carried on research concerning potential space projects. The initial space capabilities of the United States were based upon the technologies produced by ballistic missile research and development. There are several well-recognized military requirements in space, and projects to meet these requirements are in various stages of development. These requirements include surveillance or reconnaissance, communications, weather, navigation, geodetic mapping, monitoring of space phenomena such as radiation and solar flares, manned orbiting laboratory, a military patrol system for detecting, tracking, and inspecting unidentified space vehicles, and

means for disabling hostile satellites. Experts disagree about the potential value of bombardment satellites. Some observers maintain that intercontinental ballistic missiles are less expensive and more accurate than orbital bombs. Others contend that the Soviet Union may be developing such weapons, that these satellites could have significant political and psychological values for the Soviet government, and that such weapons could conceivably incinerate large portions of the earth's surface.

Military experts have stressed that there are certain peculiar military needs in space systems. These needs include all-weather capability, reduced launching costs, controlled reentry, rendezvous with hostile space vehicles, ability to operate in a combat environment, antijamming capabilities, ability to support sustained manned space flight, ability to transfer men and material between space vehicles in orbit, and ability to operate in deep space.

In the process of developing a military space policy, the Department of Defense solved the problems of initial interservice rivalry concerning space projects by establishing Air Force dominance over defense space programs.[8] The primary interest of the Department of Defense has been in the overall military programs of the United States. DOD has considered space as a place, not a project, and has maintained that a military space program as such does not exist as a separate entity.[9] It has supported the development of those space capabilities which will complement or supplement other military activities. DOD's principal concern with military space projects has been budgetary. It has generally insisted that specific military space programs must be "proved" as military requirements, should offer the only means or the best means of performing specific military missions, and should compete on a cost-effectiveness basis with other military systems that could meet the same requirements.

The Air Force has objected to what it considers to be the overemphasis on the necessity of proving a military requirement for each space project. It has maintained that the United States must explore space to discover what its military potential really is. It has further emphasized the critical importance of "aerospace" (atmosphere and space) to American security. In response to these contentions, the Department of Defense has formulated the "building blocks" theory of space research, defined as follows:

> At this stage of development, it is difficult to define accurately the specific characteristics that future military operational systems of many kinds ought to have. We must, therefore, engage in a broad program covering basic building blocks which will develop technological capabilities to meet many possible contingencies. In this way, we will provide necessary insurance against military surprise in space by advancing our knowledge on a systematic basis so as to permit the shortest possible time lag in undertaking full-scale development programs as specific needs are identified.[10]

This "building blocks" theory of space research could be considered a political compromise between two extreme alternatives: (1) ignoring certain potential military space systems in the hope that the Soviet Union would not feel it necessary to develop similar systems and (2) deliberately igniting a military arms race with the Soviet Union in space.

The political implications of military space policy involve such factors as (1) Congressional concern with the strategic importance of space and the political value of military space capabilities and (2) the limited scope of political debate which has affected military space policy. Many Congressmen have regarded space as essential to national security since space could conceivably become a future arena of war in which the nation that exercised control of space could control the earth.[11] They have maintained that space weapons as a second-strike capability could protect America against present and unforeseen types of military threats. These proponents of increased military space activities have assumed that Soviet military space capabilities have significant political and psychological values and that the Soviet Union may possibly hope to gain strategic ascendancy in space.

In addition, Congressional proponents have contended that there are several important po-

tential political values of our military space capabilities. The primary value would be that of inducing the Soviet Union to agree, either implicitly or explicitly, to ensure that space is used for peaceful purposes. Further, the United States could employ military space systems both to protect American satellites from being destroyed by the Soviet Union by threatening to intercept Soviet satellites and also perhaps to bargain for "space disarmament" in case the Soviet government relied heavily on space weapons.

A political debate of limited scope, which has direct relevance to military space policy, has arisen over American national space policy. This debate involves three factors: (1) charges of a "military space gap," (2) Congressional concern with the efficiency of liaison between NASA and the Department of Defense, and (3) generalized opposition to Project Apollo. For the reasons mentioned above, the Air Force, the Republican Party,[12] and some Democratic Congressmen have criticized the dominant emphasis on civilian space projects and have contended that the United States might face a military space gap unless more attention and Government funds are given to military space projects. In addition, some Congressmen have criticized the alleged duplication and rivalry between NASA and the Department of Defense and have insisted on more efficient liaison, exchange of information, and exchange of personnel. Opponents of Project Apollo have employed most of the arguments for increased military space activities to attack the justifications set forth by the Administration for the manned lunar landing program. The Administration has replied that Apollo and other civilian programs will provide basic technology to meet future military requirements in space.

The bulk of the political debate concerning military space policy is speculative, and for this reason the debate is complex and has lacked a dramatic focus. In addition, the debate has been involved to a great extent in budgetary politics; it has been muted by the dominant American stress on the "peaceful" aspects of space. Of course, any future Soviet military space spectacular would radically change the context of the current political debate over American military space policy.

"national" space policy

The ambiguities inherent in the civilian/military dichotomy in American space policy engaged the attention of both the Eisenhower and Kennedy Administrations. Assessing the formative period in the development of American space policy, President Eisenhower commented on 14 January 1960:

> . . . In actual practice, a single civil-military [space] program does not exist and is, in fact, unattainable; and the statutory concept of such a program has caused confusion. The military utilization of space, and the research and development directed towards that end, are integral parts of the total defense program of the United States.[13]

This approach conceived of the American space program as almost totally civilian in nature; any military space projects were regarded as part of the defense program rather than the space program.

The Kennedy Administration maintained that the Space Act of 1958, which set forth the basic tenets of our space policy, created a "national" space program composed of two mutually supporting and separately directed efforts—one civilian, the other military—not a separate program for NASA and another for the Department of Defense.[14] Decisions with respect to the manner of implementing the national space program have been political—that is, the Administration must continually assess the civilian, military, and overall national interests in the light of expanding knowledge of space science and technology. Furthermore the Administration stressed that there was no division between peaceful and nonpeaceful space objectives in American policy, since American military space programs were nonaggressive and were just as peaceful as civilian programs; thus, the United States supported "space missions to help keep the peace and space missions to improve our ability to live well in peace."[15] In terminology, at least, the Kennedy Administration attempted to ease the policy confusion created by use of the terms "military" and "peaceful" to describe space activities.

As noted above, however, the dominant stress on the "peaceful" aspects of space invited charges that the United States might face a military space gap and encouraged a general political opposition to American priorities in space policy. To a certain extent, both the Eisenhower and Kennedy Administrations maintained an inadequate conception of the political and military potential of outer space. This experience has illustrated the necessity for coordinating American space policy with military, economic, foreign, and technological policies.

Charlottesville, Virginia

Notes

1. U.S. House of Representatives, Committee on Science and Astronautics, *International Control of Outer Space*, 86th Cong., 1st Sess., 1959, p. 95.
2. Message from the President of the United States Relative to Space Science and Exploration, 2 April 1958, in U.S. House of Representatives, Select Committee on Astronautics and Space Exploration, *Astronautics and Space Exploration*, Hearings on H.R. 11881, 85th Cong., 2nd Sess., 1958, pp. 3-4.
3. *National Aeronautics and Space Act of 1958, as amended through the end of the 87th Congress, October 13, 1962*, Staff Report, U.S. Senate, Committee on Aeronautical and Space Sciences, 20 November 1962, p. 1.
4. *Ibid.*
5. Eilene Galloway, "Peaceful Uses of Outer Space and the Military Role," in U.S. House of Representatives, Committee on Science and Astronautics, *1963 NASA Authorization*, Hearings on H.R. 10100 (superseded by H.R. 11737), Part 2, 87th Cong., 2nd Sess., 1962, p. 1051.
6. See John Immanuel Klette, *Some Implications of National and International Aspects of Outer Space*, Ph.D. dissertation, Georgetown University, May 1963, pp. 214-15.
7. See "Report to NASA on the Law of Outer Space," October 1960, in the White House, *U.S. Aeronautics and Space Activities, January 1 to December 31, 1960*, Report to Congress from the President of the United States, 18 January 1961, p. 108.
8. See Robert H. Puckett, "The Military Role in Space—A Summary of Official, Public Justifications," The RAND Corporation, P-2681, August 1962.
9. Dr. Lawrence L. Kavanau, Special Assistant (Space), Office of the Director, Defense Research and Engineering, quoted in U.S. House of Representatives, Committee on Science and Astronautics, *Posture of the National Space Program*, Report, 85th Cong., 1st Sess., 1963, p. 28.
10. Dr. Harold Brown, Director, Defense Research and Engineering, in U.S. Senate, Committee on Aeronautical and Space Sciences, *NASA Authorization for Fiscal Year 1963*, Hearings on H.R. 11737, 87th Cong., 2nd Sess., 1962, p. 335.
11. This argument was also expressed by John F. Kennedy in the 1960 campaign for the Presidency, as quoted in *Los Angeles Times*, 27 August 1962.
12. See Rep. Charles S. Gubser (Chairman), Report of the House Republican Task Force on Space and Aeronautics, 21 November 1963, (mimeograph), p. 3.
13. President Eisenhower, quoted by Dr. T. Keith Glennan, Administrator, NASA, in U.S. House of Representatives, Committee on Science and Astronautics, *To Amend the National Aeronautics and Space Act of 1958*, Hearings on H.R. 9675, 86th Cong., 2nd Sess., 1960, p. 30.
14. Report of the Vice President, in *U.S. Aeronautics and Space Activities, 1962*, Report to the Congress from the President of the United States, 28 January 1963, p. 7. U.S. House of Representatives, Committee on Science and Astronautics, *United States Aeronautics and Space Activities, 1961*, Message from the President of the United States Transmitting a Report on United States Aeronautics and Space Activities for the Calendar Year 1961, Pursuant to Section 206 (b) of the National Aeronautics and Space Act of 1958, as amended, House Document No. 324, 87th Cong., 2nd Sess., 31 January 1962, p. 6.
15. U.S. House of Representatives, Committee on Science and Astronautics, *United States Aeronautics and Space Activities, 1961*, p. 6.

VIET NAM: THE DIFFICULT YEARS

LIEUTENANT COLONEL DONALD F. MARTIN

AS 1964 was drawing to a close, the efforts of the Republic of Viet Nam (R.V.N.) to preserve its freedom from the Communist insurgency had not proved completely effective. Despite three years of major economic and military aid from many Free World nations, the United States being the largest contributor, Communist Viet Cong (VC) strength had apparently increased apace. Defeat of the insurgency was not forecast for the near term. Moreover, at this juncture the ultimate outcome of the conflict seemed—at best—equivocal.

Review of events, 1954–1961

Over the past decade the United States has been actively engaged in efforts to stabilize the political situation in Southeast Asia vis-à-vis Communist expansion by force. During the first six months of 1954 the United States Air Force contributed 1800 airlift sorties, comprising 13,000 flying hours, in what proved to be a futile attempt to reverse the course of events engulfing the French in Indochina. On 7 May 1954 Dien Bien Phu fell to the Communist Viet Minh, followed on 20 July by the Geneva agreement which partitioned Viet Nam along the 17th parallel.

On 7 July 1954 Ngo Dinh Diem was appointed Premier of South Viet Nam. The French turned over control of the police, justice, security, and civil aviation agencies and the public utilities to Diem on 16 September 1954.

The U.S. decision to pledge increased aid to the new government of South Viet Nam was made by Presidential announcement on 24 October 1954. In addition, President Eisenhower stated that the U.S. expected Diem to make needed reforms.

November 1954 saw the resettlement in South Viet Nam of the largest part of almost one million refugees who fled the Communists in North Viet Nam. On 7 July of the following year Communist China announced an aid agreement with the Viet Minh. This was quickly followed by a Soviet agreement to aid North Viet Nam, called the Democratic Republic of Viet Nam (D.R.V.).

On 23 October 1955 a national referendum in South Viet Nam deposed Bao Dai, who since March 1949 had been the emperor and head of state. Three days later Diem proclaimed South Viet Nam a republic, and the first general elections for the first National Assembly took place on 4 March 1956, at which time Diem became president of the Republic of Viet Nam.

By 26 October 1956 a constitution for the Republic of Viet Nam had been adopted, and a presidential decree was issued aimed at breaking up the large land holdings created during the French colonial period. By 9 May 1958 it was estimated that roughly 35 per cent of the tenant farmers had become landowners.

In the general elections of 30 August 1959 Diem was retained as president of the R.V.N. Two months later, in October, Viet Cong guerrilla activity was noted to be on the rise. The Communist battle to subjugate the Republic of Viet Nam was on in earnest.

By the spring of 1960 the insurgency situation in the R.V.N. had obviously deteriorated. The plans, materiel, and numbers of R.V.N. forces were

inadequate to the task. Thus on 5 May the U.S. announced that military assistance to the R.V.N. would be increased at that government's request. And on 30 May the first of U.S. Special Forces teams arrived in the R.V.N. to commence training the Army of Viet Nam (ARVN).

As R.V.N. resistance to the aggression stiffened, the Communist VC announced, on 10 March 1961, a new guerrilla offensive with the purpose of preventing the April 1961 general elections. More importantly, on that same day the Communists announced formation of the National Front for the Liberation of R.V.N. (NFL).

Despite increased VC efforts to prevent it, on 9 April 1961 Diem was re-elected president of the R.V.N. On 10 May Ambassador Nolting arrived and presented his credentials to President Diem.

Two days later then Vice President Johnson arrived to confer with the newly re-elected president. The war with the insurgents was not going well for Diem, and he had expressed a desire for more U.S. aid through the Military Assistance Advisory Group, Vietnam (MAAG-V). Diem did not ask for the aid of U.S. combat troops but only for the necessary assistance to enable him to cope successfully with the Communist-backed insurgency. The next day a joint communiqué was issued announcing a further increase in U.S. military and economic assistance.

Also in May 1961 the first full squadron of 25 A-1H aircraft was delivered to the R.V.N., and the strength ceiling for MAAG-V was increased. Augmentation of the existing in-country air/ground communications was begun on 1 October when Pacific Air Forces (PACAF) deployed a Control and Reporting Post (CRP) to Tan Son Nhut Air Base near Saigon. Its purpose was to provide radar coverage for the southern area of the R.V.N. and to train the Vietnamese Air Force (VNAF) in controlling aircraft, both military and civil. Within four months 63 VNAF personnel had been trained, the CRP had been expanded into a Combat Reporting Center (CRC), and the CRC became part of a Tactical Air Control System (TACS) established in mid-January 1962.

October 1961 was a particularly significant month for United States efforts to aid the R.V.N. General Maxwell D. Taylor arrived in Saigon to survey the situation for President Kennedy and Secretary of Defense McNamara. Diem proclaimed a state of national emergency. The government of the R.V.N. leveled formal charges of aggression against the D.R.V. and demanded that the International Central Commission (ICC) carry out an investigation of the leading role of the D.R.V. authorities in direct aggression against the R.V.N. The flow of U.S. military aid appreciably quickened with the arrival of USAF instructors for the VNAF. By the end of October the U.S. was further committed to the preservation of the R.V.N. as a democratic nation.

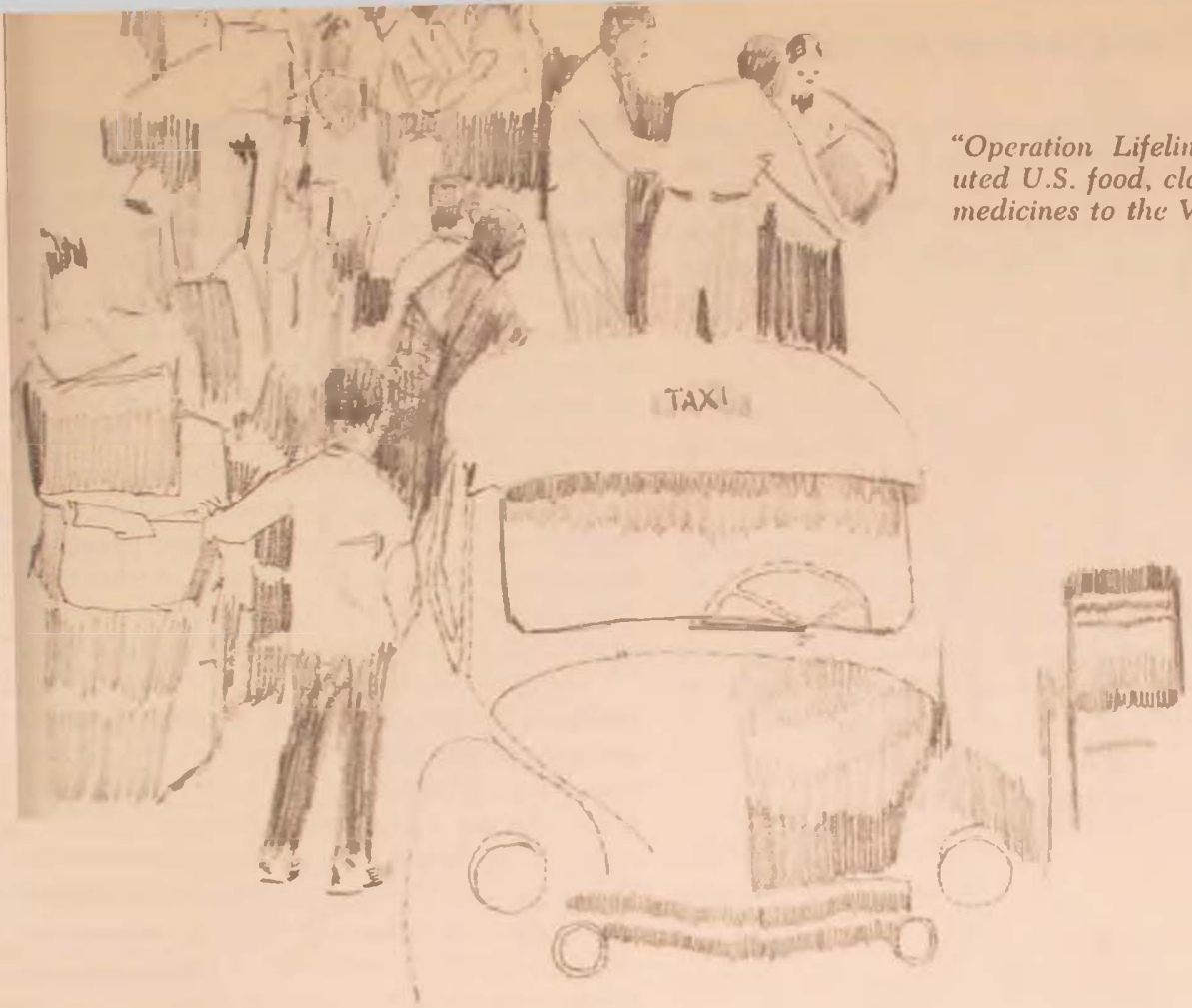
Prior to 1 January 1962 the U.S. on four separate occasions had made major pledges of increased assistance to the new and beleaguered Republic of Viet Nam. The first commitment occurred on 24 October 1954, less than 90 days after the Geneva accords. Similar pledges followed in May 1960 and in May and November of 1961.

Thus for the nine years preceding 1962 the U.S. had given increasing military aid to the Southeast Asia war against Communist insurgency—first to the French, then to the R.V.N. As the assistance increased, so too did U.S. prestige and principles inevitably become more deeply involved.

The deteriorating situation in 1961 presented the U.S. Government with two alternatives: (1) to reduce assistance or withhold it completely resulting in a VC victory and the loss to Communism of another free nation, or (2) to step up assistance of all kinds and plunge deeper into the fray with the minimum goal of denying the Communists their objectives. What might have been considered a third alternative, neutralism such as had been supported in Laos, was unacceptable to the R.V.N. and U.S. alike. The alternative of further commitment became the declared U.S. policy and on 16 November 1961 President Kennedy announced a massive increase in assistance.

the difficult years, 1962–1964

In this guerrilla conflict one of the more reliable indicators of victory, defeat, or stalemate for the Republic of Viet Nam was the numerical strength of the enemy—the Viet Cong. Enemy casualty statistics were impressive, particularly when viewed collectively. Yet they could also be disastrously misleading unless very carefully co



"Operation Lifeline" distributed U.S. food, clothing, and medicines to the Vietnamese.

ated with the number of VC replacements from filtration and recruitment.

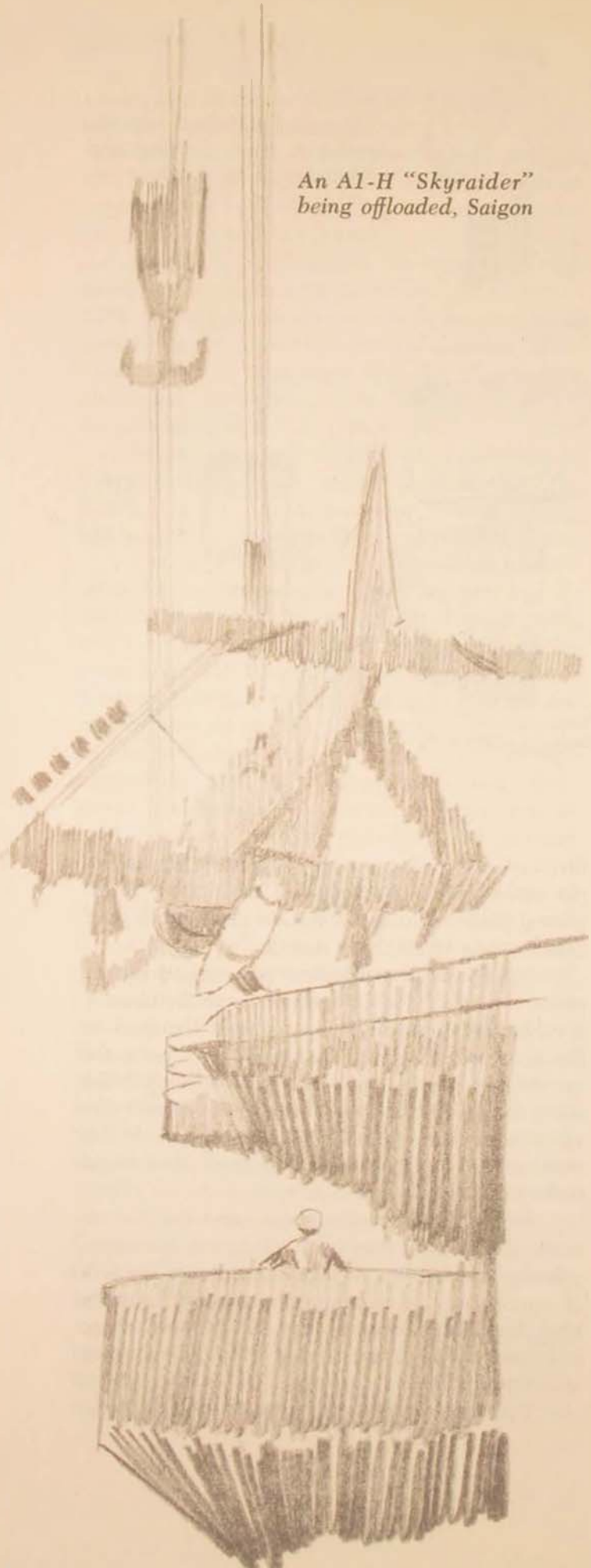
During the summer of 1961 the "hard-core" strength had been estimated at 12,000. In ecember, after the Presidential decision to inease significantly U.S. assistance to the R.V.N., e estimate of VC strength jumped to 17,000, and January 1962 it had soared to 20–25,000. By e close of 1964, hard-core VC strength was estited to be in the neighborhood of 30,000. The son given for the increases was the acquisition more accurate information on the VC rather than actual increase in numerical strength.

The VC had suffered an estimated 50,000 ualties (killed or wounded in action) in 1962 1963, an average of 68 casualties per day. ompilations for 1964 were not available at this ting.) By way of comparison, during the Korean r one American infantry division (of about 000 troops) suffered battle casualties at the e of 67 per day. In World War II an infantry division averaged ten per cent battle casualties per month. With a strength of 20–30,000, it appeared that the VC could sustain indefinitely their casualty rate of 2000 per month.

Influencing the effective prosecution of the conflict was R.V. N./U.S. adherence to the Geneva accords. Although the U.S. was not a signatory to the accords, the Under Secretary of State spoke for the U.S. at the final session on 21 July 1954 when he stated that the U.S. would respect the agreement. Therefore the U.S. would view any violation of the agreement with grave concern as threatening peace and security.

Moreover Cambodia, Laos, and the Democratic Republic of Viet Nam all served as sanctuaries for the VC, thus further complicating the task of successfully terminating the insurgency. The land boundary between the R.V.N. and these countries stretched for almost 1000 miles, much of it through dense jungle.

From late 1961 until the end of 1964 there



An A1-H "Skyraider" being offloaded, Saigon

was little apparent deviation from the classic tenets of guerrilla warfare by the Viet Cong. The Phase I groundwork of cellular subversion and indoctrination had been firmly established. The hard-core insurgents and the considerably larger paramilitary forces had launched Phase II in almost every area of R.V.N. The VC dominated large sections of South Viet Nam. More importantly, there were smaller strongholds under virtually complete VC control.

The French in the futile Indochina war were frustrated by many of the same Viet Minh strongholds which the VC now occupy. These strongholds were not pacified by the French, nor have they been pacified by R.V.N. troops during more than three years of substantial U.S. aid and training.

Various events within the R.V.N. and the attitudes of its government and its people influenced the prosecution of the war against the VC insurgents. Among them were the bombing of the Presidential Palace by two VNAF aircraft in February 1962, the Buddhist unrest in the summer of 1963, the coup of 1 November 1963 which deposed Diem, the bloodless coup of 30 January 1964 in which General Nguyen Khanh replaced General Duong Van (Big) Minh as the chief of state, and the abortive coup of September 1964 in which Generals Duc and Phat sought to replace Khanh.

Of these factors the ones that perhaps most influenced the course of war against the VC were the Buddhist situation which paved the way for the overthrow of the Diem regime in 1963, with its debilitating effect upon the governmental structure within the provinces, and the factionalism of the civil populace directed at the military government of Khanh in the late summer and early fall of 1964, which further weakened the national governmental mechanism.

Dissension among the Buddhists reached significant proportions when about 3000 of them, of all ages and classes, gathered in Hue on 8 May 1963. They gathered to demonstrate against alleged religious restrictions. The banning of processions and of the displaying of pictures of Buddha on his birthday were compared with the lack of government interference with Catholic observances. The crowd was peaceful at first but eventually became unruly. Troops and police used fire hoses to disperse the crowds. In the resulting melee five civilians were killed and seven injured

The issue simmered during the rest of May but became intensely active in June and again in August, resulting in self-immolation of Buddhists in various parts of the nation and finally the imposition of martial law. Worldwide attention was focused on the Diem regime and generated pressure for finding a solution to the Buddhist problem, creating a more representative government in the R.V.N., broadening the Diem regime, and limiting Diem's exercise of arbitrary power.

The war against the Communist insurgents had been temporarily eclipsed by the political conflict within the R.V.N. The discord and accompanying allegations became the central political issue in R.V.N. and the focus of attention in the United Nations and throughout the capitals of the world.

Thus the R.V.N. faced conflict on a "second front"—an internal sociopolitical conflict as well as the external military conflict with the VC. Unfortunately, the addition of internal political pressures to the military objective—progress toward which was, at best, not going well—increased the scope and complexity of the "R.V.N. problem."

The internal strife was thought by many to have been eliminated with the successful coup against the Diem government. However, when a second coup occurred—and then a third attempted coup—a crucial question arose. Would such a radical procedure for effecting governmental changes eliminate the debilitating disease afflicting R.V.N.'s prosecution of the war—or would it merely exchange one syndrome for another, leaving the disease unchecked?

To make matters worse, external pressures were also abuilding. By the end of 1963 Cambodia had used a series of border incidents to break off diplomatic relations with the R.V.N., to terminate U.S. military assistance, and to issue a call for neutralization of the R.V.N.

In 1964 the Khanh government made concessions to students, Buddhists, military leaders, and labor. Each concession gave rise to questions concerning the strength and stability of the interim government, the existence of a common national purpose to heal factionalism and provide the vital cohesive force thus far lacking, and the crushing possibility of a political vacuum developing.

Countering the Communist insurgency in the R.V.N. had proved to be extremely difficult, complex, and vexing. A composite of diverse influences existed—political, psychological, sociological, and military. The interaction of these variables had worked to determine the relative effectiveness or ineffectiveness of R.V.N. efforts. Not all the policy determinations influencing the conflict in the R.V.N. had enhanced the attainment of purely military objectives. In fact some political/policy influences had acted as constraints on the military prosecution of the war, e.g., R.V.N. and U.S. adherence to the provisions of the Geneva accords.

This is not meant to deprecate the validity of such constraints. On the contrary, their existence points up the trade-offs implicit in the diversity of efforts expended to achieve a single national objective. Efforts to achieve one apparently simple and forthright national objective are, only too often in the real world, encumbered by many diverse and sometimes conflicting considerations.

significant factors bearing on the problem

Apparently there are no pat answers to a well-planned and supported insurgency mounted in a favorable sociopolitical, economic, and geographical environment. Most of the glibly advanced solutions either unwittingly address but one facet of the total problem or erroneously purport to eliminate the many parts of the problem by addressing only one.

Yet there are some rather startling factors bearing on the Viet Nam problem, and isolating them might provide some insight for successfully dealing with the insurgency.

- Only one South Vietnamese in 500 is a hard-core VC. The latest estimate of 30,000 VC in a national population of approximately 15,000,000 constitutes an overall .2% VC-to-population ratio.

- Only one South Vietnamese in 100 is either a hard-core VC or an active supporter. It has been estimated that more than 100,000 Vietnamese are what might be called VC paramilitary or active supporters of the VC. They are porters, farmers, runners, informers, and others who actively assist the VC while not themselves bearing arms. Thus the entire VC strength in South Viet Nam represents less than one per cent of the national population.

• Targets for the VC are large, fixed, and vulnerable. The task of the national government, while obvious, is often overlooked. It must protect the population, the means of production (industrial and agricultural), and lines of communication and commerce—all of which represent essentially fixed targets. The job of providing protection is overwhelming. For example, cities, hamlets, roads, railroads, canals, power plants, storage areas, and the peasant at work in the field are all part of the security task.

• By contrast, the VC at the present phase of the insurgency are mobile, fleeting targets. Some of the guerrillas are part-time VC and blend in with the populace during the day. Most, however, operate from the jungle fastness or VC redoubts such as Zone "D," a virtually inaccessible area northwest of Saigon. When the VC have completed an attack or elect to break off an engagement, they frequently melt away in small groups to facilitate withdrawal and then regroup at predesignated points.

• The existence of sanctuaries along an ill-defined border stretching over hundreds of miles of dense jungle is an asset of inestimable value to the insurgents. Not only does it provide a safe haven for rest, refitting, and remanning battle-torn VC units, it virtually precludes isolation of the battlefield, so necessary to forcing attrition of enemy supplies and troops, collapse of his infrastructure, reduction of his combat capability, and his eventual liquidation.

• External support was (and may still be) the absolute essential to successfully mounting the insurgency in the R.V.N. It may never be known to what exact extent external Communist support from China, North Viet Nam, and other Communist bloc nations, funneled through Laos and Cambodia and by sea, has contributed to the sustenance of the insurgency. Yet some specifics are known. Weapons and materiel captured from the VC by ARVN forces have, in many documented instances, been manufactured in Communist China, the East European bloc, Russia, or the D.R.V. The VC cadres come largely from North Viet Nam and are fleshed out, by persuasion or coercion, with South Viet Nam recruits. Earlier in the insurgency the Vietnamese infiltrators from North Viet Nam were made up of those Viet Minh troops who had been born and reared in South Viet Nam but had elected to move to the Communist north when the country was partitioned in 1954. More recently authoritative sources report infiltration of personnel born in North Viet Nam.

• This is a war on two fronts. There is conflict between the VC and the R.V.N. as a national entity, and there is conflict between the national government and various competing factions within the nation. The existence of both external and internal conflicts saps the strength of the government in dealing effectively with either.

• The ratio of money spent by the Communists to that spent by the R.V.N. is unknown, but it might well be in excess of $1 to $10 or perhaps even of $1 to $100. The United States has reportedly spent in the neighborhood of $3 billion in the R.V.N. over a period of three years for various types of aid and expansion of the R.V.N. armed forces. By contrast, the cost in resources to the Communists has been associated with the maintenance and replenishment of some fraction of the 20–30,000 hard-core VC. Much, but not all, of the logistics necessary to support the VC has been taken from within the R.V.N.—captured from the armed forces and trains, taxes in the form of foodstuffs from farmers, taxes in money from plantation owners, extortions from businessmen in the form of "protection," and the like. Many weapons and much ammunition are captured in-country, and even some medicine finds its way into the hands of the VC. In addition to small arms, many of the larger weapons (such as recoilless rifles and ammunition), medicine, and raw materials for the production of explosives are also brought into the country by the Communists. Moreover, higher specialized training and the general training of cadres are accomplished almost entirely out-of-country. These costs must be borne by the Communists. All in all, it would seem that such a one-sided resource expenditure ratio, which distinctly favors the Communists, would motivate them to continue, perhaps expand, their backing of the insurgency.

portents for future insurgencies

Obviously it is far easier to deal successfully with an insurgency when it is in its infancy. However, various political/policy realities may work

make a quick ending virtually impossible of attainment. In that case the remedies for the disease become—inevitably it would seem—more extreme and less attractive to modern Free World societies as the insurgency progresses. For example, when an insurgency is launched such as by the dropping of Indonesian paratroop guerrillas into Malaysia—an action freely admitted in the United Nations by the Indonesian representative—the task of hunting them out and eliminating the threat can be done without interfering with the routine life of a democracy or suspension of basic freedoms.

On the other hand a strong central government is essential to contend successfully with a full-blown insurgency. When an insurgency becomes as well established as that in the R.V.N., the total resources of the nation must be brought to bear just as completely as they are in a Western democracy in time of war when the nation is faced with a threat to its continued existence as a political entity. In the United States during World War II, price, wage, and rent controls were put into effect, rationing of food and other products was implemented, conscription was imposed—in short, certain individual "freedoms," if you will, were voluntarily surrendered by the populace through their elected officials, or government, in the all-out effort to protect the Nation and aid our allies.

Imposition of martial law necessarily goes further. The civil judicial system may be suspended, to be replaced with military tribunals, as occurred in the R.V.N. Requisitioning of private property is permitted, while the right of assembly, demonstration, petition, and strike may be suspended. In democratic societies the imposition of martial law is usually reserved for exceedingly grave crises. Not so in many Communist countries, where the ostensible existence of human rights and exercise of the franchise are merely a façade covering conditions approaching those of martial law.

In the early stages of an insurgency in a new democracy, it may be possible to make democratic advances while putting down the insurgency. In other cases this may not be possible. Many new democracies, and some older ones, are relatively weak, politically, and lack stability because of diverse competing factions.

From the record thus far in the R.V.N., it would appear that in the later stages of a growing insurgency strong central direction of the war is essential if there is to be any chance of reversing the trend and defeating the insurgents. If the situation deteriorates, responsibility and authority would seem to gravitate to a certain few, with ultimate decision authority resting on one man despite overtones of dictatorial power. In the U.S. this power resides in the President, who is commander in chief of the armed forces.

Yet strong central authority is not enough. In the early stages the VC were dependent upon the sanctuary and external support provided by those motivating, disruptive powers (D.R.V. and Communist China) external to the area being fought over (R.V.N.). There are at least three means by which the external nation exporting the insurgency may be influenced to terminate the insurgency before it reaches the stage where it is self-sustaining within the geographical limits of the contested nation. However, there can be great disparity between the alternatives in regard to effectiveness, cost, and susceptibility to uncontrolled escalation.

(1) *Denying the enemy his objective* is a term used by some strategists to connote actions, restricted to the objective country (in this case R.V.N.), which will, by costly attrition of forces committed by the aggressor, cause that sustaining external power to relinquish his objective. Since this concept *limits military action to attacking those forces committed by the aggressor within the target nation*, the risk of escalation is minimal.

Thus far, this concept has not yet succeeded in the R.V.N. Over the past three years VC strength has, if not actually increased, at least not decreased even in the face of greatly expanded U.S. aid.

While opinion is divided as to the part which external Communist support and availability of tremendous sanctuaries have played in the stronger VC force posture, there is no informed disagreement with the view that the net effect of sanctuaries and external support has been deleterious in some significant degree to the R.V.N. effort.

Attrition of committed aggressor forces within the borders of the R.V.N. under the "denial of objective" concept has not proved effective in cutting off the source of external support (personnel and materiel) or in eliminating sanctuaries. Moreover, while countering the threat solely within the area in dispute bears a low risk of unintended escalation, it is exceedingly expensive in terms of military manpower as well as material resources.

(2) *Covert reprisal* in the form of controlled insurgency operations within the *aggressor nation* presents an opportunity to capitalize on the advantages inherent in guerrilla warfare. The tables are turned: the existence of sanctuary, external support, and reversed cost ratio favoring the new insurgent works as a powerful incentive to get the aggressor nation to cease his insurgent activity. Thus for a fraction of the cost of mounting an extensive counterinsurgency operation, insurgency might be made a two-way street, with the attacker being as vulnerable as the attacked. Moreover, the extent of the reprisal insurgency is subject to control, and termination as appropriate, at any level of intensity short of the point at which it becomes, in effect, self-sustaining.

Insurgency as an instrument of reprisal runs a higher risk of escalating the conflict to overt warfare, since it enlarges the area being fought over to encompass the aggressor nation. Much of the stigma attached to insurgency by the Free World might be removed by eschewing wanton atrocities as practiced by the VC. Obviously elimination of such atrocities would limit the use of terror as a guerrilla tactic, but their absence should work to reduce alienation of the population.

(3) *Overt reprisal* (similar to that in the Gulf of Tonkin episode) represents a somewhat more precipitate means of more rapidly influencing, hopefully curbing, the actions of a nation exporting insurgency. The extent to which this option for reprisal increases the possibility, even probability, of unwanted escalation is influenced by the relative military power of the opponents which can be brought to bear, as well as the respective evaluations of importance of the national objectives of the participants and the impact of the overt reprisal on the aggressor. In sum, the alternative of ceasing the insurgency must be made more attractive to the aggressor nation than the alternatives of continuing or escalating the conflict.

AT THIS point in time and under the conditions obtaining in the R.V.N. at this writing, one per cent of the population operating with access to safe havens and backed by an external power is threatening the existence of a new democracy. This small segment of the populace has gained strength beyond its numbers by exploiting factionalism and political, social, and religious organizations.

The harsh realities of the R.V.N. conflict may yet produce an effective means of throttling future insurgency in its infancy. It would seem more likely, however, that guerrilla warfare will be recognized as a concept for conflict which is not to be exploited solely, and safely, by the Communists to achieve their ends. It might well be that the more effective deterrent to externally supported insurgency will be the capability and determination to mount a larger, more successful reprisal insurgency within the aggressor country.

As in any military conflict, a nation does not rationally or intentionally start a war which it believes it will lose. The low-cost, low-risk, high-gain aspects of guerrilla warfare for the initiator must be reversed.

Failure to deal successfully with Communist exportation of insurgency in the R.V.N. may influence the incidence and decisiveness of insurgency elsewhere in Asia, the Western Hemisphere, Africa, and the Middle East—with disastrous results for the Free World.

Hq Pacific Air Forces

THE COMMANDER AND HIS INFORMATION OFFICER

MAJOR WILLIAM BENDER, JR., USAFR

THE QUALITY of leadership a commander furnishes his information officer is so crucial and bears such direct relation to the results obtained that it seems every treatise on managerial functions would give it more than passing attention. This is an area in which the consequences of good, poor, or mediocre leadership can occur with astonishing speed and massive visibility.

But the senior officer who seeks guidance for directing and supporting the work of his IO will usually seek in vain. At best he finds academic discussions on democracy, freedom of the press, the public's right to know, and the First Amendment. None of this is calculated to do him much harm. Yet it fails to explain how he can direct the information program into building a strong bridge of understanding between the service and the American public.

At the opposite pole, his search may also uncover some of the vast folklore of misinformation that is always available to fog the picture: carefully embroidered case histories, outdated fears and views of the news-gathering fraternity, and colorful novels by disgruntled journalists who served in one or another of the recent wars—usually in PIO.

The commander's involvement in public information work is inescapable. The regulations hold him fully accountable for this, as they do for everything else that occurs within his command. But whereas his troops will be adequately fed and housed, the aircraft will be maintained, and the runways cleared of snow, all without his personal intervention, yet if he neglects to give adequate guidance to his information program, the result can be immediate malfunction or utter paralysis.

While the commander bears the responsibility, the lion's share of day-to-day relations with the press and public falls directly upon the IO. By any orderly form of logic, this officer should be just as responsive to commands, directives, and regulations as any other member of the staff.

Somehow it doesn't always work out that way.

There are probably a number of reasons for this, but one of them, at least, is psychological: it seems impossible to "order" a man to be creative. And a good IO must exercise considerable creative talent to be a good IO.

Another reason is that the IO labors under some peculiar handicaps unknown to most other career fields. Few novices, for example, would think of becoming bomb disposal experts overnight. But by the odds of human nature, fully half the personnel on a normal military installation consider themselves natural-born information specialists. As a result, the

IO is frequently pressured to follow certain *methods* in the conduct of his duties. By contrast, the supply officer, weather officer, and bomb disposal expert are simply exhorted to produce *results*.

There is a whale of a difference.

unit mission

Undoubtedly the single most important step a commander can take to launch his information program in the desired direction is to explain the organization's mission, as he sees it, to the IO. This needs to be done in person, and in detail. It should be done soon after assuming command. It needs retelling immediately when a new IO joins the organization, and recurrently thereafter. It needs to be done whenever the mission changes.

The concept of unit mission is crucial. It can and should govern every official move the IO will make. It determines the particular public, or publics, he will attempt to reach. It controls the content, methods of presentation, and forms of information he will offer. It provides him with an essential method of screening the inevitable distractions that tend to diffuse IO work. And it gives the IO his major effective defense against those officers senior to himself who tempt him to divert his efforts on their behalf.

While explaining the unit mission, the commander should also state with absolute candor how he plans to judge the IO's performance: Will it be by column-inches in the *Air Force Times*? By the dollar volume of base fund drives for the Red Cross and Community Chest? By the expressed opinions of other staff officers? By the amount of personal attention the commander himself receives in the local, regional, or professional press? Or by some desired attitude change in the local population? Any of these yardsticks—and hundreds more—may be completely justified in the light of the unit's mission, but they need stating.

This has to be a cards-on-the-table session, without cautious modesty or equivocation. For the commander henceforth will get exactly what he asks for; sometimes he will get *only* what he asks for.

Nevertheless, even after the IO knows the unit mission and any additional short-term goals the commander wishes to support, he will still walk a tightrope with certain stories and events. There may be only a hairline difference between a news release that supports the mission and one that merely flatters somebody's ego.

Consider, for example, the typical release when Good Old Joe is being transferred out of the command. With ponderous platitudes, it merely recites his biography all the way back to grade school. There is an odd chance that this fascinates Joe and his wife. It is a gesture, somewhat like placing a bronze plaque on the spot Joe's desk once occupied.

With imagination and effort and a greater concern for the unit mission, that story could focus on what Joe did to support that mission. Thus it would be one more step in advancing public understanding of the command.

public interest

Tangential to the matter of unit mission is the potential degree of public interest in that mission. The commander, no matter how devoted he may be to his unit and no matter how significant he considers its mission, must have the knack of seeing it in news perspective. Only then can he understand one of the major concerns of his IO.

The IO knows that the mission of the command imposes certain finite limits on the degree of public interest he can expect to encounter or create. Measuring "degrees" of public interest is an elusive and rather subjective task at best, but it may be illustrated with a case history.

In 1950 I was recalled to active duty from a Michigan Volunteer Air Reserve Training Unit (VARTU). I was first assigned to Hq Air Materiel Command, then to Hq Far East Air Forces, then to the United Nations Advance Camp at Munsan-ni, Korea.

Let us postulate an arbitrary scale of public interest ranging from 0 to 10 and ascribe to each of these four units a span of estimated public concern. The VARTU was occupied with

a somewhat perfunctory training program for reservists. Public interest: 0 to 1.

Hq AMC was busily purchasing the tools for the war that had broken out in Korea. Interest: 1–4. Hq FEAF was fighting that war, so almost anything in the way of news from that source had a high rate of interest; call it 5–10. And in July of 1951 when the U.N. Advance Camp became the focal spot of cease-fire negotiations, even the daily weather report was a matter of worldwide concern. Interest: 0–10.

The point here is that the VARTU commander and his IO can expend any amount of energy and effort in publicizing their unit and never have more than trifling success, compared to the U.N. Advance Camp. The difference is the degree of public interest.

Another aspect of public interest which exerts a potent influence on a command's information program is the dramatic distinction between what the public wants to know and what some individuals within the command think the public ought to be told. Much too often a person who insists that the public "ought to know" certain information is more concerned with his own individual sphere of activity than with the desires and needs of the public. Once alert to this symptom, the commander and his IO can steer a course for their information program more closely in keeping with their best estimate of true public interest. Nevertheless there will be continual attractions and distractions to tempt them away from that course.

The IO usually is a competent judge of these matters. Whether he can exercise his judgment depends, in large measure, upon the kind of support he receives from his commander. This support can be provided simply and effectively by a clear understanding that the IO's duties are to be geared to public interest and to the support of the command mission.

As taxpayers, the public has a keen interest in the versatility, modernity, and efficiency of the armed forces. Their interest in Good Old Joe's biography is pretty casual. And the mere fact that they "ought to be told" about some exotic problem generally implies that they have no interest whatsoever.

bad news

The big payoff for an information program often comes in moments of crisis. The complex tasks of running the Air Force can produce anything from an embarrassing goof to a calamity. In such crises prompt and clear communication with the public through the mass media becomes essential.

Much has been said about releasing bad news along with the good, about the slim chance of concealing bad news under any circumstances, and about accepting the consequences of one bad event without compounding the problem by alienating the press.

Yet there is an additional factor that is seldom mentioned except in whispers between experienced IO's. It involves one of the oddities of modern news reporting. Editors develop certain ingrained habits, even before they get to be editors. High on the list is an automatic reflex that discounts at least 50 per cent of all claims made by public relations people. This habit becomes so fixed that when an IO volunteers a report on some matter of "bad news" the editor will discount half of that, too. He reasons, logically enough, that the news can't really be so bad or the Air Force wouldn't be calling him up trying to rush it into print.

Good editors and good reporters all have mental radar sets keenly attuned to detect any sign of reluctance to divulge information. Experience has shown them that the most dramatic stories are the ones that have to be dug out by tooth and claw. They're not brought in gratis and dropped on the editorial desk.

Thus, by helping to ensure that bad news will get the same quick and accurate treatment as good news, the commander gives his IO a tool of incalculable worth in carrying out his duties. By making proper use of that tool, the IO will lessen the impact of all pernicious events that may occur and will be able to salvage some positive goodwill from almost any imaginable situation.

avoid "new rules"

My civilian information activities gravitate around some 600 medical doctors. When

a news correspondent arrived for an interview one day recently, the doctor involved abruptly demanded a written contract to give himself complete editorial control over the way the story would appear in the paper. This triggered a rhubarb of damaging proportions, even though official policy had also been violated by the doctor's demand.

The power structure of the military establishment creates even greater dangers of having sudden "new rules" introduced to affect the command's press relationships. The situation is especially delicate when the military news source outranks the IO. What the source intends as a mere suggestion easily may be misconstrued to be an order. It may be acted upon accordingly, even though the IO considers it risky—if not totally improper—under the circumstances.

Such an event can corrode the prestige, credibility, and effectiveness of the entire public information program. Yet preventive measures are possible, and comparatively simple, when the commander recognizes the hazard and delegates to his IO sufficient authority to cope with it.

judging the IO's performance

Assume for the moment that elsewhere in this issue of the *Review* there appears a laudatory article about your command, placed here by your IO. Knowing this issue is being read by influential officers throughout the service, you might experience a proper glow of pride.

Assume, further, that some six months ago you charged your IO to tell the unit's story to the general public. Now what?

Well, it's an accurate and most favorable story—this hypothetical article—and it's something you've thought the rest of the Air Force ought to know about. You'll congratulate your IO for his efforts. Fine.

Once the IO learns you actually measure his performance by the stories he gets in Air Force publications, your entire information program will gently "adjust" itself. You will get stories in the trade papers and other media.

The general public may sometimes wonder if you are alive.

Ideally, every commander should keep himself posted on what the public is reading, hearing, and learning about his organization. But in a practical sense, this is rarely possible. There are simply too many channels of public communication.

But the commander can guard against a mental ambush: belief that what *he* is reading is also being read by the target public. It is quite possible for the IO to do a competent job of reaching the target public without his commander's knowing it, unless the commander is part of the target public. Conversely, the commander may see a good deal about his organization in his normal sources of information, only to discover that this outpouring from the IO has missed the target public altogether.

symptoms of trouble

Editors seldom agree on what makes a good story, and the decision is no easier for commanders. Nevertheless, when something goes awry in the information office, it shows.

There are at least three fairly reliable and reasonably objective symptoms that the information program is getting bogged down. When any one of them appears over a period of time the personal aid and intervention of the commander may be needed to get the IO back on the proper course. The three are a marked paucity of news, stories that are much too long, and something that might be called the "chain-of command syndrome."

This last is a curious obsession of the IO to recite the tables of organization at the slightest provocation. His stories read like this:

> A1C Able B. Charlie, of 111 Mainstreet, Hometown, U.S.A., who is a member of the Electronics Repair Section, of the 1st Squadron of the 2d Fighter Group, of the 3d Fighter Interceptor Wing, of the 4th Air Force at Hoosatonic Air Force Base of the Continental Air Command, participated in a recent training exercise at Sauk Air Force Base of the Strategic Air Command, according to Colonel D. E. Fox, commander.

Having produced this monstrosity, the IO is comforted by the knowledge that neither Colonel Fox nor any of his subordinate com-

manders will register a complaint about being slighted in Airman Charlie's publicity.

The fact that no editor will print such cumbersome prose bothers this IO not at all. Editors, he has learned, do not sit on his promotion board. Nor sign effectiveness reports. Nor do they complain about the lack of proper recognition.

Thus the chain-of-command syndrome is a signal that considerations other than public interest and proper communication techniques reign supreme in the information office. The cure, if there is to be one, can come only from the commander.

The commander also should be eternally suspicious of any purported news release, aimed for the general news media, that is longer than a single typewritten page (double-spaced, of course). The consistent appearance of longer stories suggests that the IO is padding his reports for some reason. Or that he is a victim of the chain-of-command syndrome. Or that he doesn't know how to write. Any of these reasons cries for early correction.

Except for the commander and his IO, there is no one who has any reason for reducing the length of an official news release. The editor who receives it may find it much easier to throw it in the wastebasket.

When that happens often, a large slice of your public information program dissolves into a useless ritual.

On the other hand, when the commander furnishes knowledgeable aid and guidance to his IO, the information program will remain a positive force for winning the understanding, esteem, and support of the American public.

Ann Arbor, Michigan

THE BIOLOGICAL BASIS OF ARMS CONTROL

Captain Frank H. Dowell

MUCH HAS appeared in the popular press in the last few years concerning what has come to be called "arms control." As I understand the arguments, they propose that by adopting a series of progressively less provocative military postures the nations of the world may eventually reach a situation in which there is little or no danger of war.

Whether we progress toward that state—and if so our rate of progress—depends upon man himself. Some of the arguers believe that the scientist can best solve the problems of war and peace and thus lead us toward the warless state. Others think the man of affairs, using management techniques, can best accomplish the tasks involved in controlling the present arms race. Is it possible that the question of arms control cannot be answered within the framework of existing knowledge?—that perhaps knowledge must be extended by new facts ascertained or new awareness of old facts, especially concerning man himself?

Since human events are determined by human nature, to understand them it is well to look at certain aspects of human nature. Man's evolution has been a history of the survival of those most highly endowed with the qualities of the hunter. Experiments with mice have shown that fighting behavior can be altered chemically and is thus biochemically and genetically controlled. Man's hunting traits must also have a genetic basis and have been established through natural selection, in which both environment and heredity play a part. Once established, these genetically controlled traits tend to remain established, because of the Hardy-Weinberg equilibrium.

In short, certain qualities of human personality are of positive evolutionary significance. Once established, they tend to remain established. Whether and how we use these qualities is a matter of choice, but survival and reproduction of the individual in a society is dependent upon their varied and effective use. These uses may, however, be different from the way of nature.

As is apparent, this is a restatement in terms of the "new systematics" of the dual nature of man recognized by many theologians and philosophers. For example, reason and the appetite for danger are both qualities of evolutionary significance. Both exist as part of the nature of man (as observation tells us), and both will probably continue to exist. This relationship between appetite and reason can be illustrated by a simple analogy, the relationship between reason and the appetite for food. If a

an pays 25¢ for a meal, we regard him as ungry. If he pays $25 for a meal, we regard im as hungry but also probably as a person of ultivation, taste, discernment, and wealth. If e pays $250 for a meal, we regard him as a fool.

In the appetite for food as in the other ppetites, there is a threshold, of course varying om person to person, at which reason takes ver from other drives. That such thresholds xisted in relationship to reason and the appe-tes and drives involved in war was recognized y Lee at Fredericksburg when he said that was well that war was so terrible, for other-ise we would love it too well. More recently arbara Tuchman in *The Guns of August* has own the results of activity, before the thresh-ld has been reached, when war is still all glory, xcitement, and the chase. Those who have atrolled or flown at low level also understand. o the concept of a biological threshold at hich reason takes over from appetite appears be a general one. A specific instance is the reshold at which reason takes over from the mplex of appetites that constitute the enjoy-ent of both hunting and war.

Most thinking about arms control has been ncerned with morality, estimates of capabil-y, and the mechanics of weaponry. It is pos-ble that in considering these obviously im-rtant factors the theorists have not made suffi-ent use of the biological threshold of reason r "credibility") in assigning weights to dif-rent strategies, with resultant errors in assess-ment. For example, if we consider a hypothetical simple dual game in which there is complete antagonism and in which both opponents are completely rational, what would be the result if incorrect weights were assigned to different strategies by both players? Both players, acting rationally, might well favor different falsely weighted strategies in the same real situation. In this case what they would do would not be clever but merely irrelevant, since there would be no real difference between their strategies.

If biological threshold is a factor that is not weighted sufficiently in the assignment of weights to strategies, then either side or both sides may think they are acting in a credible fashion when actually they are not. As correct weighting is essential for rational playing, the concept of biological threshold should then be tested as a component of the correct weight.

Since conventional war probably has a deterrent value too low to cause any rational hesitation about its use, all of the following comments will concern nuclear war. Suppose that in a nuclear situation we let four be the value assigned to the absolute economic capacity of two countries for maintaining a deterrent posture. (See Table I.) Also suppose that we let three be the value, though less than capacity, at which reason, or the calculated unwillingness to accept a given amount of damage, takes over from the thrill of war and the advantages to be gained from it. This value at which reason takes over is the biological thresh-

terrent posture		protection					
		game 1		game 2		game 3	
a	b	a	b	a	b	a	b
gh	high	4*	4*	3*	3*	4 or 3*	4 or 3*
gh	low	4	0	3	0	4 or 3	0
w	high	0	4	0	3	0	4 or 3
w	low	2**	2**	2**	2**	2**	2**

table equilibrium
nstable equilibrium

4 = capacity
3 = biological threshold
2 = other

able I. Equilibrium points between less than capacity and less than threshold

old of reason. From these suppositions a number of interesting conclusions can be drawn. In game one, the two level (less than both the capacity level and the biological threshold level) is an equilibrium. However, it is an unstable equilibrium, since it can be changed unilaterally. Four is the equilibrium of capacity and cannot be changed by either side without causing defeat or an unstable equilibrium. In game two, the two level is again unstable. The three level allows equilibrium at the biological threshold, but not at capacity. Either side can raise to capacity if it is willing to pay the price, and the other side must follow. Equilibrium can then be more than three but not less than three, as was shown above. Now, since three cannot go to four instantly (investment is required) and if both sides do not wish to invest total capacity in a given posture, then both sides can equilibrate at the three level as shown in game three. This is less than capacity but high enough to require the exercise of reason. Therefore, it would seem to be possible to arrive at a stable, credible equilibrium at less than capacity. It is possible to use the biological threshold of reason as the equilibrium point. It would seem, then, because of the obvious advantage of a credible, nonexhausting posture, to be desirable to use biological threshold as the equilibrium. Therefore, it is an important factor in weighting a strategy.

As the biological threshold is important and differs for different men and groups of men (Figure 1), the problem is to determine this threshold for applicable groups of men and for all men and to see the relationships between these thresholds and the capacities of the countries involved. For instance (Figure 2), if capacity is four, if all men are to be deterred, and if the "all men" threshold is over four, then it is necessary to operate at capacity and pray. If capacity is four and the thresholds of the groups of men to be deterred are all three, then equilibrium can come at less than capacity. If equilibrium is attempted at a level lower than the thresholds involved, reason will not allow the equilibrium to remain constant, for it will not be credible. Thus, equilibrium at the under-capacity threshold is possible in a two-party or

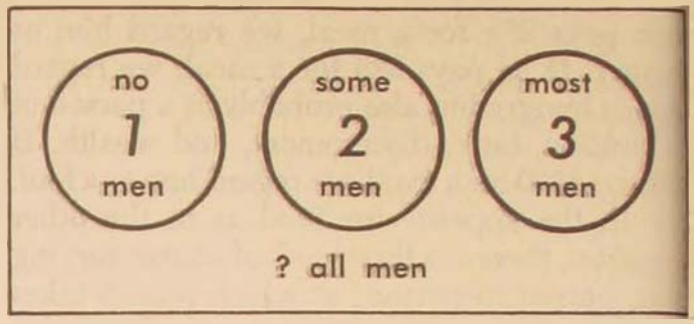
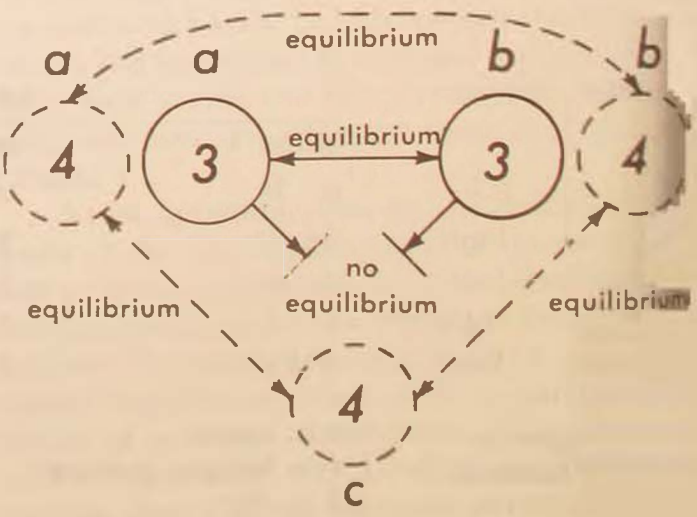


Figure 1. Biological thresholds of different groups of men

multiparty situation when all thresholds are the same. In a multiparty situation (Figure 2) with different thresholds, even though A and B could equilibrate at a level less than capacity, both must equilibrate at capacity in order to deal with C, with its higher threshold. From this it can be seen that, under certain conditions, applying the concept of biological threshold cannot eliminate war but can allow us to act as if war did not exist, and at a level that is not exhausting. Under other conditions, an exhausting military posture will accomplish nothing if it does not exceed the biological threshold of those whom it is intended to deter.

Figure 2. Multiparty equilibrium with different thresholds



Even though the biological thresholds of l men and even particular groups of men have ɔt been determined, it should be possible to st the concept, nonquantitatively, by examin- g some events of the last two decades. First, relations between the United States and ussia, the deterrent posture of the United ates during the 1940's was not such as to low reason to take over. Not enough damage uld be done for it to be credible. At present ɔth the United States and Russia have suffi- ent force to allow destruction beyond the level at can be rationally accepted by either, even ough neither is at capacity. Thus, they have uilibrated at the biological threshold level en though this has not been recognized. They e acting as if war did not exist, and at a non- haustive level. Second, in the multiparty uation of Russia versus China versus the nited States, the threshold levels again are not own. However, there may be reason to be- ve that the biological threshold of China is nificantly higher than that of either the nited States or Russia. If the United States d Russia are at nonexhaustive equilibrium d if the biological threshold of China is gher than that of either Russia or the United ates, then both the United States and Russia ıst equilibrate at the higher level. If the bio- gical threshold of China is higher than the pacity of either the United States or Russia, en even equilibrium at capacity will be of no lue.

The alternatives are for both the U.S. and e U.S.S.R. to strive for a posture of capacity to combine their capabilities, with the rea- nable certainty that they will exceed the inese biological threshold, unknown though is. It would seem that even though the bio- gical thresholds have been unknown, they ve been the actual basis on which nonexhaus- e equilibrium has been reached. They will o probably be the basis for any new equilib- m. The introduction of a new and perhaps gher biological threshold by China points out e necessity for determining this new biologi- threshold (even though threshold equilib- m without knowledge of the threshold has been attained previously), so that either exhaustion may be avoided or new alignments of power arranged, or both. It appears that, possibly, the elements for a new "acting as if war did not exist" situation are present, but that rearrangement is necessary. Determination of the "all men" biological threshold or even the China biological threshold would simplify and accelerate a necessary accommodation—something that was stumbled upon previously. Lacking this, the only alternative is an exhaustive, capacity-level deterrent posture.

In summary, we have seen that:

(1) There is a biological basis for human actions.

(2) The basis for these actions is genetically determined, is of evolutionary significance, and once established tends to remain established.

(3) Both reason and the complex of drives and appetites called "love of war" are so determined, established, and retained.

(4) There is a biological threshold, different in different men, at which reason takes over from appetite.

(5) This threshold is a part of the weight assigned to strategies.

(6) It is possible to equilibrate at a military posture determined by this threshold rather than at one determined by capacity.

(7) United States—Soviet relationships tend to confirm the hypothesis that they have equilibrated at a nonexhaustive biological threshold less than capacity, even though this threshold has not been known.

(8) Uncertainty exists in the multiparty United States–China–U.S.S.R. situation because of the lack of determination of the "all men" biological threshold.

(9) The determination of the "all men" or even "China" biological threshold is necessary in order either to establish a new nonexhaustive equilibrium or, this determination not being possible, to create new arrangements of force rapidly and simply. In this case, knowledge can substitute for previous accident.

(10) In the absence of the threshold level or new arrangements, exhaustive, capacity-level activity—with hope—is the only alternative.

5th Epidemiological Flight (PACAF)

Military Affairs Abroad

THE DEBATE BETWEEN KHRUSHCHEV AND HIS MARSHALS

DR. KENNETH R. WHITING

MR. KHRUSHCHEV had seemed to be facing an unusually large number of economic headaches of late. For example, the endemically poor state of Soviet agriculture was brought out into the open by the disastrous harvests of 1963, and Khrushchev had to go shopping abroad for grain. Even the Soviets admitted that their agriculture needed some drastic and expensive medication. The rising demand for more and better consumer goods, plus the public's impatience with the deplorable housing situation, had Nikita mumbling about "the material and spiritual needs of the people." Such basic weaknesses in the second-largest economic power on earth, in a nation that claims to be ready to lay the foundations for the communist stage of plenty, seem incongruous to say the least. In addition, Soviet forays into the field of foreign aid, restricted though they be, are still expensive and demand the very types of goods needed at home to bolster a sagging economic growth rate. Just to make the headache complete, Mr. Khrushchev was more or less committed to matching the U.S. in space, a tremendous drain on scarce Soviet resources in trained personnel and materials. In short, Khrushchev was facin a perennial problem that comes to all leade be they capitalist or communist—the necessity living within the nation's available resource Unfortunately for Mr. Khrushchev the NATO allie especially the U.S., have far more of the necessa resources than the U.S.S.R.[1]

Well aware of the enormous costs entailed solving these domestic dilemmas, Khrushchev w challenging some of the traditionally favori claimants to the budget. In October 1964 he su gested that "the development of heavy industry the foundation for the rise of the whole count and the strengthening of its defenses was over." To both the more orthodox Party leaders and t Soviet marshals, this must have sounded like she heresy. They must have wondered what ever ha pened to the Khrushchev who bludgeoned Male kov out of power in 1954–55 for taking just such stand.

The political struggle in 1954 between Khrus chev and Malenkov for the fallen Stalin's mant

This article was completed before Nikita Sergeyevich Khrushchev was toppled from power, but his stubborn debate with his top military leaders seems to be one more reason for his downfall. The thesis of this article is that Khrushchev, having risen to power at least partly with the support of the military leaders, began to have second thoughts at the end of the 1950's about the enormous share of Russia's relatively scarce resources being allotted to them. He apparently felt that the defense of the Soviet Union could be guaranteed by the PVO, nuclear weapons, and a relatively large number of missiles. He, therefore, saw an opportunity to get large amounts of capital and manpower by cutting deeply into conventional armament and military personnel. His marshals, on the other hand, were arrayed in the not unusual army stance bidding for enlarged conventional ground forces and supporting weapons in the familiar Soviet emphasis on balanced forces, the concept of victory through "combined arms." It is not hard to believe that they could maintain such characteristic views to the extent of withholding support for Khrushchev in a critical issue.

coincided with a new look in Soviet military doctrine. After a decade of slavishly chanting the Stalinist credo of the five operating factors for the achievement of victory, Soviet theorists were finally freed. They were allowed to discuss the probable effects of nuclear weapons and especially the awesome effects to be attained through a surprise air attack involving long-range aircraft and nuclear bombs. The Soviet Union now had such weapons, at least enough to pose a retaliatory threat, so it was at long last safe to discuss them.

Malenkov, to the horror of the military, drew the wrong conclusion from all this, and on 12 March 1954 he publicly stated that another world war was unthinkable as such a holocaust would mean "the destruction of world civilization."[3] Mikoyan, in a speech in Erevan, said substantially the same thing. Apparently the majority in the Presidium ganged up on Malenkov, and in a speech six weeks later he abandoned the "destruction of civilization" thesis and opted for the "end of the capitalistic system" theme.[4] What was behind Malenkov's position in early March and his retraction in April is a confused story, but the main outline is fairly clear.

Malenkov, who had based his power play on the managerial elite or "business" group in the Soviet Union (the economic planners, factory managers, and professionals in the economic world), wanted to put more emphasis on the production of consumer goods. This meant a curtailment of investment in heavy industry and a cut in military spending. Both of these cuts were extremely disagreeable to the military leaders and to a majority in the Presidium. Voroshilov, Bulganin, Molotov, Kaganovich, and Khrushchev all expressed their disapproval publicly and were undoubtedly even more vociferous in Presidium meeting. They followed the traditional line: Wars are inevitable as long as capitalism exists; the U.S. is preparing to attack the U.S.S.R.; therefore, only a continued emphasis on heavy industry and an even stronger military force will enable the Soviet Union to survive the attack and eventually win the war.

Malenkov's position was that heavy industry and military strength were satisfactory. The real need was a sharp increase in consumer goods, so long relegated to a secondary place in the scheme of things. Malenkov was apparently ready to settle for a retaliatory capability, and he regarded the Soviet armed forces as capable of deterring the U.S.

Khrushchev, thumping the drum vigorously for the traditional emphasis on heavy industry as the only way to further economic development and expressing horror at the thought of weakening the Soviet military posture in the face of imperialist plans for a new world war, was able to gain the backing of the military leaders and the orthodox Party leaders. On 8 February 1955 Malenkov admitted his lack of qualifications to head the government and resigned to become the Minister of Electric Power.

Ousting Malenkov as premier was only one step in Khrushchev's rise to power; he still faced a formidable opposition in what later came to be

called the "anti-Party group" headed by Molotov, Malenkov, and Kaganovich. His strongest cards in this deadly game were his control of the Party apparatus as Secretary-General of the Party and his close relationship with Marshal Zhukov and the military based on his approval of their demands for heavy spending in weapons and in the industries closely associated with military needs. For all intents and purposes Khrushchev was the favored one as far as the brass was concerned.

The real crisis came in the early summer of 1957 when the "anti-Party group" gained a majority in the Presidium and tried to oust Khrushchev. He appealed to the Central Committee, and Zhukov and the military leaders stood solidly behind him. Khrushchev emerged the victor but beholden to Marshal Zhukov, who was now playing a political role as a member of the Presidium in addition to being Minister of Defense. Zhukov, however, received his reward in October when he was removed from all authority, military and political, thus leaving Khrushchev the new *vozhd*, or dictator.

In order to understand Khrushchev's economic-military dilemma in the late 1950's and early 1960's, it is necessary to describe his estimate of the military capability of the Soviet Union vis-à-vis the United States. It would seem in retrospect that during the 1955–57 period Mr. Khrushchev was bluffing about an effective strategic capability. Soviet military literature seemed to imply a capability to pre-empt an American attack but was vague about how this was to be done. In the fall of 1956 Khrushchev, caught in the middle of both the Hungarian revolt and the Suez crisis, resorted to vague hints about rockets with nuclear warheads. He probably did have enough short-range missiles to plaster France and Britain, but it is extremely unlikely that he could have inflicted unacceptable damage on the U.S.

The reason the Soviets put the accent on preemptive attack was their evaluation of American strategy. They saw an ever-increasing American emphasis on air power, in avowed military policy, in official writings, and especially in budget allocations. They tried to talk down such a policy, continually referring to it as reliance on the fallacious doctrine of a single weapon system, and monotonously chanted the old Soviet slogan that the small, elite air force saved the imperialists from having to rely on massive armies where morale would be weak. Beneath all this smoke, however, the Soviet strategists were faced with the insoluble problem of how to cope with an American strategic superiority. The truth seems to be that they did not have the wherewithal to do so.

Between 1950 and 1955 the Soviets had developed an extensive system of advanced air bases in the arctic, had probably worked out refueling techniques, and by 1955 had demonstrated the twin-jet Badger, the four-jet Bison, and the four-engine turboprop Bear. The Badger lacked the range for deep penetration of the U.S., the Bear had the range but was very slow, and the Bison was not being produced in large enough numbers to present a real threat. In the missile field, only tactical and intermediate-range weapons were available. All in all, to speak of a "balance of terror" was fallacious, unless one had in mind only Russia and Europe.

Until the middle of 1957 the Soviets were simply responding to an American lead in strategic weapons. Even geography was against them. Their advanced bases in the northern rim of Siberia and on the arctic islands were more than offset by the U.S. bases ringing the Soviet Union. Their inventory of bombers, although somewhat similar to that of the U.S. in types, was very inferior in numbers and actual performance. A doctrine of pre-emption may have been a measure of desperation, but it was the only doctrine at all feasible. If they had too little to pre-empt with, they certainly had far too little to retaliate with after an American strike.

The advent of the ICBM and the successful launching of the Sputnik in 1957 had a miraculous effect on the Soviet attitude in the strategic debate with the U.S. Khrushchev now began to make noises about Soviet superiority in strategic weapons. At the height of his new euphoria he relegated bombers and surface vessels to the museum and seemed determined to make long-range missiles the be-all and end-all of military strategy. Looking back at this display of cockiness, one finds it hard to discern anything except a bold gamble on a psychological advantage. The West was in a mild state of shock, and Khrushchev was capitalizing on it. Of course, there is the fact that this was the Soviets' initial military "first," a weapon that was not merely a duplication of something already in the U.S. arsenal.

Khrushchev brandished his new ICBM as an implicit backup to his Berlin ultimatum in November 1958. On the other hand, he showed a reluctance at allowing Mao Tse-tung to draw him into an actual confrontation with the U.S. in the Taiwan Strait conflict of 1958. The wind might be blowing from the East in Mao's opinion, but Khrushchev was better aware of how little force was behind that wind.

This brings up the question of why the Soviets did not maintain their lead in ICBM's. On the surface it looks much like their failure to produce Bison airplanes at the rate American intelligence judged them capable of: in short, the reluctance to commit such a large portion of the economy to one weapon. In other words, it would seem that Khrushchev was running a little short on resources, largely because he had overextended his commitments. As early as the Malenkov-Khrushchev duel for power, it is evident in retrospect that Malenkov realized that something had to give if the Soviet economy was not to be seriously overstrained. The Malenkov policy of easing up on military spending and on investments in heavy industry would have allowed the allocation of more funds in the consumer goods industries and in agriculture, the two weakest segments in the overall economic picture. Khrushchev, seeking the support of the military leaders and the conservative majority in the Party leadership, gambled on the traditional system's lasting long enough to enable him to get a vastly improved military stance before he turned his attention to the obsolete economic machinery. Thus the period after 1955 saw an unusually heavy commitment in military hardware, research and development, and skilled personnel.

By 1958, however, Khrushchev saw how overextended he was in his "races" with the U.S. He was racing the U.S. in space, in armaments, in economic aid to underdeveloped countries, and in economic growth in general. All this was being attempted with a gross national product (GNP) only half that of the United States. At this point Khrushchev tried to back off a bit. He began to seek a *détente* with the West, which led eventually to Camp David in late 1959. He also began to try to renege on his military expenditures.

In this tight situation, Khrushchev seems to have been unwilling to put up the wherewithal necessary to push ICBM's off the production line like "sausages," as he once put it. The liquid-fuel ICBM of that period was extremely expensive and complicated. Furthermore, it was not adaptable to hardened sites and was therefore vulnerable to American attack. Whatever the reasons, the Soviets did not produce their new ICBM's as fast as Western intelligence sources estimated them capable of.

By the end of the 1950's Khrushchev was facing another problem, a drastic shortage of young people coming into industry and the armed forces. The catastrophic losses in manpower during World War II plus an abnormally low birthrate during those years resulted in a dearth of young people in the late 1950's and early 1960's. Thus a reduction in the Soviet Armed Forces would both save money for other purposes and allow a diversion of young men into industry.

These seem to have been the reasons for Khrushchev's "new strategy" speech to the Supreme Soviet on 14 January 1960.[5] That speech also set the tone for what apparently has been a behind-the-scenes controversy between him and his military leaders right down to the date of his ouster. Khrushchev justified his manpower cut by shouting shrilly that the Soviet deterrent force was capable of keeping the West at bay. Almost at the beginning of his long harangue he stated his main premise: "We are several years ahead of other countries in the development and mass production of intercontinental ballistic missiles of various types." As a result, he said, even "the statesmen of the Western nations, including the U.S.A. itself," agree that the launching of the Soviet satellites and space rockets has made the American people aware that the U.S.A. is militarily no less vulnerable than any other country. Khrushchev then went on to use this shaky premise as a justification for his proposed drastic cut in military personnel.

In the course of his speech he produced a number of interesting figures on the size of the Red Army between 1945 and 1960. Between 1945 and 1955 the armed forces had been reduced from 11,365,000 to 5,763,000 men, and between 1955 and 1958 another 2,140,000 men had been demobilized. Thus the total was 3,623,000 in January 1960. Khrushchev now proposed a further reduction of 1,200,000, which would bring the total down to 2,423,000.

The irrepressible Khrushchev then asked: Why not?—the Soviet Union had an adequate

stockpile of atomic weapons and a "powerful rocket technology" in a period when the "armed forces have been largely converted to rocket and nuclear weapons." As for the conventional types of weapons, his own words best express his thoughts:

> Given the present development of military technology, military aviation and the navy have lost their former importance. This type of armament is not being reduced but replaced. Military aviation is being almost entirely replaced by rockets. We have now sharply reduced and probably will further reduce and even halt production of bombers and other obsolete equipment. In the navy the submarine fleet is assuming great importance, and surface ships can no longer play the role they have played in the past.

In his opinion the new weapons, the phenomenal growth rate of the Soviet economy, and the "consolidation and growth of the mighty socialist camp" all added up to an unassailable Soviet Union. Furthermore, a country's defense capability was no longer determined by masses of soldiers under arms but by its total firepower and means of delivery, both of which the Soviets had in abundance. The proposed manpower cut, he went on to maintain, would "help to build our economic might and to create additional possibilities for raising the standard of living, further increasing material goods, developing housing construction and shortening the working day." In fact, the cut would yield an annual saving of approximately 16 to 17 billion rubles.

Khrushchev, as future events were to demonstrate, had picked a poor time to try prodding his marshals into cutting back on manpower. The "Camp David spirit" so evident in his 14 January speech soon soured into his more usual snarling attitude as a result of the U-2 incident and the Khrushchev-Eisenhower confrontation at the abortive Paris summit meeting, both events taking place in May 1960. As a result the military leaders were less liable to censure if they hinted, as some did, that this was not the time to attempt drastic surgery on the armed forces.

If the events of 1960 were not conducive to a general reduction in Soviet military expenditures, those of 1961 were even less so. The American reaction to the 1961 Berlin crisis was, from a Soviet point of view, sobering. Such steps as the increase in the U.S. defense budget, the acceleration of the Minuteman and Polaris programs, and the calling up of the reserves could hardly help Khrushchev's case. Even the much-vaunted "consolidation and growth of the mighty socialist camp" sounded a bit silly with Mao and even Enver Hoxha of tiny Albania tweaking Khrushchev's nose with impunity. Finally, by the autumn of 1961, the Department of Defense was beginning to reverse the Democratic campaign estimates of Soviet superiority in ICBM's—U.S. strategic superiority was now being proclaimed, loud and clear. No longer could Khrushchev claim, as he had in his 1960 speech to the Supreme Soviet, that even the Western statesmen acknowledged Soviet missile superiority.

Given this set of circumstances, one is not surprised that the Soviet Minister of Defense, Marshal of the Soviet Union Rodion Ya. Malinovsky, in his speech to the 22nd Party Congress on 23 October 1961, presented some views that were at variance with Khrushchev's strategy of 1960.[6] Malinovsky began his speech by pointing an accusatory finger at the Kennedy administration's warmongering activities in general and in particular at its military buildup with "the 'Berlin crisis' as a pretext." What else could the Soviet Union do except respond to such a challenge? Thus in 1961 the defense capability of the U.S.S.R. had been strengthened in the following manner:

> The reduction of the armed forces that had been planned and was in process was temporarily halted; defense expenditures were increased somewhat; the regular demobilization from the army and navy to the reserve of noncommissioned officers and men who had completed their tour of active service was temporarily put off; nuclear tests are being conducted.

Lest any of the audience think that all this was in contradiction to what Khrushchev had advocated in 1960, Malinovsky went on to praise the report of "our Supreme Commander-in-Chief, Nikita Sergeyevich Khrushchev" as a "penetrating analysis of the nature of modern war" and "the basis of Soviet military doctrine." Malinovsky then picked out a part of Khrushchev's speech that all the Soviet military leaders could agree upon:

> . . . a world war, should it be loosed by the imperialist aggressors, would inevitably take the form of a nuclear-missile war, that is, a war

> in which the chief means of destruction would be nuclear weapons and the principal means of delivering them to the targets would be rockets. In view of this fact, war would start differently than in the past and be waged in a different way.

Malinovsky, however, went far beyond Khrushchev in giving an apocalyptic flavor to the all-out nuclear holocaust and predicted its "unprecedentedly destructive character" which would "result in the deaths of hundreds of millions of people, and whole countries will be turned into lifeless, ash-covered deserts."

Having paid his respects to Khrushchev's "military doctrine" and even embellished it somewhat, Malinovsky then contradicted the very basis upon which the manpower cuts proposed by Khrushchev in 1960 were predicated—the obsolete character of conventional armaments and the uselessness of large numbers of soldiers in an era of tremendously increased firepower. The Western leaders, said Malinovsky, are well aware of the horrors of a thermonuclear exchange, and they are now trying to achieve their aggressive aims by waging "local 'small wars' using conventional weapons and tactical atomic weapons." Such being the case, large numbers of men are still vital. Malinovsky's own statement of this doctrinal point is hard to improve upon:

> Although nuclear weapons will hold the decisive place in a future war, we are nevertheless coming to the conclusion that final victory over an aggressor can be achieved only through combined operations by all branches of the armed forces. We are therefore devoting due attention to the perfection of weapons of all types, teaching our forces to use them skillfully and to achieve a decisive victory over the aggressor.
>
> We also believe that under modern conditions any future war would be waged, despite the enormous losses, by mass, many-million-strong armed forces.

Malinovsky then pointed out that although the ground forces had been reduced numerically, their new rocket units armed with nuclear and other missiles with varying ranges had tremendously improved their combat capabilities. There has been no relaxation in the attention paid to conventional arms, in particular the artillery, and the number of tanks per motorized infantry division or tank division is far higher than in World War II. There has also been great progress in the training of the parachute troops as well as in the air transport available to them. During recent Soviet maneuvers "military air transport alone dropped more than 100,000 parachutists, to say nothing of the personnel and cargo it transported."

In direct contrast to Khrushchev's contemptuous reference to "bombers and other obsolete equipment," Malinovsky put in quite a plug for the value of the air force, even in the long-range delivery of nuclear weapons. Obsolete piston-engine military aircraft had been completely replaced in the air force by up-to-date jet planes, "including supersonic long-range bombers. . . . Missile-carrying aircraft able to deliver long-range nuclear-missile strikes at an aggressor without entering his antiaircraft defense zone are being introduced in ever greater numbers. This has greatly increased the military capabilities of our aviation."

In describing the navy, Malinovsky was in complete agreement with Khrushchev that its main arm was the submarine fleet and that the basis of the submarine fleet was "atomic submarines armed with powerful nuclear missiles." But he did not condemn surface ships to the immediate Limbo that Khrushchev had allotted them, and he even advocated a major role for "naval missile-carrying aircraft" acting in coordination with submarines in combat operations.

Malinovsky undermined Khrushchev's proposed defense cuts largely based on the "obsolescence" of conventional arms, which Malinovsky refused to admit. He then conceded that the heart of the Soviet military stance is the strategic rocket troops recently created by none other than Comrade Nikita Sergeyevich Khrushchev himself. Further, this branch of the services is to be in a constant state of combat readiness to inflict a devastating defeat on the aggressor and the aggressor's country. But, Malinovsky went on to point out, the "main common task we have set for all our armed forces . . . is to study and master ways of effectively repulsing an aggressor's surprise nuclear attack and frustrating his aggressive designs by promptly dealing him a crushing blow." The words "all our armed forces" left the ICBM forces as only one of the services to perform the "common task."

In May 1962 the Ministry of Defense published a book entitled *Military Strategy,* a collec-

tive effort of 16 Soviet experts under the editorship of Marshal of the Soviet Union V. D. Sokolovsky, the recently retired Chief of Staff.[7] As the book states, this is the first comprehensive survey of Soviet strategy since 1926. The book reflects the dialogue which has been going on since Khrushchev's 1960 speech. It also reflects a more or less balanced view between Khrushchev's position in 1960 and the views of the more tradition-minded military leaders. The book further indicates a definite shift from the concept of land warfare largely on the theater level to one of global strategy and emphasizes a pre-emptive doctrine, the necessity of keeping the missile forces postured to pre-empt. Although the work is not as clear as one might wish as to just how the conventional forces fit into global warfare, nevertheless it does indicate that the economy is geared not so much for a protracted conflict as for the maintenance of the pre-emptive forces in readiness.

About the same time, May 1962, Colonel Sidel'nikov in an article in *Krasnaya Zvezda* (Red Star)[8] reduced Soviet military doctrine to a five-point summary:

(1) A world war will inevitably become a missile-nuclear war. This is why the Communist Party of the Soviet Union created the Strategic Missile Force.

(2) Missiles with nuclear warheads can reach any target in minutes and gain decisive results over enormous areas. The targets will be troop concentrations, missile and air bases, industrial and population centers. The large area of the U.S.S.R. makes it less vulnerable than other nations.

(3) The important role of missiles has not diminished the importance of other types of weapons. The final and decisive victory over the imperialists will be the result of the combined action of all arms and services. The next world war will be waged by massive, multimillion-man armies.

(4) "The very first massive nuclear strikes are capable to a large extent of determining the entire consequent course of the war and of inflicting great losses on the rear and on the troops. Therefore, the first period of the war is exceptionally important. *Soviet military doctrine holds that the chief, most important, and very first priority task is to be in constant readiness for a reliable repulse of a surprise attack by the enemy and the frustration of his aggressive plans.*"

(5) The war will be between two coalitions, the socialist and the imperialist. It will mean the all-out mobilization and utilization of the economic, moral, scientific-technological, and military potential of both coalitions. But the socialist coalition is superior in its ability to mobilize. The Communist Party of the Soviet Union, taking this into account, has assigned the task of guaranteeing completely the defense needs of the country to heavy industry.

A new edition of *Military Strategy* came out in 1963, but the changes were minor. The doctrine, at least the public one, was still pretty much the one summarized in *Red Star:* a compromise between Khrushchev's "new strategy" of 1960 and Malinovsky's reinterpretation of that strategy in late 1961.

Khrushchev, however, continued to announce reductions in military expenditures and cuts in military personnel. At the Plenum of the Central Committee of the Party in December 1963, devoted primarily to planning a tremendous, 42-billion-ruble expansion of the chemical industry in the next seven years, he stated that he planned to introduce at the forthcoming session of the U.S.S.R. Supreme Soviet a reduction in military expenditures in the 1964 budget. He justified this step on the usual ground that new weapons made large forces unnecessary, as can be seen in the following statement:

> It is possible to argue about who now has more battalions, regiments, and divisions. . . . But we are not living in the Napoleonic age when the strength of the armed forces of states was measured in thousands of bayonets and sabres. It is now another age—an age of nuclear weapons which possess fantastic destructive force.[9]

On 14 February 1964 at another Plenum of the Central Committee, this one devoted to the improvement of agriculture, Khrushchev again referred to a reduction in defense expenditures and in the size of the armed forces.[10] He went into some detail to prove that these cuts were not due to an economic squeeze as was being claimed by the "ideologists of imperialism," but surely he protested too much.

Many Soviet military theorists, however, have seemed more dubious than Khrushchev about conventional armaments and large armies being made

obsolete by the advent of the missile and nuclear warhead. Colonel I. Korotkov, writing in early 1964, pointed out that some military theorists, although admitting the tremendous role of missile-nuclear weapons, nevertheless continued to view future war as probably protracted and thus requiring the use of ground forces, the navy, and the air force.[11] In other words, some of the military theorists were still not convinced that Khrushchev's "new strategy" was necessarily valid under all conditions.

One American authority, Thomas W. Wolfe, has described in some detail the difficulties that the authors of *Military Strategy* faced in steering their course between the Scylla of Khrushchev's "new strategy" and the Charybdis of Malinovsky's "rebuttal" at the 22nd Party Congress in 1961.[12] Wolfe divides the participants in the struggle into the "radicals" who, like Khrushchev, see the ICBM and the supermegaton warheads as the main ingredient in the Soviet strategic posture, and the "traditionalists" who see the new weapon systems as only another ingredient in the combined forces concept. Both views were advanced in the book, thus awkwardly arriving at a compromise that is really an agreement to continue to disagree.

One of the "traditionalists," it would seem, is the editor of *Military Strategy*, Marshal V. D. Sokolovsky. In August 1964 Marshal Sokolovsky, aided by a Major-General M. Cherednichenko, wrote two articles for *Red Star* in which he visualized a future world war as either a short-lived missile-nuclear exchange or a protracted conflict involving the combined forces on an enormous scale.[13] Inasmuch as Marshal Sokolovsky seems to occupy a key position in the present "radical-traditionalist" controversy, a short description of his latest effort would seem in order. (In summarizing these articles I shall refer to Sokolovsky as the author, although I have no idea of just how much General Cherednichenko contributed to the effort.)

The article begins by stating that there is now taking place the greatest revolution in the history of armed combat and that the authors would like to share their views on this subject, although they "may, or may not, coincide with the opinions and views expressed by other comrades." This being the case, they expect the comrades to "examine our views critically."

The missile-nuclear weapons available in the Soviet Union make it possible to inflict a crushing defeat on any aggressive coalition, and in a short time at that. Planning for such a repulse is an extremely complex task, and the "planning of nuclear strikes must be accomplished with such precision that it will be possible with the least quantity of nuclear warheads to guarantee in the shortest time the complete disruption of the economic and military might of the aggressor." This sounds like Khrushchevian strategy, but in the next sentence Sokolovsky goes on to say: "It is also necessary to determine the methods of operation of the conventional forces and means under conditions of great destruction and high levels of radioactive contamination."

Under contemporary conditions the fate of the war will be decided by nuclear strikes of strategic weapons. The strategic strikes will determine the outcome of battles and operations. Battles in the land and sea theaters of operations will be waged to capitalize on the results of the nuclear strikes by completing the destruction of the enemy forces, if there are any left. Even these tasks will be decided by operational-tactical nuclear weapons. This sounds like a point for the "radicals." But Sokolovsky balances this in the next paragraph:

> However, in the course of military operations there will not infrequently be occasions when combat situations will have to be decided by conventional weapons without the use of nuclear weapons. Therefore the army must also be able to conduct such operations.

Sokolovsky then goes on to state that the initial period of the war in which the opponents use up all their accumulated stock of nuclear weapons will be of decisive importance in the outcome of the war, or even see the end of the war. Nevertheless, he adds:

> . . . theoretically, it may be assumed that after the exchange of nuclear strikes, the war will go on. One side may preserve the capability of waging offensive operations. The war may enter a new period. The armed conflict in each period will be the combined operations of all types of services according to a unified design and under a unified strategic leadership directed toward the resolution of the immediate military-political and strategic tasks.

In Sokolovsky's scenario for the next world

war, the imperialists intend to deliver a mass of nuclear weapons in the very first three days of the war and then, radiation levels permitting, go over to an offensive in which the ground forces exploit the results of the nuclear strikes. The Soviet Union, however, has everything necessary to thwart such a surprise attack. Modern methods of detection and warning will ensure that the Soviets have the ability to mount a timely and crushing retaliatory response. The basic means of delivering the retaliatory blow, apparently, will be the strategic missile force, atomic missile submarines, and strategic aviation. "Tactical missile forces, tactical and naval aviation, missile-carrying surface ships, and shore missile installations of the navy will also be involved in the retaliatory nuclear response."

After the retaliatory nuclear response it may be possible to use airborne forces to exploit immediately the results of the nuclear strikes and, radiation levels permitting, to carry out an offensive with ground forces to complete the defeat of the remaining enemy forces in the theaters of military operations. At the same time the enemy's navy must be destroyed in the sea and ocean theaters of operations.

Sokolovsky continues to balance out the decisive effect of strategic nuclear attacks with a cautious "on the other hand" they may not be decisive. This balancing act is well illustrated in the following passage:

> From this there arises, in our view, an indisputable conclusion: a thermonuclear war cannot be lengthy. Therefore, it is necessary, in our opinion, to be prepared in the first place for a short war.
>
> It is impossible, however, to exclude the possibility of a relatively extended war. This may have to do with a war in which nuclear weapons will not be used (for example, a local war capable of growing into a world conflict). Therefore, it is impossible to neglect the preparation for a relatively extended war.

Unlike Khrushchev, who relegated bombers to the museum several years ago, Sokolovsky sees a vital role for the bomber in the next world war. After the salvo of missiles will come the strikes of long-range bombers, but they will use techniques quite different from those in the last war. The availability of air-to-ground and air-to-ship missiles with nuclear warheads has changed the tactics of long-range aviation. There is no longer any need of large formations of aircraft to carry out a combat mission. Small groups of missile-carrying aircraft with escorts, or even single aircraft, will carry out the attacks. The aircraft will launch their missiles from outside the air defense zone of the enemy. After this, long-range bombers with nuclear bombs can penetrate the enemy country.

Sokolovsky finishes up with a vivid description of how the next world war will be fought, and it would be best to leave it in his own words:

> The aggressive bloc of the imperialists, NATO, maintains in constant readiness strong formations of ground troops and tactical aviation. It is equipping them with nuclear weapons and is preparing to conduct combat operations using nuclear weapons. In the event of the unleashing of an aggressive war by the imperialists, nuclear weapons will be used on these formations. Then decisive offensive operations of the ground forces and frontal aviation will be unleashed for the final defeat of the enemy troops in the theater, enemy territory seized, and the invasion of the aggressive armies into the territory of the socialist countries prevented. In the land theaters there will be unleashed offensive operations of a strategic magnitude (strategic offensive operations involving several formations of ground troops and units of the other services of the armed forces). It is not to be ruled out that in some directions the defensive will be used as an emergency and temporary form of military action.
>
> The main means of conflict in the land theaters will be nuclear weapons delivered with the aid of missiles and long-range aviation, and also with the help of operational-tactical missiles and frontal aviation. Tank and motorized-infantry formations, plus airborne units, will exploit the results of the nuclear strikes in order to complete the destruction of the enemy troops and to advance deep into his territory. The objectives of the armed conflict in the theater will be the nuclear facilities of the enemy, his tank, airborne and motorized forces, or infantry formations and units.
>
> It will be characterized by an absence of firm fronts. The military operations will take place simultaneously over great distances on the front and in the rear, will be distinguished by furious tempo and maneuvering of forces, by great bitterness. The forces will have to

operate under conditions of great destruction, fires, floods, and high levels of radioactive contamination.

It is especially necessary to speak of the operational-tactical missile forces. You cannot look upon them as a means of firepower to cover the troops as in the case of artillery. This is a fundamental tool in the hands of the commanders with which they will resolve the main tasks of the battles and operations: the destruction of those who survived the strikes of the strategic missiles, of the nuclear means, formations and units in regions of concentration, on the lines of deployment and in combat formations on the offensive or defensive, control points, rear bases, etc. The basic method used by the operational-tactical missile forces will be missile-nuclear strikes: massed, grouped, or single. The methods used by the artillery are not suitable for the new role of these forces, methods such as the artillery preparation for an attack and the artillery support of the offensive (the creeping barrage, the consequent concentration of firepower).

Frontal aviation will play an important role in the armed conflict in the theater. It can destroy the enemy's aviation, his missiles, artillery, antitank materiel, and manpower by using nuclear weapons and conventional means of firepower: it can fulfill the tasks of antiaircraft defense, reconnaissance, and the transport of troops by air. The equipment of frontal aviation with supersonic aircraft, "air-to-ground" and "air-to-air" missiles has radically changed its operational tactics. The flights of large masses of aircraft, aircraft "hanging" over the field of battle for protracted periods, have passed into history. They have been replaced by the maneuvers of small groups, pairs, and single aircraft, operating at low altitudes and using complex methods to deliver strikes.

The tactics of tank and motorized troops are changing. The offensive will be waged predominantly in tanks, armored transports, and even in helicopters; it will develop along basic directions. Attacks on foot will be a rare phenomenon. In view of the fact that the threat of a hostile nuclear attack will constantly hang over the advancing troops, they must operate without concentration, must maneuver, in essence be in movement at all times and also have in readiness at all times the means of defense against flash radiation, against radiation; they must use machines and opportunities afforded by the terrain, against the shock waves. In the course of the combat operations these troops will complete the destruction of the enemy formations which have been staggered by the nuclear strikes. At the same time they must be ready to smash up separate garrisons of the enemy with conventional firepower.

Airdrops carried out in the rear of the enemy from helicopters will find wide application. Motorized rifle units can be used in such attacks. This will be a distinctive offensive by air—a new phenomenon in the modern military art.

The role of airborne troops in carrying out tasks in the armed conflict in the theater is sharply increasing. These troops have the capability of rapidly exploiting the results of the nuclear strikes. Opportunities are developing for carrying out deep penetrations by airborne operations because of the inevitable destruction of the enemy's PVO (antiaircraft defense) as a result of massive nuclear strikes.

The operations of the navy will have a significant importance in the achievement of the aims of the missile-nuclear war. The equipment of our fleet with nuclear submarines armed with missiles and an air force equipped with long-range missiles and nuclear weapons has sharply increased its striking power. This allows it to move from fulfilling combat assignments along the coast in cooperation with ground troops to independent and decisive operations over the broad expanses of the oceans.

The character and methods of armed conflict in the maritime theaters have changed. Squadron battles, artillery duels, battleships, cruisers, and other surface ships have passed into history. The new class of large surface ships, pushed forward by the American-British school—aircraft carriers which fire not artillery shells but aircraft—has also outlived its usefulness. It has become vulnerable. It is already unable to play a decisive role in the armed conflict at sea in a nuclear war. Armed conflict on the seas will be first of all the operations of submarines, their missile and torpedo nuclear strikes against naval ships, convoys, and transports, against naval bases and important continental targets. In addition there will be the operations of missile-carrying aircraft with their missile strikes on the same types of targets. This comprises the essence of armed conflict on the seas in the thermonuclear war. This also is a new phenomenon in naval military art.

The most important job of naval operations in the ocean and sea theaters will be the destruction of the nuclear submarines. The American press extols its missile-submarine, the "Polaris," in every way possible. It speaks of their invulnerability. In reality, these ballistic missiles have essential drawbacks: warheads of low magnitude, low reliability and accuracy of the guidance systems, and, therefore, a low firing accuracy. The "Polaris" is sufficiently vulnerable that it can be successfully combated, which the Americans themselves are forced to admit. Missile submarines can be destroyed, in the regions where they are based, by strikes from the missile forces, submarines, and aircraft. Also nuclear antisubmarine submarines, aircraft, and even helicopters and antisubmarine surface craft are able to destroy enemy submarines quickly after spotting them. In the American press it is mentioned that submarines are very sensitive to underwater nuclear explosions.

A very important task of the armed conflict in the ocean and sea theaters is the destruction of the aircraft carrier strike units of the enemy. They can be destroyed at their bases by nuclear strikes of the missile forces, submarines, and aircraft. Effective means of combating aircraft carriers and other surface ships at sea are nuclear submarines with target-seeking missiles and torpedoes as well as aircraft with nuclear-warhead "air-to-ship" missiles. The diesel-electric submarine with modern armament has also not lost its usefulness.

There have also been essential changes in the methods of doing such naval jobs as disrupting the ocean and sea communications of the enemy, assistance of our own land forces, the landing of troops, defense against enemy landings, and defense of communications.

Thus radical revolutionary changes have occurred in all the important areas of military art.

So long as the possibility of a nuclear-missile war arising under modern conditions is not excluded, it will be necessary to work out and master further the new military art, the art of waging nuclear-missile war.

Right to the final showdown, the dialogue between Khrushchev and at least one group of his marshals was apparently in full swing. It would seem that Sokolovsky had delivered a solid blow in favor of the "combined forces" concept and had created some doubt that the ICBM and supermegaton nuclear warheads are the entire answer.

Khrushchev, however, in a speech to the World Youth Forum on 19 September 1964, answered his marshals, albeit somewhat indirectly.[14] After a rambling discourse about the main struggle between communism and capitalism being in the field of economic development, he finally hit out at the military, or at least at the "traditionalists," and their advocacy of ground forces and conventional weapons. He told his audience that he had been misquoted by the bourgeois press about his statement to the members of the Japanese Diet concerning a "new terrible weapon." What had actually taken place was as follows, in Khrushchev's own words:

> I said that my friends and I had spent the whole preceding day with the military: with marshals, generals, and admirals, with scientists working in the field of armaments, with engineers. This took place here, near Moscow. We looked not at atomic and hydrogen weapons but at rifles, infantry and tank weapons and rocket equipment for close combat. And after this inspection I told the Japanese Diet members approximately this: "What hasn't man thought up to destroy people! These are terrible weapons." And I repeat again that they are truly terrible weapons. When the bourgeois correspondents learned of this, they began to write as though I had spoken about some new weapon that could destroy everything, absolutely everything! I didn't say that. But aren't the weapons that have already been created the atomic and hydrogen weapons—aren't they terrible enough?
>
> Let me say this. I have lived through two wars, even three: The first world imperialist war, the Civil War and the second world war. In these wars the tank was the terror of the fields. And now I shall tell you a secret: When I went out onto the training field and saw the tanks attacking and how the antitank artillery hit these tanks, I became ill. After all, we are spending a lot of money to build tanks. And if —God forbid, as they say—a war breaks out these tanks will burn even before they reach the line indicated by the command.

If Sokolovsky was the spokesman for an large segment of the military high command, it would seem that Khrushchev's rejoinder pushed the debate toward the showdown. Nikita was def

nitely unimpressed by his marshals' display of conventional weapons. The tenor of his speech was in the direction of more accent on consumer goods and a curtailment of such things as obsolescent anks and other out-of-date components in the Soviet Armed Forces. Both sides had spoken out as openly as is likely in the Soviet Union, and the debate seems to have reached the point where something had to give.

Aerospace Studies Institute

Notes

1. We shall assume that the Soviet gross national product a little less than half that of the U.S. More exact estimates are vailable, but they differ rather widely.
2. Article in the *Christian Science Monitor* (3 October 964, p. 4) based on a report in *Izvestiya*.
3. *Pravda*, 13 March 1954.
4. *Izvestiya*, 27 April 1954.
5. *Pravda*, 15 January 1960, pp. 1-5; a complete translation is in *The Current Digest of the Soviet Press*, XII, 2 (10 February 1960), 3-16.
6. *Pravda*, 25 October 1961, pp. 4-5; a condensed translation is in *Current Soviet Policies*, IV (New York: Columbia University Press, 1962), 156-59.
7. V. D. Sokolovsky (editor), *Voennaya Strategiya* (Voennoe izdatel'stvo ministerstva oborony SSSR, Moskva, 1962); *Soviet Military Strategy*, translated by H. S. Dinerstein, L. Goure, and T. W. Wolfe (Englewood Cliffs, N.J.: Prentice-Hall, 1963).
8. Col. I. Sidel'nikov, "O Sovetskoy Voennoy Doktrine," (Concerning Soviet Military Doctrine), *Krasnaya Zvezda*, 11 May 1962, pp. 2-3; translation in *Air University Quarterly Review*, XIII, 4 (Summer 1962), 142-50.
9. *Pravda*, 15 December 1963, p. 3.
10. *Pravda*, 15 February 1964, p. 6.
11. Colonel I. Korotkov, "O razvitii sovetskoy voennoy teorii v poslevoennye gody" (Concerning the Development of Soviet Military Theory in the Postwar Years), *Voenno-Istoricheskiy Zhurnal* (Military-Historical Journal), No. 4 (April 1964), p. 46.
12. Thomas W. Wolfe, "A First Reaction to the New Soviet Book 'Military Strategy,'" RAND Memorandum, RM-3495-PR, February 1963.
13. Marshal of the Soviet Union V. Sokolovsky and Major-General M. Cherednichenko, "Voennoe iskusstvo na novom etape" (Military Art in a New State), *Krasnaya Zvezda (Red Star)*, 25 August 1964, pp. 2-3, and 28 August 1964, pp. 2-3.
14. *Pravda*, 22 September 1964; translated in the *Current Digest of the Soviet Press*, Vol. XVI, No. 38 (14 October 1964), pp. 8-10. This speech was not printed until three days after its delivery.

Air Force Review

ABRES

Brigadier General Harry J. Sands, Jr.

AMONG THE objectives of the Ballistic Systems Division of the Air Force Systems Command is that of developing advanced ballistic re-entry systems (ABRES). This development program is conducted by the Ballistic Missile Re-entry Systems Office of the division.

To appreciate the technical problems associated with the task of placing a warhead in a re-entry vehicle, then adding devices that will ensure that the re-entry vehicle successfully penetrates enemy defenses and accurately impacts on the target, one must first consider what is termed "re-entry environment." When an object such as a re-entry vehicle climbs out of the earth's atmosphere, moves in semiorbit through a near vacuum, then dips down and re-enters the atmosphere at speeds in excess of 20,000 miles per hour, environmental conditions are created that actually tax the imagination. Figure 1 illustrates qualitatively the re-entry physics phenomena generated by such a re-entry vehicle. These tremendous temperatures and pressure conditions, which the re-entry system must endure while still protecting the warhead, maintaining system accuracy, and attempting to penetrate a defense radar net, provide the basis from which the various required

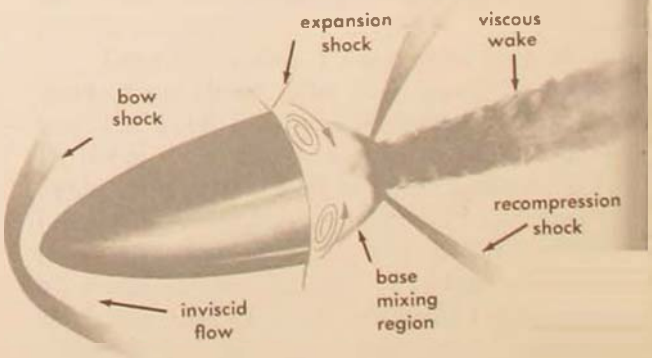


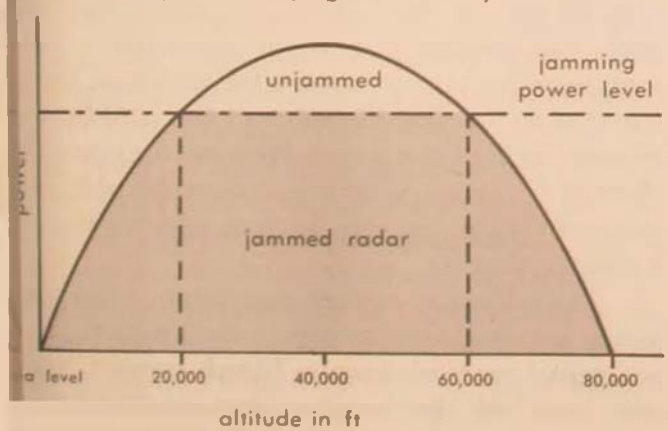
Figure 1. Re-entry phenomena include the various interactions between flow fields, shock waves, and mixing areas. The resulting radar or optical signature represents the sum of the contributions made by the bare body and the trailing wake

technical disciplines are exercised in the Advanced Ballistic Re-entry Systems Program.

By "re-entry system" we mean the total payload package, that is, the warhead, the re-entry vehicle carrying the warhead, and any auxiliary devices and/or techniques incorporated or accompanying, which tend to improve defense penetration. All of the many aspects of a re-entry system fall under ABRES purview. Functionally the ABRES Program concerns itself with the application to re-entry systems of many technologies—thermodynamics, astrodynamics, materials, arming and fuzing, re-entry physics, and others.

The various technical approaches taken in the ABRES Program are carefully formulated feasibility efforts stemming from detailed offense versus defense gaming analyses. These gaming exercises are performed on a continuing basis and are constantly being updated to include current postulations of enemy defenses. Evolving from these system analyses are those offense-oriented techniques or design characteristics which, following feasibility demonstration, can be efficiently incorporated into current re-entry system design. For example, an engagement doctrine (Figure 2) may postulate that a certain defense radar exhibits a particular power curve. By superimposing a line representing the output of an offensive jammer, one can hypothesize how effectively the jammer neutralizes the defense radar. This systems analysis function, therefore, serves as the motivating element in the initiation of the development cycle of a new re-entry system concept.

igure 2. Engagement doctrine. The power vs. alti-de curve is plotted for a given radar. The broken orizontal line represents power output of an of-nsive jammer. The unshaded area, compared to the tal area under the radar power curve, represents e remaining degree of effectiveness for that radar.



Proceeding on the assumption that certain defense system characteristics can be defined, one of four general functional offense system approaches can be pursued. The first involves the degree of invisibility one can attain with an unaccompanied re-entry vehicle. In other words, can a re-entry vehicle containing a warhead, without the addition of auxiliary penetration aids, assume a sufficiently small radar and optical signature so that it will not be detected, tracked, and intercepted by a defense system? Recent flight tests conducted under ABRES have revealed the beneficial effects of variation of vehicle configuration, choice of heat shield material, and ability to control re-entry at a specified angle of attack. Closely associated with these design parameters is a relatively new but effective technique that involves the addition of radar absorption material (RAM) to the basic heat shield to reduce the radar cross section. There is much more to learn, not only of the individual parameters as they affect the resulting signature but of their interplay and the design trade-offs to be considered. It must be kept in mind that the only truly significant conclusions stemming from experimental test results are those that provide a basis for a realistic and practical operational system design.

The total signature of a re-entry vehicle (R/V), that of the vehicle, its surrounding flow field, and the trailing wake, has been consistently difficult to simulate with a small, passive decoy. This fact is graphically described by Figure 3. It shows the difference between the displayed radar signatures of an R/V with its wake and of a decoy. From this comparison, the difficulty of simulating an R/V with a decoy becomes obvious. The use of decoys typifies the second functional approach for improved penetration but constitutes only one of several different types of auxiliary devices.

The ABRES Program is investigating both passive and active countermeasures. Active countermeasure techniques can either deceive or overpower a defense radar. The former approach may provide false and misleading electronic signals intended to trick the defense system into committing an interceptor to an electronically simulated,

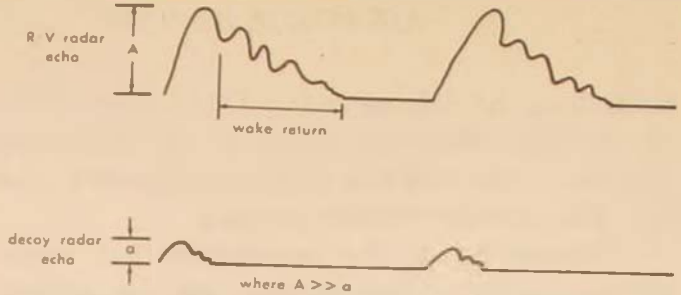


Figure 3. Typical radar returns. The top display represents a series of radar returns or echoes from a re-entry vehicle (R/V) with a trailing wake of pulse amplitude "A." The bottom display indicates a series of decoy returns of very much smaller amplitude "a." Continuing ABRES effort has significantly reduced R/V returns and considerably enhanced decoy signals, both in amplitude and pulse length. These converging values will ultimately enable the accurate simulation of R/V's by decoys.

rather than real, re-entry vehicle. Many variations and sophisticated advancements in masking, simulation, and deception are currently being exploited under ABRES.

A third general means of achieving, or at least approaching, the optimized penetrator involves the use of maneuvering. The maneuvering ballistic re-entry vehicle (MBRV) widens the so-called ballistic defense "threat tube" by being able to traverse laterally or deviate vertically a finite distance. A maneuvering capability also gives a re-entry system tremendous flexibility by permitting a mix of maneuvering and standard ballistic missile re-entry vehicles. This mix forces upon a defense system a very difficult problem in discrimination. In addition, once terminal position location sensing can be perfected as an operating system, it can be installed in a maneuvering vehicle, thereby creating an ability to terminally fix the target and correct the trajectory accordingly. The resulting improvement in system accuracy on target is tremendously significant.

In the same functional category, but with a widely divergent application, is the ABRES development of a boost glide re-entry vehicle (BGRV). Whereas the MBRV maneuvers at the terminus of a ballistic trajectory, the BGRV re-enters the atmosphere after an extremely short ballistic trajectory and performs a long, in-the-atmosphere glide to the target. By designing a high lift-to-drag vehicle to accomplish this, we increase the overall range significantly. Our systems analysis also tells us that to defend against this type of threat a nation must greatly increase the scope and dispersion of its radar/interceptor net, thereby multiplying its defense burden.

Finally, the fourth approach concerns the building of a re-entry vehicle sufficiently "hard" to withstand nuclear effects. This concept implies that a re-entry vehicle which has been acquired, tracked, and intercepted can still survive a proximity burst without significantly degraded accuracy. Even broader in concept, however, is the possibility of hardening re-entry vehicles and all their subsystems without compromising a low signature design approach. This is an ultimate goal in ABRES and, if achieved, will come truly close to the realization of a universal, all-purpose re-entry vehicle.

As pointed out earlier, the re-entry environment for which a re-entry vehicle must be designed, if it is to survive and operate efficiently within that environment, cannot be directly controlled, but the resulting interactions with an R/V can be strongly influenced. One of these "regulating" parameters is the time required for traversal of the sensible atmosphere, approximately 300,000 feet down to impact. This time is a direct function of the R/V velocity, which in turn depends on aerodynamic drag. A rather gross design parameter called ballistic coefficient (β) relates an R/V's weight (W), cross-sectional area (A), and drag coefficient (C_D) in the following manner:

$$\beta = \frac{W}{C_D A}$$

It logically follows that the shorter the time the R/V spends in the atmosphere, the smaller the depreciating effects of re-entry, since less time will be available for the various re-entry system errors to accumulate. The resulting benefits are primarily twofold: less time for a defense system to acquire, track, and destroy; and overall improved system accuracy. The primary means for achieving these results is to increase the value of the ballistic coefficient. Within the ABRES Program considerable effort is being expended to accomplish this objective by reducing vehicle drag effects through optimized shaping.

To realize the concept completely, other elements are necessary to the ABRES Program. Experimental payloads require launch support, and, once launched, they require adequate downrange instrumentation. If it is lacking, the highest degree

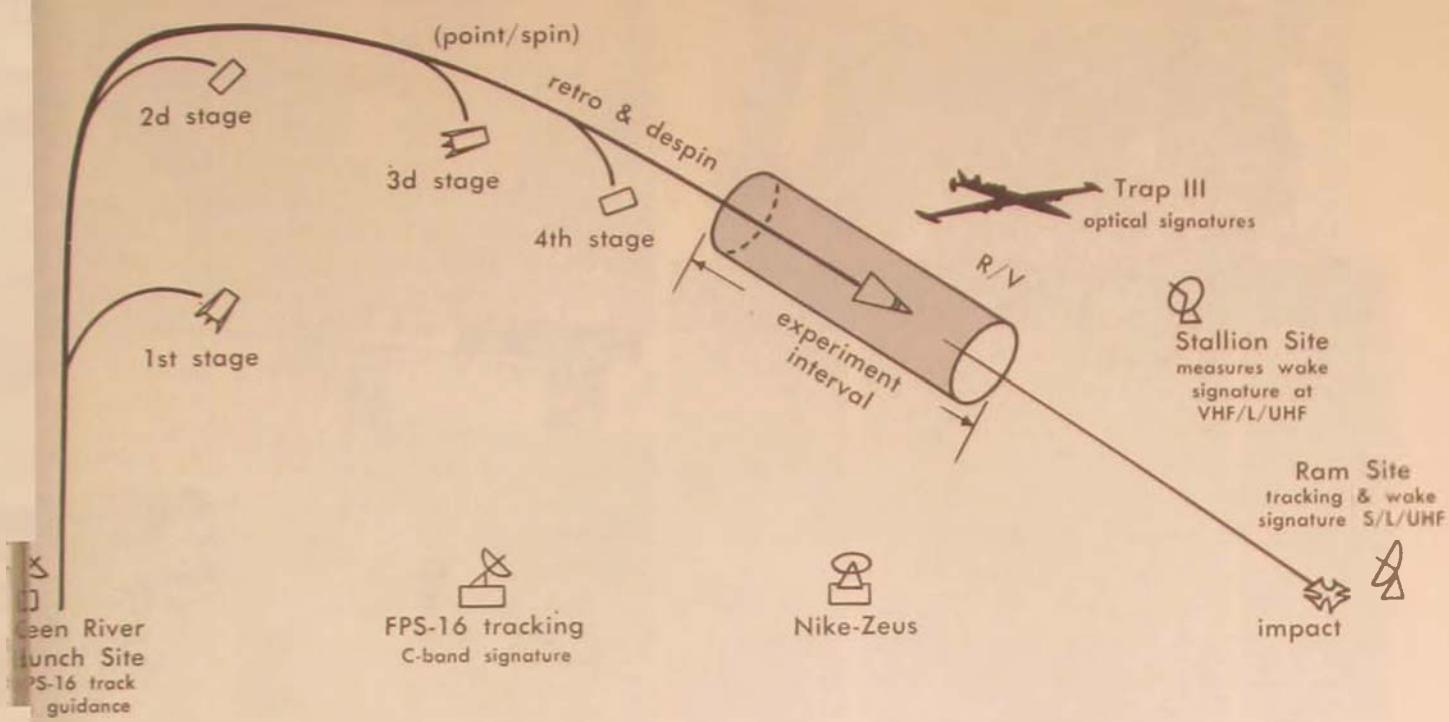


Figure 4. This typical mission profile on the White Sands Missile Range suggests the complexity of instrumentation support required to gather adequate test data. After launch by the four-stage Athena booster, the re-entry payload enters the experiment interval.

of excellence in payload design will still yield no data, and thus the R/V will fail in its objective. Supporting launch activities for our ABRES Program are on the Western Test Range. The R/V's are launched from Vandenberg AFB, to impact into an instrumentation net in the Kwajalein Atoll area, and on the inland range from Green River, Utah, to impact on White Sands, New Mexico (Figure 4). The program places strong emphasis on both airborne and ground instrumentation to realize the maximum benefit from each test.

Late in 1962 Headquarters Air Force Systems Command designated the ABRES Program director as responsible for the proper integration of all re-entry system technology within the command. This integration has resulted in the coordination of the various efforts of all divisions within the Systems Command, the Ballistic Systems Division being designated as the lead agency. The Director for Research and Engineering, Department of Defense, has also recognized ABRES as the prime DOD instrument for re-entry technology. The ABRES Program thus has the key role of initiator, coordinator, and implementer for efforts associated with improving effectiveness of ballistic missile re-entry systems. It also is responsible for the general advancement of technology required for re-entry systems in space applications.

THE ADVANCED Ballistic Re-entry Systems Program typifies, then, a unique segment of our total defense effort. The re-entry system, including the vehicle, the warhead, and the penetration aids, has attained importance as an entity. It is now a discrete and completely recognizable missile subsystem, a major element determining the total effectiveness of our defense arsenal. Progressive improvement of this element is undeniably the *primary* function of ABRES. Our ballistic missile force can be only as effective as the re-entry systems that place a payload on a designated target. Of course the ABRES Program also has the purpose of general advancement of re-entry technology as it can be applied to the overall space effort.

These vital mission objectives give the ABRES Program and its roughly 150 engineer-scientist-manager Air Force officers an increasingly important role in the buildup of our strategic missile power.

Ballistic Systems Division, AFSC

Air Operations in Viet Nam

AMMUNITION DROP

Preflight briefing for airdrop of 105-mm ammunition t troops of the Republic of Viet Nam Army (ARVN) in th Mekong Delta area, by 315th Troop Carrier Group aircra

ARVN truck with 105-mm shells backs up to C-123B.

Rollers are locked to the aircraft ramp.

While loadmaster works on weight tables,

and load is tied down with chains.

first pallet of shells rolls into aircraft,

C-123B's taxi out to runway.

In route to drop zone

The first load hits its drop zone . . .

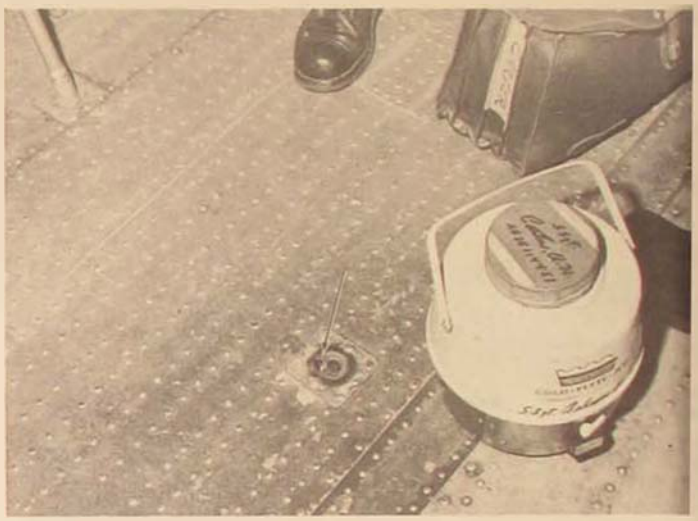
Awaiting signal to push out pallet

the second load hits its drop zone . . .

and the third hits its drop zone.

On the third pass over the drop zone, ground fire strikes the aircraft from which the photos were taken. Crew member holds control cable cut by a 30-caliber bullet and points to hole in fuselage where projectile entered.

Another 30-caliber left a small hole in the floor.



Mission completed, members of 33d Consolidated Armament Maintenance Squadron look for other bullet holes.

A 50-caliber hole is discovered in landing gear door. Nine rounds in all struck the aircraft.

In My Opinion

ARE WE LIVING A FICTION?

COLONEL J. TOD MESEROW

THE COMMANDER must have command or operational control over support organizations necessary to accomplish his mission, so states paragraph 3a, Air Force Regulation 20-1, April 1953. In today's environment this is a principle that is no longer practiced in its entirety. Base commanders now have very little to say about a number of activities. For example, base commanders have very little command or control over:

—their inspection. That's done largely by major air command, the Auditor General, OSI, TIG, and frequently by the GAO.

—their manpower authorizations. That's increasingly done by Congress, OSD, the Air Staff, and the major air command.

—their data systems and reports. This is being regimented by machine standardization and dictum of higher headquarters.

—their equipment. Many equipment review panels and central purchasing bodies in effect dictate by their allocation decisions the capability of commanders to accomplish their missions.

The list could go on. The issue to be faced is that systems for control of resources—men, money, and material—are rendering the principle of control by the immediate commander a fiction. In the early 1950's when the principle was first announced it made good sense. In those days communications were nowhere near as sophisticated and responsive as they are today. The concept of rotation was limited in its application, and Air Force tactical units were pretty well anchored to the strip from which they had to operate. Moreover, manpower controls were in no way as severe and restrictive as they are now. In recent years it has been demonstrated that the Air Force can be highly mobile, flexible, and responsive in a crisis, anywhere in the world. Yet our regulatory system persists in giving lip service to the penchant for absolute resource control by every commander.

Much as one hears discontent over centralization, the fact remains that the trend is pointing rapidly in that direction. Its adherents claim more efficient operations, procedural standardization, reduced costs, rapid response, and a host of other

values. Certainly no professional airman would quarrel with the overall objective of providing the nation with the best fighting and supporting force at the least possible cost.° This objective has fathered the systems for administration and logistic activities which have become so complex that much attention of commanders is diverted from primary air power matters to less important but time-consuming support considerations.

This leads to the purpose of this article, the proposed establishment of a worldwide Air Force Base Command. Why not? There is nothing inherently wrong in bigness. In fact in the private sector the giant grocery chains, department store organizations, and restaurant/hotel combines are proving with remarkable success that centralization, procedural standardization, and equity in the distribution and control of resources are more efficient. Why shouldn't the Air Force take a leaf from the book of private enterprise and apply the lessons to its own management? A worldwide base command structure would have many advantages:

- The freeing of tactical commanders from direct concern and involvement in logistic and administrative problems. This advantage alone holds considerable merit for the idea.
- A reduction in the size of tactical headquarters, a continuing anathema in the eyes of the Congress and the Department of Defense.
- A more equitable distribution of base support resources throughout the Air Force.
- The development of an expertise and body of knowledge which would accrue to the benefit of all in terms of uniform procedures, faster reaction time, and flexibility in the concentration of support where and when required.
- Elimination of expensive and time-consuming cross-servicing agreements (AFR 11-4).
- Improved uniformity in contract services management and control.
- More effective response to statutory civilian superiors in justification of the support requirements of the Air Force.
- Improved application of resources in support of primary tactical and strategic missions.

°Honorable Eugene M. Zuckert, "Defense Resource Allocation Is a Central Problem," Supplement to the Air Force Policy Letter for Commanders, No. 11, 1964, p. 2.

Recent Air Force experience in providing TDY personnel to Southeast Asia in support of accelerated activities there demonstrated the problem of sourcing many Air Force commands in an emergency situation. Had the Air Force established a worldwide base command organization, the problem of moving support people quickly to a trouble spot would have been reduced. A single commander responsible for housekeeping throughout the Air Force would have been able to respond more rapidly. More importantly, he would be in a better position to know which bases could best afford to lend the needed assistance with least disruption to the activities at those bases.

It is not proposed that the tactical commander should be denied the resources he needs to fight. He must have command and control of his operations people and his crews, and he should have command and control of his organizational maintenance people and weapons loaders. These are the people he must use on deployment anywhere in the world. Everything and everybody else that he needs to fight from any base available and feasible for his use should be provided by a host base commander. If the people and the resources are not immediately available, they should be provided by the worldwide Air Force Base Command. Such a command could be as responsive as the tactical commands in support of general war or contingency plans. How? By proper mobility planning, organization of variable combat support teams, and exercise of these organizational entities for rapid deployment anywhere, anytime, either to bare-strip bases or as augmentation to a going base that needs more help.

It is high time that serious thought be given to ways and means of accelerating an inevitable development, which is bound to be the child of centralization within the concept of unified command of combat forces. For the benefit of the Air Force, now and especially in the next decade, it is proposed that all real estate, and its management, be assigned to a single Air Force command organized as the Air Force Base Command (AFBC) to do the job. Why wait? Why not do it for ourselves and design the organization we need? *Before* it's done *to* us!

Hq Pacific Air Force

EFFICIENCY OR EFFECTIVENESS– LET'S HAVE BOTH

Lieutenant Colonel James T. Hargrove

MANAGEMENT improvement programs dictated by a variety of circumstances originating at the highest levels of command dictate efficient use of every dollar spent. These programs bring sharply into focus a necessity to assess and reassess requirements thoroughly.

We have been, and will continue to be, called upon to forego some of the "nice-to-have" goods and services which may have been routine in less lean years. The forecast is that future dollar resources will continue to be extremely limited. Business as usual is not the order of the day.

Absolute appreciation of the management problem is vital, and Air Force mission elements must continue to evaluate requirements conscientiously. Conversely, we cannot use "limited fund availability" as an excuse for failure to meet our responsibilities effectively.

In a prevailing climate of efficiency, we must also maintain effectiveness. Much has been said of efficiency, and there is an abundance of guidance on how to achieve it. However, we should be ever aware that it is entirely possible to gain maximum efficiency and simultaneously lose maximum effectiveness.

Consider an example: A Forest Ranger is faced with the problem of evacuating a family of five, trapped in a forest fire, across a raging river. He has time for only one crossing, and though his boat will carry six persons *effectively* it is designed to carry four *efficiently*. Should he be efficient or effective? The answer is obvious.

Likewise, our answer is obvious. Effective utilization of resources, now as never before, is a must. Where national security is at stake, there can be no acceptable alternative to success.

Forthright acceptance of the challenge to be both efficient and effective by performing our duties in a professional manner, be the task large or small, affords military and civilian personnel of the United States Air Force a rare opportunity to contribute to the future of the Air Force and the security of the Nation.

Do not let this opportunity pass you by.

United States Air Force Academy

Books and Ideas

JAPANESE WAR HISTORY

Susumu Nishiura

AT THE TIME of the cessation of hostilities in August 1945, the Japanese Imperial Headquarters of the day instructed the Japanese forces to destroy all their important documents by fire.

The American, British, Soviet, and other forces stationed in Japan and abroad made every effort to seize all the official and private military documents possessed by Japanese officers and men. Among the important historical papers we are now keeping in the War History Office are not a few which we owe to efforts of the men who continued to hide them at the risk of their lives.

The destruction of the historical materials or their seizure by the occupation force and independent suppression of war-history research activities by the Japanese government under the rule of the occupation authorities, coupled with the prohibition of Japan's rearmament, caused a vacuum in the investigation and research of the history of the Second World War on the Japanese side.

With the outbreak of the Korean War in 1950, the Police Reserve Force was organized in accordance with the instructions of General Douglas MacArthur, commander of the occupation force. It has since grown into the Japan Self Defense Force of today. In October 1955 a joint War History Office of the three services, land, sea, and air, was established in the Self Defense Force for the first time after the end of the war as an official research institution of history. The present writer was appointed to the post of its chief.

Thus the investigation, research, and compilation of works on war history began, with the main emphasis on the Japanese side of the history of World War II in the Pacific. Under the conditions mentioned, the acquirement of historical materials was very hard, and the staff was short handed, so that it was at first very difficult to advance the work. But the staff was gradually

filled until now it amounts to about 90 persons in all, including about 40 historians. Moreover a large number of the seized historical papers were returned through the good auspices of the United States Government. Furthermore many other papers hidden hitherto were gathered at home.

Thus we have come to possess about a hundred thousand historical items at the present time, and we have had a chance to hear from about a thousand living experienced warriors on the average every year. Under these conditions we are continuing investigation and research activities. Although our work is not yet complete enough to make it open to the public, we hope, in view of the demand from all quarters, that a partial account may be published little by little after a few years. This matter has not yet been officially determined.

Although we have not yet published an official war history in Japan, a good many works of unofficial war history have been published. I will introduce some of them.

A. Takushiro Hattori. *Daitoa Senso Zenshi* (The Complete History of the Greater East Asia War). 8 vols. Tokyo: Masu Shobo, 1956.

The author, Colonel Hattori, served twice during the war as chief of the operation section, General Staff Office of the Army. In cooperation with about ten of his comrades during the war, he discusses the whole range of political and military strategy before and after the opening of hostilities and the principal battles in the light of previously unreleased original materials. This book is recognized as one having high accuracy and covering a broader field than any similar work published hitherto.

An English version of the book has not been published, but it seems that a translation of the book is being used by the Historical Section of the U.S. Army.

B. The International Politics Society of Japan. *Taiheiyo Senso Eno Michi* (The Way to the Pacific War). 7 vols., with a separate data book. Tokyo: The Asahi Newspaper Office, 1962.

Some dozen scholars, specialists in the modern history of Japan, give an account of all that happened from the Manchurian Incident to the outbreak of the Pacific war, based on many unreleased historical materials of the Ministry of Foreign Affairs, the former Japanese Army and Navy, etc., including a good many materials possessed by the War History Office. In comparison with the books published hitherto, it is recognized as excellent in the richness of the materials used. It is expected that an English version of this book will be published soon in the United States.

C. Kazuo Horiba. *Shinajihen Senso Shidoshi* (The History of the Conduct of War in the China Incident). Tokyo: Jijitsushin Sha, 1962. 365 pp., with data book, 780 pp.

D. Maj. Gen. Takeo Imai. *Shinajihen no Kaiso* (Reminiscences of the China Affair). Tokyo: Mimizu Shobo, 1964. 385 pp.

E. Katsumi Usui and Masao Inaba. *Gendaishi Shiryo* (Japanese Documents for Modern History). 8 vols. Tokyo: Mimizu Shobo, 1964.

As the authors present many original materials, this book is valuable for fundamental study of the Second World War. It should be used together with the separate data books listed under B and C above.

F. A number of the works belonging in the category of private memoirs of experienced military persons or those who held important posts during the war are as follows:

(1) Mamoru Shigemitsu (Foreign Minister during the war). *Showa no Doran* (The Turbulent Era of Showa). 2 vols. Tokyo: Chuokoronsha, 1952.

(2) Shigenori Togo (Foreign Minister at the time of the outbreak and end of the war). *Jidai no Ichimen* (A Sign of the Time). Tokyo: Kaizosha, 1952. 360 pp. English version: *The Cause of Japan*. New York: Simon and Schuster, 1956.

(3) Masanobu Tsuji (Colonel, Staff Officer, Imperial Headquarters). *Gadarukanaru* (Guadalcanal). Tokyo: Ato Shobo, 1951. 294 pp.

(4) Masanobu Tsuji (Colonel, Staff Officer, Field Army). *Jugo Tai Ichi, Biruma no Shito* (15 Versus 1: The Struggle for Burma). Tokyo: Kantosha, 1950. 350 pp.

(5) Saburo Sakai (Lieutenant, Navy, Commander of Fighter Squadron). *Sakai Saburo Kusen Kiroku* (Records of Air-Battle by Saburo Sakai). Tokyo: Shuppan Kyodosha, 1956. 329 pp. English version: *Samurai* by Saburo

Sakai with Martin Caidin and Fred Saito. New York: E. P. Dutton & Sons, 1957. 382 pp.

(6) Matoi Ugaki (Vice-Admiral, Chief of Staff, Combined Fleet). *Sensoroku* (Memoirs of the War). 2 vols. Tokyo: Nippon Shuppan Kyodosha, 1953.

(7) Ryunosuke Kusaka (Vice-Admiral, Chief of Staff, The 1st Air-Fleet and Combined Fleet). *Rengo Kantai* (The Combined Fleet). Tokyo: The Mainichi Newspaper Office, 1956. 228 pp.

(8) Atsushi Oi (Captain, Navy, Staff Officer, Sea Escort). *Kaijo Goeisen* (The Japanese Anti-Submarine). Tokyo: Nippon Shuppan Kyodosha, 1953. 301 pp.

(9) Minoru Genda (Captain, Navy). *Kaigunkokutai Shimatsuki* (Story of the Naval Air Force). 2 vols. Tokyo: Bungeishunju Shinsha, 1961.

(10) Shigeru Fukutome (Vice-Admiral, Chief of Staff, Combined Fleet). *Kaigun no Hansei* (Reflections on the Navy). Tokyo: Shuppan Kyodosha, 1951. 246 pp.

(11) Mitsuo Fuchida and Masatake Okumiya. *Middowei*. Tokyo: Nippon Shuppan Kyodosha, 1951. 294 pp. English version: *Midway, The Battle that Doomed Japan: The Japanese Navy's Story*. Annapolis: U.S. Naval Institute, 1955. 266 pp.

(12) Tameichi Hara (Vice-Admiral). *Teikoku Kaigun no Saigo*. Tokyo: Kawade Shobo, 1955. 219 pp. English version: *Japanese Destroyer Captain* by Tameichi Hara, Fred Saito, and Roger Pineau. New York: Ballantine Books, 1961.

(13) Mitsuo Fuchida and Masatake Okumiya. *Kidobutai* (Task Force). Tokyo: Nippon Shuppan Kyodosha, 1951. 345 pp.

(14) Rikihei Inoguchi and Tadashi Nakajima. *Kamikaze Tokubetsu Kogekitai*. Tokyo: Nippon Shuppan Kyodosha, 1951. 428 pp. English version: *The Divine Wind*. Japan's Kamikaze Force in World War II. Annapolis: U.S. Naval Institute, 1958. 240 pp.

(15) Nariyoshi Furukawa. *Shisei no Mon* (Gate to the Other World). Tokyo: Chuosha, 1949. 286 pp.

The author gives a story of the Japanese side in the battle of Okinawa.

I withhold comment on each of the above-mentioned books; however, as a matter of course allowance must be made for their special character as private memoirs.

G. Others:

(1) The works of Masanori Ito

Mr. Ito was one of the excellent journalists in Japan. His works have persuasive power and are popular books having many readers.

(a) Masanori Ito. *Teikoku Rikugun no Saigo* (The End of the Imperial Japanese Army). 4 vols. Tokyo: Bungeishunju Shinsha, 1956.

(b) Masanori Ito. *Rengo Kantainna Saigo*. Tokyo: Bungeishunju Shinsha, 1950. 330 pp. English version: *The End of the Imperial Japanese Navy*. New York: W. W. Norton & Company, 1956. A Japanese account of the rise and fall of sea power, with emphasis on World War II.

(c) Masanori Ito. *Rengo Kantai no Eiko* (The Glory of the Combined Fleet). Tokyo: Bungeishunju Shinsha, 1962. 274 pp.

(2) Ikuhiko Hata. *Nichusensoshi* (The History of the China Incident). Tokyo: Kawade Shobo, 1961. 369 pp.

Mr. Hata is one of the writers of *Taiheiyo Senso eno Michi*. He describes the course and complicated circumstances of the China Affair, especially the state of affairs on the spot and in Tokyo.

(3) The Institute of Diplomatic Affairs in Japan. *Taiheiyosenso Geninron* (The Origins of the Pacific War). Tokyo: Tokyo Daigaku Shuppan Kai, 1957. 800 pp.

(4) The Institute of Diplomatic Affairs in Japan. *Taiheiyosenso Shuketsuhen* (The Termination of Hostilities in the Pacific). Tokyo: Tokyo Daigaku Shuppan Kai, 1958. 861 pp.

(5) Saburo Hayashi. *Taiheiyosenso Rikusengaishi*. Tokyo: Iwanami Shoten, 1951. 307 pp. English version: *Kogun, The Japanese Army in the Pacific War* by Saburo Hayashi and Alvin D. Coox. Quantico, Va.: Marine Corps Association, 1955.

(6) Sokichi Takagi. *Taiheiyo Kaisenshi* (Story of the Japanese Naval Operations in the Pacific War). Tokyo: Iwanami Shoten, 1949. 238 pp.

The two books (5) and (6) present respectively a summary of land and naval warfare in the Pacific war.

(7) Fumio Iwaya. *Chuko* (Battles of Naval

Attack Plane). 2 vols. Tokyo: Shuppan Kyodosha, 1958.

H. Some books pertaining to weapons, ships, airplanes, etc., used by the Japanese forces:

(1) Kitaro Matsuki. *Senkan Yamato, Musashi no Sekkei to Kenzo* (The Design and Construction of the Battleships Yamato and Musashi). Tokyo: Haga Shoten, 1961. 422 pp.

(2) Shizuo Fukui. *Zosen Gijitsu no Zenbo* (The Whole Aspect of the Japanese Naval Shipbuilding). Tokyo: Koyosha, 1953. 293 pp.

(3) Shizuo Fukui. *Nippon no Gunkan* (Japanese Warships). Tokyo: Shuppan Kyodosha, 1956. 292 pp.

(4) Kumao Mizuno. *Nippon Gunyoki no Zenbo* (The Whole Aspect of Japanese Army and Navy Aircraft). Tokyo: Kantosha, 1960. 324 pp.

(5) Jiro Horikoshi and Masatake Okumiya. *Zerosen*. 2 vols. Tokyo: Shuppan Kyodosha, 1954. English version: *Zero*. The Inside Story of Japan's Air War in the Pacific by Jiro Horikoshi, Masatake Okumiya, and Martin Caidin. New York: E. P. Dutton & Sons, 1956. 424 pp.

(6) Haruji Kan. *Rikusen Heiki no Zenbo* (The Whole Aspect of the Japanese Army Weapons). Tokyo: Koyosha, 1953. 483 pp.

I. Pictorial Records:

(1) Minoru Akimoto. *Nippon Rikugun Kokutai Shashinshu* (Pictorial Record of the Japanese Army Aviation Corps). Tokyo: Shuppan Kyodosha, 1961. 126 pp.

(2) Minoru Akimoto. *Nippon Kaigun Kokutai Shashinshu* (Pictorial Record of the Japanese Navy Aviation Corps). Tokyo: Shuppan Kyodosha, 1960. 114 pp.

(3) Shigeo Moritaka. *Daitoa Senso Shashinshu* (Pictorial History of the Greater East Asia War). 8 vols. Tokyo: Fuji Shoen, 1954.

(4) Akira Takeuchi and Tomio Hara. *Nippon no Sensha* (Japanese Tanks). 2 vols. Tokyo: Shuppan Kyodosha, 1961.

(5) Yutaka Asanaga and Tadatoshi Yokoi. *Shashinshu Teikoku Kaigun* (Pictorial Record of the Imperial Japanese Navy). 2 vols. Tokyo: Shuppan Kyodosha, 1960.

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The Contributors

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Colonel Allen K. McDonald is Deputy Director of Aerospace Weapons, DCS/Plans, Headquarters Air Defense Command. Commissioned on completion of flying training in 1943, he served in the European Theater of Operations as a B-26 pilot. Following various postwar assignments in the United States, he was sent to Korea in 1954, where he served as Commander, 40th Fighter Interceptor Squadron, and Commander, 35th Fighter Interceptor Group. After a tour of duty in Japan, he attended Air Command and Staff College, Maxwell AFB, then was assigned to Headquarters USAF as Interceptor Systems Operations Officer, Air Defense Division, DCS/Operations. Upon graduation from the Air War College in 1960 he assumed his present position.

Lieutenant General William H. Tunner, USAF Retired (USMA) was Commander, Military Air Transport Service, at the time of his retirement. After flying training in 1929, he served with various tactical and training units until 1939, when he was assigned to the Military Personnel Division, Office of the Chief of the Air Corps. When the Air Transport Command was organized in 1942, he was named commander of the Ferrying Division. During World War II he commanded the India-China Division, ATC, with responsibility for the "Hump" airlift. In 1948 he assumed command of the Atlantic Division of the new Military Air Transport Service. Shortly afterward he was ordered to Germany to command the USAF-RAF airlift into blockaded Berlin. After a tour at Hq MATS as Deputy Commander for Operations, 1949-50, he commanded the Combat Cargo Command of the Far East Air Forces during the Korean War. He then served as Deputy Commander, Air Materiel Command, until 1953, when he returned to Germany as Commander in Chief, United States Air Forces in Europe (USAFE). He was Deputy Chief of Staff, Operations, Headquarters USAF, from 1957 until his assignment as Commander, MATS, in 1958. During his years of active duty General Tunner was awarded the DSC and four times was awarded the DSM, as well as many foreign decorations. Since retirement on 31 May 1960 he is writing as well as farming at Ware Neck, Virginia. He is author of *Over the Hump*, published by Duell, Sloan and Pearce in 1964.

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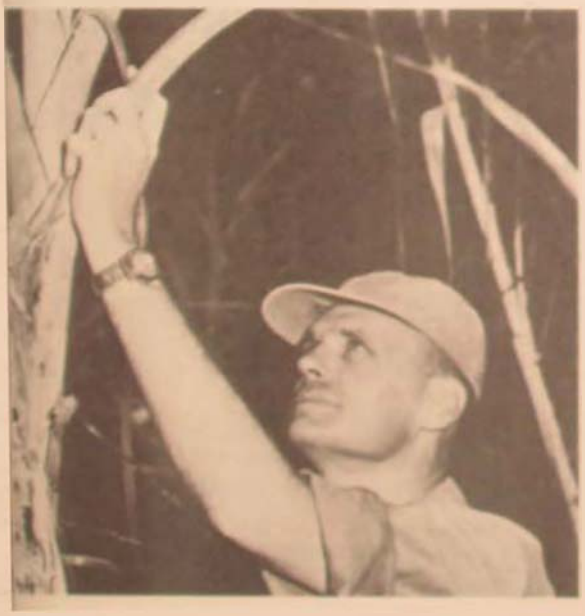

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ATTENTION

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