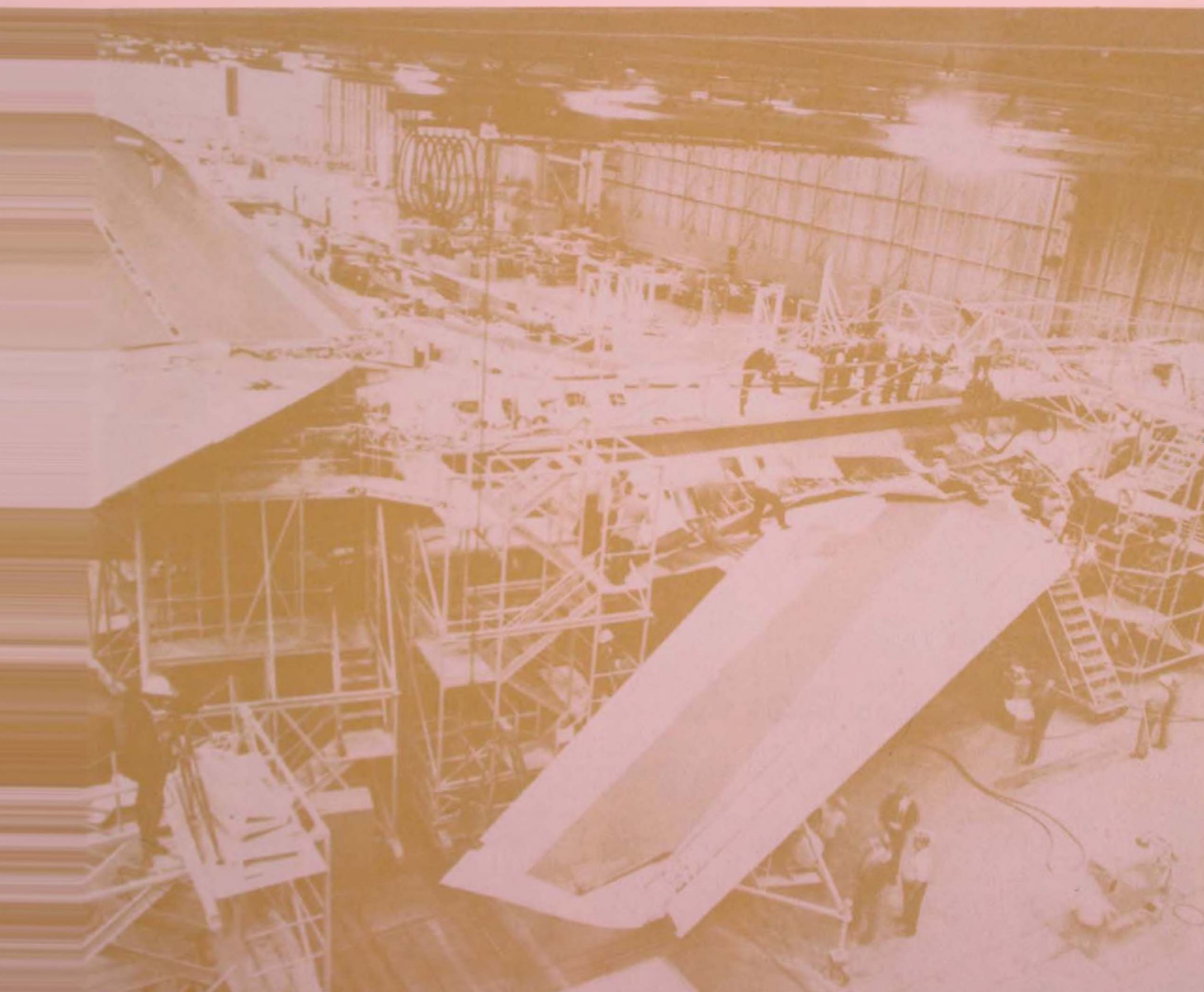
AIR UNIVERSITY review

MARCH–APRIL 1976



The Professional Journal of the United States Air Force

from the editor's aerie

As of this writing, the future of the B-1 is still uncertain. Opponents of the aircraft have mounted a multifaceted, multimedia campaign to kill it. In the lead article of this issue, Major General Abner Martin describes some of the improved capabilities of the B-1 and its developmental progress. Unfortunately, the complete potential of this weapon system cannot be explored in any public dialogue because of security considerations, but notwithstanding that limitation, we recommend General Martin's article to both advocates and opponents of the B-1.

Our cover shows the B-1 in brake and steering tests and static design verification tests.

In the article "Who Needs Nuclear TACAIR?" Colonel David L. Nichols asks us to examine our tactical nuclear posture in Europe. Closely related to his thesis, a number of recent articles in the national press indicate that the close air support mission is being emphasized by both senior Army and Air Force commanders in Europe and that the demonstrated capability of terminally guided conventional munitions replaces, to some degree, our need to rely on nuclear weapons. Whether or not you agree with Colonel Nichols's conclusions, we recommend the article as a thoughtful examination of existing tactical nuclear doctrine.

With this issue of the *Review*, we depart from a practice of many years' standing, that of using only the in-depth essay type of book review in our Books and Ideas department. We shall continue that practice for those books that seem to merit such intensive consideration. However, for other books of more than passing interest or merit that we feel our readers would like to know something about, we shall include shorter book reviews. Here we present four of these capsule reviews, all written by staff members of the Department of History at the U.S. Air Force Academy. We are grateful to Major Donald R. Baucom of the History Department for coordinating this potpourri of reviews for us.

We are pleased to announce the addition of Lieutenant Colonel David R. Mets to our editorial staff. Colonel Mets has been a frequent contributor to various service journals and has taught Military History at both the Air Force Academy and the Military Academy. He comes to us from Korat, Thailand, where he was the commander of the 16th Special Operations Squadron, an AC-130 Gunship Squadron. A graduate of the U.S. Naval Academy, Colonel Mets has a Ph.D. in history from the University of Denver. His colleagues in the Organization of American Historians and Air Force Historical Foundation who have papers for potential publication may be interested to know that he occupies the position of Acquisitions Editor.

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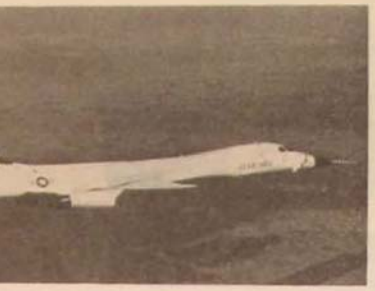
AIR UNIVERSITY review

ATTENTION

The *Air University Review* is the professional journal of the United States Air Force and serves as an open forum for exploratory discussion. Its purpose is to present innovative thinking and stimulate dialogue concerning Air Force doctrine, strategy, tactics, and related national defense matters. The *Review* should not be construed as representing policies of the Department of Defense, the Air Force, or Air University. Rather, the contents reflect the authors' ideas and do not necessarily bear official sanction. Thoughtful and informed contributions are always welcomed.



THE B-1

Strategic Deterrence into the Twenty-First Century

MAJOR GENERAL ABNER B. MARTIN

ON 19 September 1975 the Air Force's new B-1 strategic bomber demonstrated for the first time its capability as a low-altitude, high-speed penetrator. That was the seventeenth in an orderly series of flight tests which started on 23 December 1974 and will provide data on which to base a production decision in November 1976. Behind these flight tests lie four years of the most comprehensive design and ground tests ever conducted in the development of a military aircraft. The studies on which these designs are based go even further back, to 1965 and the Advanced Manned Strategic Aircraft (AMSA)—dubbed by some "America's *M*ost Studied *A*ircraft."

And yet, as the B-1 is being readied for production, some people still ask why this country needs a new bomber, or why it needs a bomber force at all. Others ask how an aircraft will penetrate advanced enemy defenses. And finally, why it costs so much to build.

These are thoughtful questions, and they deserve thoughtful answers. In this article I will briefly review the role of the manned strategic bomber and our dependence on a modern

B-1 Dimensions/Performance

Maximum speed	Supersonic speed at high altitudes; high subsonic at treetop altitudes
Range	Intercontinental (unrefueled)
Tanker support	Existing KC-135 tankers
Crew	Four: pilot, copilot, and two systems operators (provision for two instructors)
Maximum gross takeoff weight	350,000 to 400,000 pounds
Weapons payload	Approximately twice that of the B-52 24 SRAM internally or 75,000 pounds of bombs internally
Length	151 feet
Height	34 feet
Wing span	
Forward	137 feet
Swept	78 feet

strategic aircraft to maintain the degree of parity established in the Strategic Arms Limitation Talks (SALT). I will review in some detail the B-1's role in fulfilling this requirement for the latter part of this century and beyond; provide some insight into specific design features and test methods unique to this particular aircraft design; and discuss the cost of this system in an unstable economy.

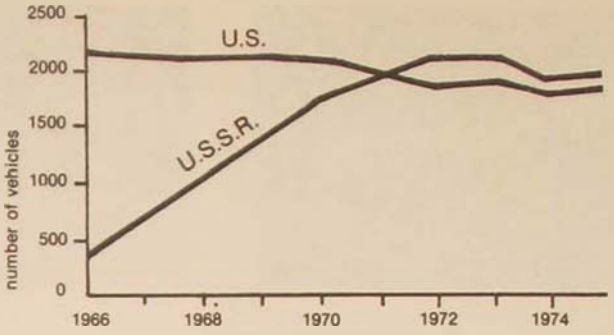


Figure 1. U.S. and U.S.S.R. intercontinental bombers (inventory)

the role of the strategic bomber

Much has been written about the Triad of strategic weapons that provide the backbone for this country's deterrent posture. The synergistic effects of our land-based ballistic missiles, sea-launched missiles, and manned strategic bombers greatly compound the problems faced by any would-be attacker who contemplates a nuclear Pearl Harbor to rob this country of its striking force. These weapons are mutually supporting.

The role of the manned bomber is unique. It alone can be launched on warning and maintained in a nearly invulnerable airborne alert, under positive control, while negotiation proceeds to resolve a crisis situation. It alone takes advantage of national decision-making capability in a changing conflict situation, and it alone can be recalled when the crisis is over.

It is generally well known that for almost two decades following World War II the manned strategic bomber was our most important deterrent weapon. Indeed, for over a decade, until the advent of the ballistic missile, it was our only strategic deterrent. What is not so widely recognized is the degree to which our deterrent posture still depends on the bomber.

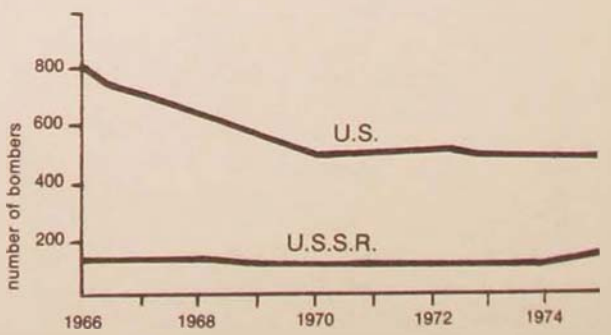
SALT negotiations have resulted in a form of parity in total strategic offensive delivery vehicles, as shown in Figure 1. Most of the Soviet payload is carried in missiles, however, while approximately half of the U.S. capability depends on the strategic bomber force. This past and present dependence is indicated in Figure 2, which breaks out the intercontinental bombers separately.

If we allow our bomber force to become obsolete, so that it can no longer survive or penetrate the enemy's improved defenses, it could in time cease to be an effective deterrent. Failure to modernize the bomber force, then, would unilaterally decrease our strategic capability by some fifty percent.

Why a new bomber?

The B-52 has been the mainstay of our strategic deterrent since it was first pro-

Figure 2. U.S. and U.S.S.R. operational strategic offensive delivery vehicles



Captions are Reversed on Figures 1 & 2

duced in the early 1950s. Since that time it has gone through a number of model changes, the last being the G and H models. Additionally, the B-52s in the operational inventory have had a number of modifications to add power and increase structural life.

These continuing modifications have increased the useful operational life of this outstanding aircraft to a full thirty years. When finally retired, it will have flown through half the history of aviation. With further modifications we might keep it flying longer, but the B-52 will still be the same size, the same aerodynamic shape, and thus will still have similar aerodynamic drag and radar cross section. Relatively little can be done to improve its reaction time. And it will lose its capability to penetrate Soviet territory as their defenses become increasingly more sophisticated. In time, the B-52 will cease to be a credible deterrent.

Compared to the B-52, the FB-111 is, of course, a more modern aircraft with higher speed and better low-level performance. However, it is simply too small to perform the operational mission of the B-1. Air Force studies of "stretched" versions of the FB-111 with new engines have shown that its capacity for carrying weapons and fuel is much too small to make it a viable alternative to the B-1. Aside from the fact that it would not cover all targets of interest, cost-effectiveness studies have indicated that as many as ten times the number of aircraft (plus additional tankers) would be required, rendering it a much more costly and less effective option.

necessary attributes of a follow-on bomber

To deter war, a follow-on bomber must possess two specific attributes: it must be able to survive a surprise attack and it must be able to penetrate an enemy's defenses. There are other requirements—many others—but these two are primary. And the B-1 has been designed with these foremost in mind.

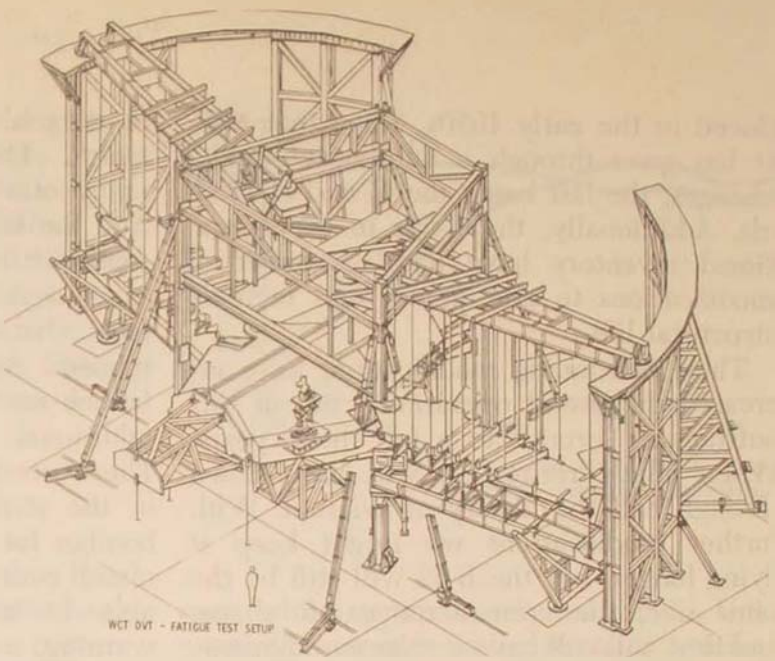
• *Ability to Survive a Surprise Attack.* One of the unique features of the manned bomber force is the ability to launch on warning, thereby achieving an additional measure of invulnerability. There need be no question of confidence in the strategic warning system, for the bomber force remains under positive command control. But the bomber must be able to take off following a minimum warning, such as might be expected from an attack by sea-launched ballistic missiles (SLBM). The bomber should have a short takeoff run to enable it to get into the air quickly and be able to accelerate rapidly to high speeds and escape a base that may be under attack. It should be hardened to the effects of nuclear blast and radiation, and its design should permit dispersal to a significant number of airfields. These requirements have greatly influenced the design of the B-1.

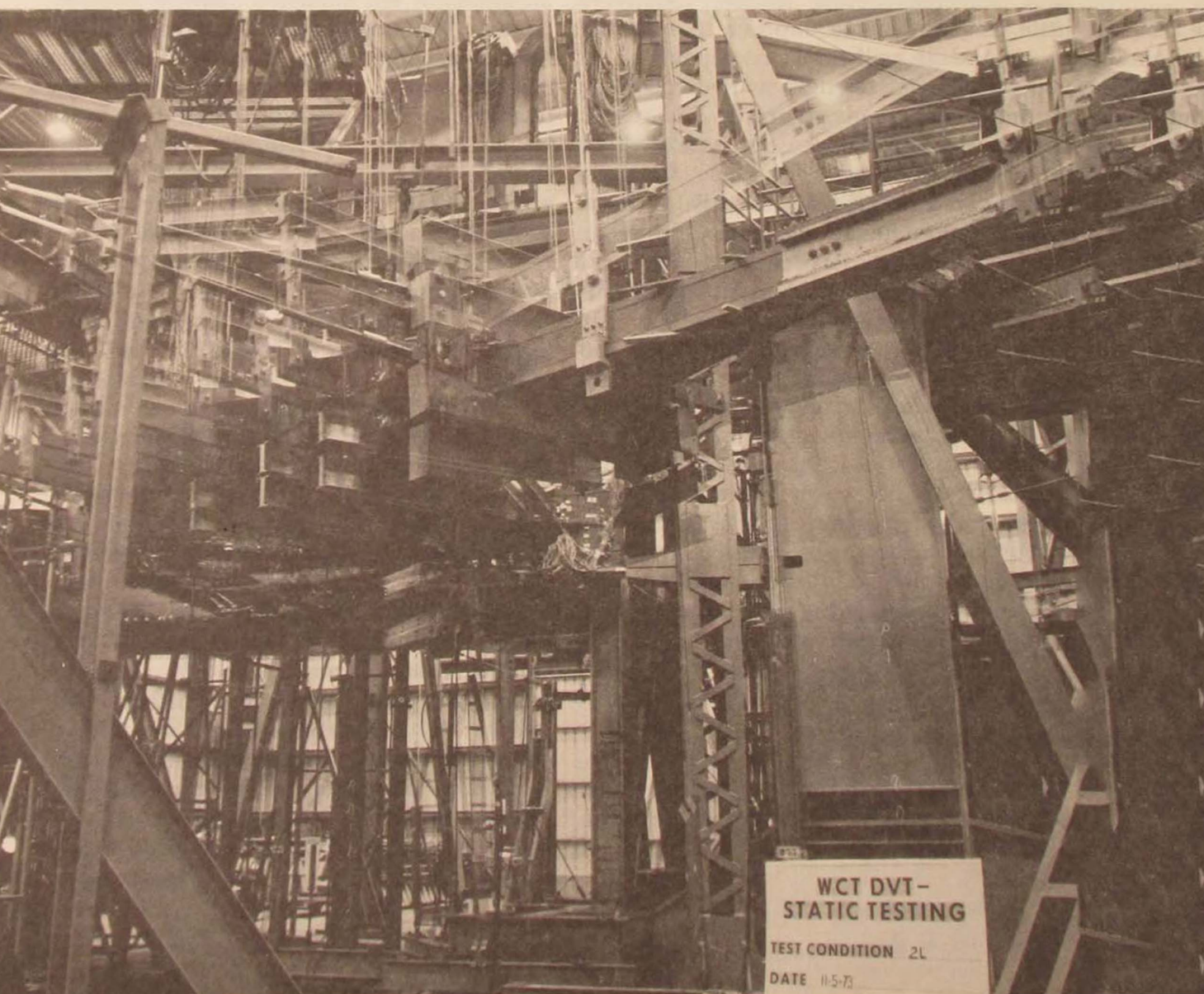
The B-1 is designed to launch in less than half the time of the B-52. With its swing-wing in the forward position, it has a relatively short takeoff roll; it can accelerate rapidly after takeoff to a higher speed than that attainable by the B-52. It is the first aircraft specifically designed to a high blast and radiation hardness requirement, and even its white paint plays a significant part in reflecting the radiant heat from a nuclear blast. The combination of these factors will enable up to sixteen B-1s to survive an attack severe enough to permit escape by only one B-52. Further, the smaller B-1 has been designed to utilize about 150 more airfields than the wider B-52, thus permitting wider dispersion in times of crisis. This feature further increases the B-1's survivability potential and enor-

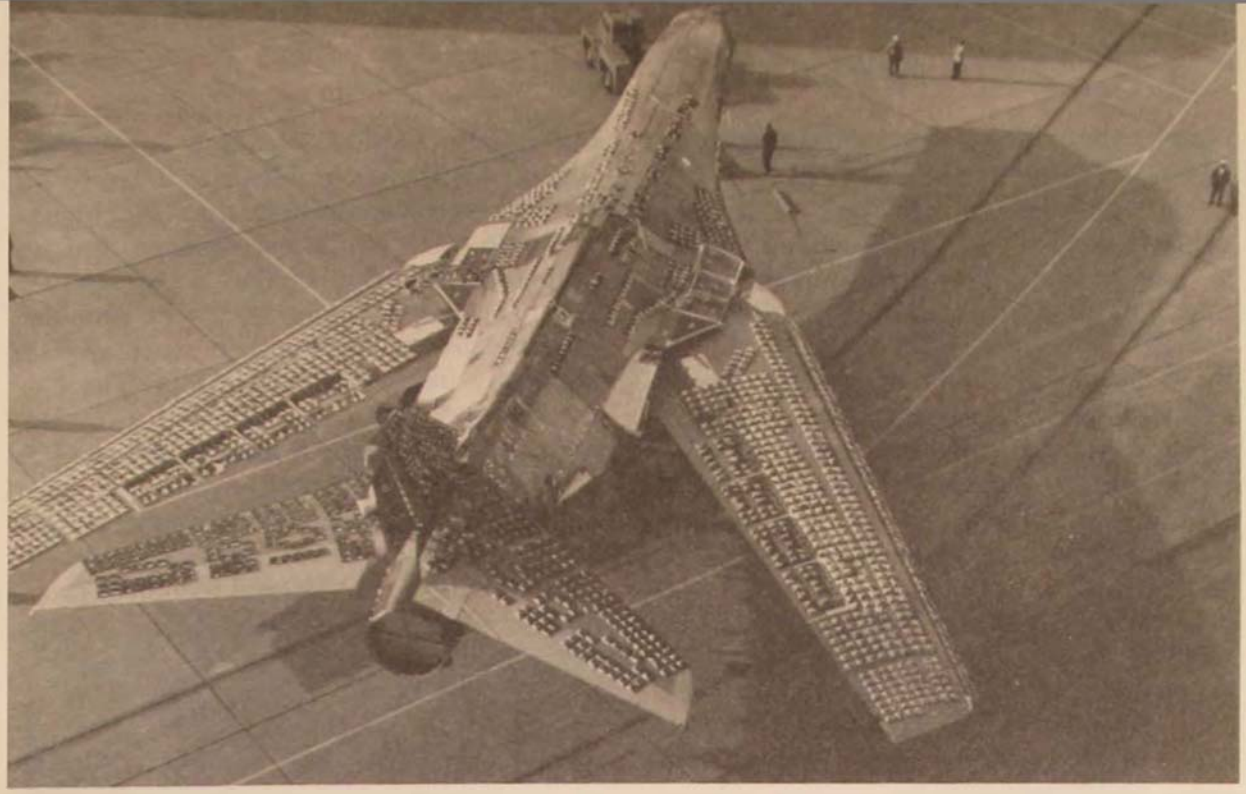
Continued on page 8

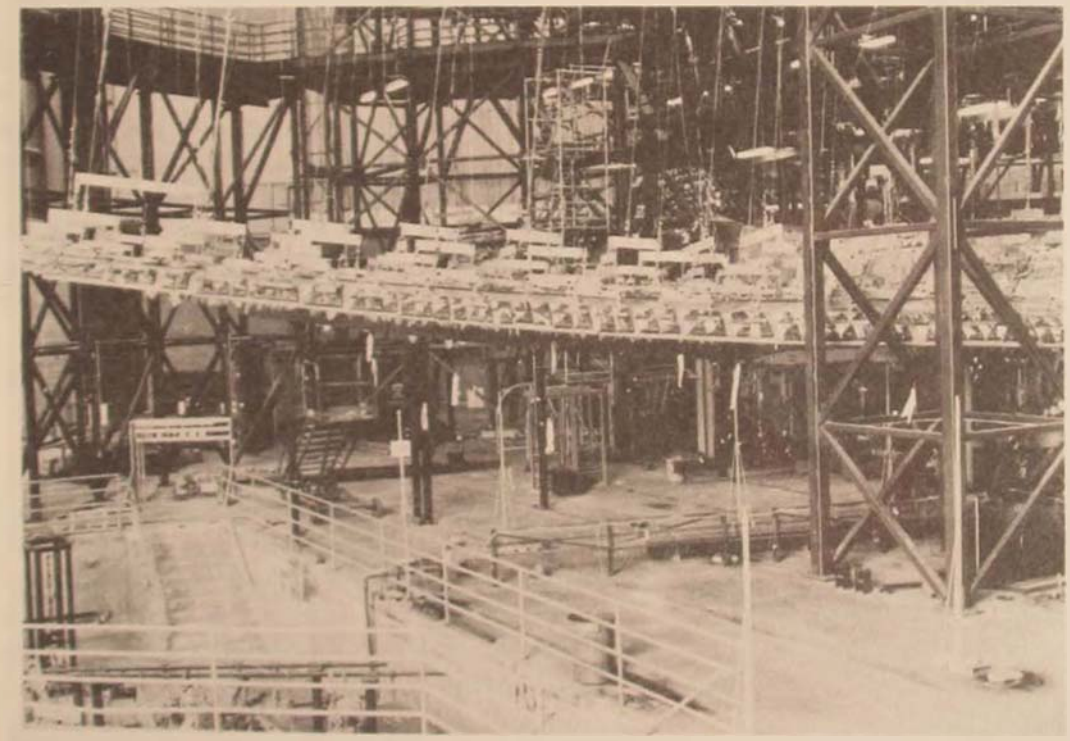
B-1 Static Testing

The outer panel of the B-1's wing carry-through structure undergoes static design verification testing (below). Double exposure suggests magnitude of vertical deflection of the component as it is subjected to critical flight maneuver test conditions. . . . The drawing shows the structural specimen installed in the test fixture at Rockwell International, Los Angeles.









The second B-1 prototype moves into the Lockheed proof load fixture at Palmdale, California (top). Approximately 300 pads were attaching points for hydraulic-powered equipment that put the airframe through static tests completed in June 1975. . . . The aircraft wing (above) goes through proof load test conditions.

mously complicates a potential aggressor's offensive problem.

• *Ability to Penetrate.* The other primary requirement of the bomber force is penetration. This requirement, more than all others, has driven the design of the B-1. Both the B-52 and the B-1 can fly to the enemy defenses. The B-1 carries a significantly greater payload, and its swing-wing and specially tailored fan-jet engines use less fuel; but both will get *to* enemy territory. Today and for an indeterminate time dependent largely on our adversaries' actions, the B-52 can *penetrate* those defenses. In the period from 1985 and beyond, however, the B-52's penetration task would be extremely difficult, and the B-1 will be available. The B-1 could penetrate under the enemy's radar near treetop level at high subsonic speeds. This high-speed, low-altitude requirement largely dictates the swing-wing design, even if a supersonic flight capability were not desired. The low radar cross section is also significant, denying acquisition until the B-1 is within one-half to one-third the acquisition range of the B-52. To complicate the enemy's defensive problems further, a sophisticated defensive countermeasures system will automatically (or manually, if desired) acquire and jam a wide range of enemy acquisition radars.

The inherent capability of the B-1 to fly at high supersonic speeds further complicates the enemy defenses by requiring a defensive capability to defend against high-altitude supersonic attack. The flexibility to fly any combination of these missions is the best guarantee of a reliable penetration capability.

to learn from the past . . .

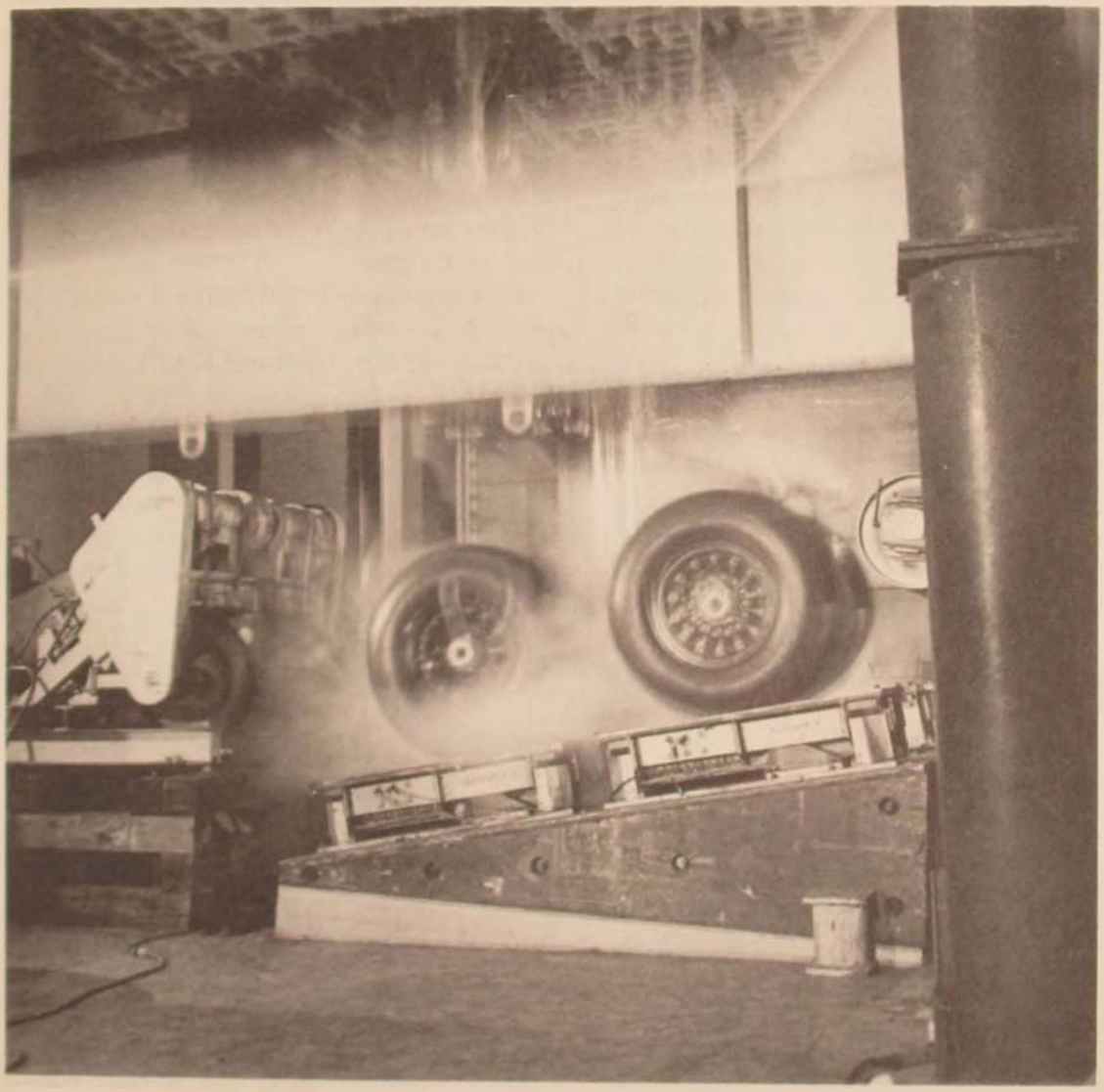
Each successive aircraft design should result in a better product than its predecessor. But each successive design is a harder and usually costlier job. One has knowledge of additional problems that are to be avoided and capabilities that are highly desirable. The B-52 experienced fatigue problems requiring major wing rework. The F-111 had a major wing root problem with the use of high carbon steel, requiring costly inspection and retrofit. The C-5 experienced static load problems in the design of its wings. All aircraft designed to date face problems with windshield bird impact. Obviously we do not wish to encounter these problems with the B-1.

In addition to the normal technical problems in designing and developing a large swing-wing aircraft with significantly higher performance than that previously attained, we undertook to avoid the problems of the past. To accomplish this, we were the first to institute fracture mechanics as a requirement from the time of contract award. Special fracture-tough alloys were specified, and hundreds of aircraft specimens and sections of various size were tested to failure. If fatigue cracks did not develop by the end of the specified test cycles, they were artificially induced, and the specimens were then subjected to design limit loads. To assure a fatigue life at least equal to that of the B-52, a B-1 lifetime of 13,500 hours was specified, and aircraft components were designed to withstand four times this service.

Major sections of the aircraft were subjected to static tests. The aft fuselage, with its massive titanium spindle that holds the movable horizontal tail, was static-tested to limit load and on to ultimate load in a number of flight conditions. The aircraft's critical wing carry-through section, which connects to fuselage components and to the movable wings by pivot pins, was similarly tested. An additional series of large structural specimens will shortly commence four lifetimes of fatigue testing.

The logical progression of structural

Main landing gear of the B-1 simulates a landing at the Cleveland Pneumatic Company. Spinning more than 1200 rpm, the wheels slam onto the inclined platform "runway."



tests is from parts, to major structural specimens, to a complete airplane. The number 2 aircraft has been designed and instrumented for structural tests and has undergone static testing to design limit loads in a specially designed fixture at Lockheed-California at Palmdale. During these ground tests the 2000-odd strain gages were calibrated for use in subsequent flight loads testing in actual flight.

new dynamics

The actual aerodynamic design of the aircraft is believed to be the most comprehensive yet undertaken. Over 22,000 hours of wind-tunnel testing have been conducted to confirm and improve the design, utilizing 44 models in 18 different wind tunnels.

Subsystems. Concurrent with basic aero and structures design and tests, the designs of the various subsystems received their own qualification. A flight control mockup, dubbed the "Iron Bird," accumulated over 1800 hours in operating mass-simulated control surfaces with the actual hydraulic plumbing and components. Of particular interest was the operation of specially designed actuators and motors utilized in a 4000-psi hydraulic system.

The landing gear was tested through hundreds of cycles, and tires, brakes, and shimmy dampers were similarly tested in specially designed simulators.

Unique Features. By and large, the B-1 design does not "push" the state of the art. It does, however, use the latest techniques and developments to attain a substantial improvement in overall performance. Among the unique features are an Electronic Multiplex System (EMUX), which avoids the use of some 30,000 wire segments; a Central Integrated Test System (CITS), which records 3148 system measurement items during flight to provide trending data for extended usage of engines and other components—as well as maintenance data for rapid turnaround. The 240-volt power system is virtually unique to aircraft design, as is the 4000-psi hydraulic system.

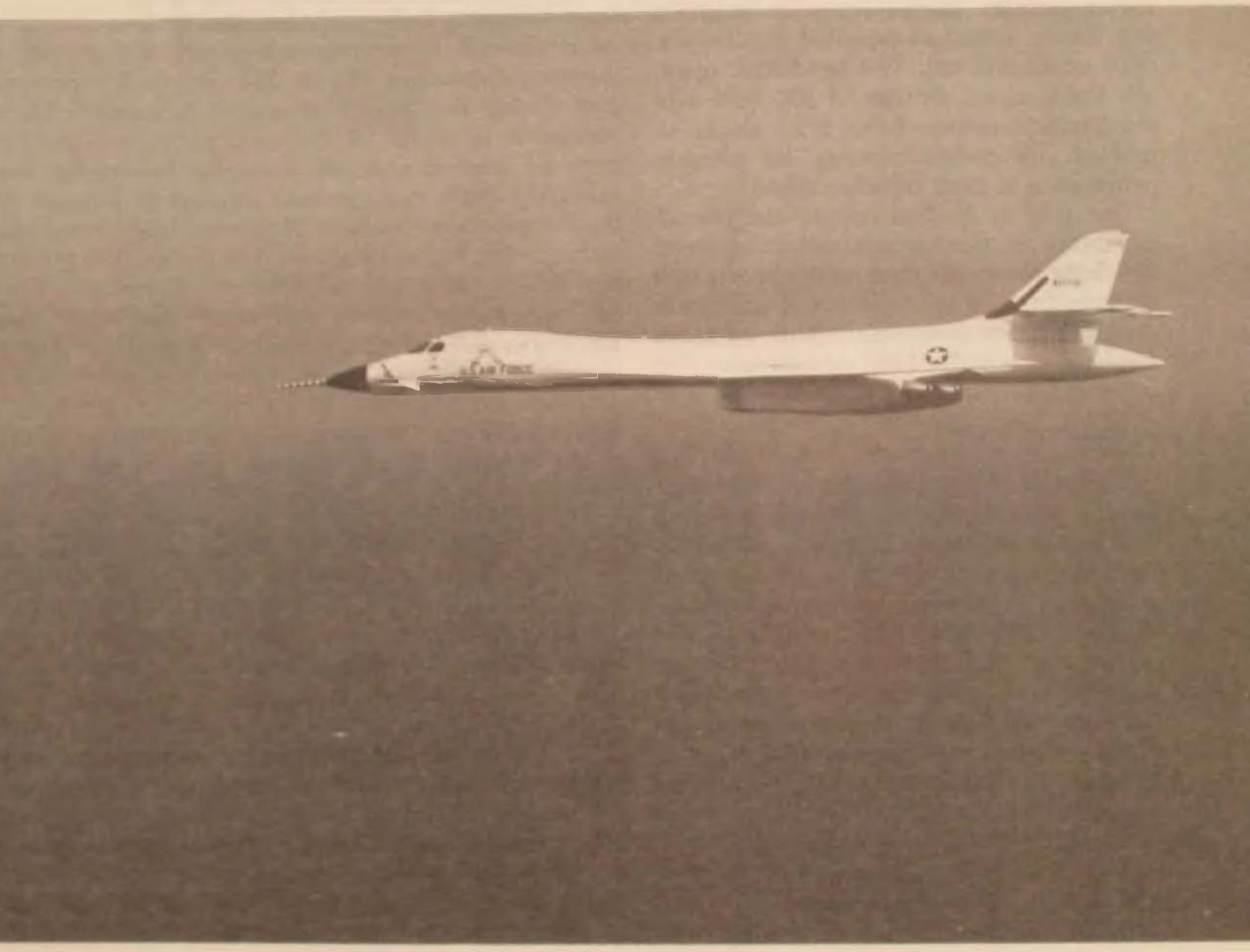
But perhaps the most distinctive feature of all is the overall redundancy requirement—the aircraft is designed to "fail operational, fail safe." In brief, this means that the aircraft must still be able to accomplish its operational mission after failure of any one major subsystem. It must be able to sustain any *additional* failure of that subsystem and still be able to land safely. With few exceptions, the present design meets these requirements. For example, two completely separate flight control systems are utilized—one mechanical and one an electrical "fly-by-wire" system —each with some redundancy integral to itself. Normally the systems are integrated, but they can be operated separately in the event of failure.

Also unique are the structural mode control system, which senses aircraft motion and dampens out structural bending through the use of small canards on either side of the cockpit, and a Fuel Center-of-Gravity Management System, which automatically repositions the fuel load to maintain the aircraft center of gravity within safe limits during wing sweep operation and weapon delivery.

status of B-1 program

With all this pretest, how is the flight-test program progressing? As befits a program with a single aircraft and a high investment, we are proceeding at a conservative pace. But our progress is going quite nicely. We are well into the B-1 flight-test program and have encountered fewer problems than one would expect in a program of this magnitude and complexity. Those that we have encountered have been relatively minor in nature and have not significantly

The first B-1 connects with a KC-135 tanker over the Pacific. A routine part of the flight-test program, aerial refueling enables the aircraft to maintain the weights specified for individual test points and extends the length of the test mission. . . . A speed of .85 Mach (approximately 650 mph) at 500 feet altitude demonstrates the B-1's initial capability as a low-altitude, high-speed penetrator.



delayed development or testing.

To date, we have operated all aircraft systems, including numerous full sweeps of the wings. We have performed airborne refuelings and supersonic flight several times and have demonstrated the airborne restart capability of the engines. Five test pilots, including one from the Strategic Air Command/Air Force Test and Evaluation Center, have flown the aircraft.

We have extended the flight envelope to the high "q" (dynamic pressure), low-altitude regime. This was accomplished by progressively measuring aircraft response to flutter outputs mechanically induced by five flutter actuators installed on the aircraft wings and tail. The key flutter point, .85 Mach at an altitude of 500 feet over the Pacific, confirmed the B-1's ability to perform its design mission: low-altitude penetration at high subsonic speed.

Our goal is to demonstrate the overall capability of the aircraft, attaining some 250 flight-test hours prior to the production decision in 1976. Aircraft 3 will contribute about 50 hours to this total, with offensive system tests commencing this spring.

technical challenge

From a technical standpoint, the health of the B-1 program is good. Careful planning and methodical testing have paid off in that we have avoided the major technical problems that plagued so many programs in the past. We have minor problems, of course, the type one encounters and resolves in the normal course of research and development, but nothing of a nature to hinder our test and development program. If I were to look for the greatest challenge we have faced to date, it would probably be weight growth.

This problem is not unique to the B-1, and I know of no aeronautical or space program that has not had to face up to it. As a matter of fact, the B-1 has fared comparatively well in this regard. Its projected operational weight is only about 20 percent greater than originally predicted—a much better record than that achieved on many other programs. Weight could be further reduced at increased cost, but operational performance does not require it, and the additional expense may not be justified.

program cost

Our greatest concern, and one that is the least understood, is program cost. It has been difficult to portray adequately the meaningful changes in the B-1 program cost during this period of high inflation. Measured in terms of constant dollars—with all inflation removed—there has been relatively little cost growth forecast for the B-1 program—less than 12 percent from its beginning five years ago until its planned completion some ten years hence. There has been no growth in real terms since December 1973. Perhaps the best way to portray real cost is in man-hours per pound required to build the first aircraft, and here again the B-1 compares very favorably as the following figures indicate:

Man-hours per Pound* to Complete First Aircraft	
B-1	26
F-111	31
A-3J	24
B-58	54

* DCPR weight (Defense Contractor Planning Report)

Unfortunately, the dollar has not been stable, and inflation has steadily reduced our purchasing power since inception of the program in 1970. We also *project* continued inflation until the buy-out of the program over the next decade. The compounding effect is that the buying power

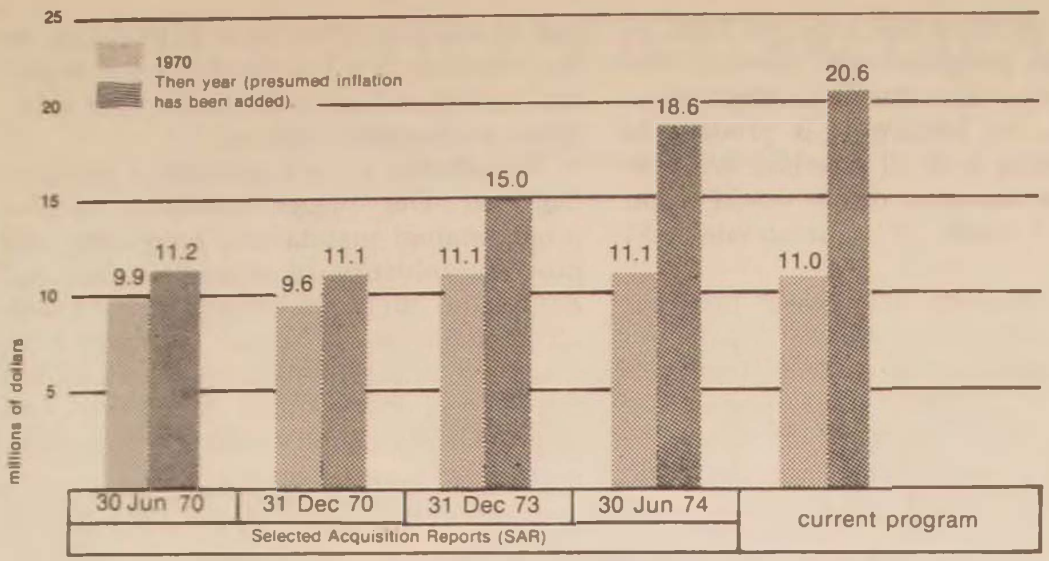


Figure 3. Track of Selected Acquisition Reports (SAR) in millions of dollars

of a dollar when we complete the program in 1985 is estimated to be only about 42 cents as compared to the buying power of a dollar when we initiated the program in 1970. As a result, our estimates of B-1 production costs increase. Figure 3 shows B-1 forecast program costs as we have reported them in our Selected Acquisition Reports (SAR) to the Congress from 1970 to the present. The bars on the left show constant dollar forecasts, and those to the right include the effects of inflation. As can be readily seen, the effects of inflation just about double the forecast future cost.

What this means, in more familiar terms, is that an automobile costing $3500 in 1970, when this program began, costs approximately $5000 today. If the same inflation factors are applied to it as to our B-1 cost estimates, it will cost over $7000 in 1985.

Throughout the last four years and particularly during the past year, we have placed considerable emphasis on reducing B-1 costs to the practical minimum. Outside expertise has been applied in the form of a high-level independent study directed by the Air Force Chief of Staff. As a result we believe the system costs no more than necessary to accomplish its required mission. A new aircraft designed today would look much the same as the B-1. Started later, with continuing inflation, it would cost much more.

What can be done to minimize further the total program cost? The effect of inflation is significant—a one percent change from our estimated rates can increase or decrease our forecast total program costs by approximately $1 billion. The trend of our economy, however, is beyond the control of a program manager.

Time, to some extent, is within our control, and this is the largest single factor affecting total program costs. If production

is delayed, inflation has a longer time to act, and total program costs increase. For this reason, as well as the forecasted operational need, we believe it is prudent to avoid any delay if at all possible. We estimate that a one-year delay would again increase B-1 costs by approximately $1 billion.

A related problem that drives program costs is the creation of extended gaps between the numbers of aircraft manufactured. If the FY76 program is approved as submitted, we will face a gap of 35 months between the manufacture of the third and fourth aircraft, which itself causes some loss of learning. Extension of this gap or the creation of a gap between the fourth and subsequent aircraft would pose additional production problems.

Technically, the B-1 program is performing well. Our biggest problems involve programming: maintaining continuity and program integrity to minimize gaps and reduce the effects of inflation on our overall program cost. We are confident that, with adequate support from the Congress, the B-1 will cost no more than it must cost to provide our country with a viable deterrent into the next century.

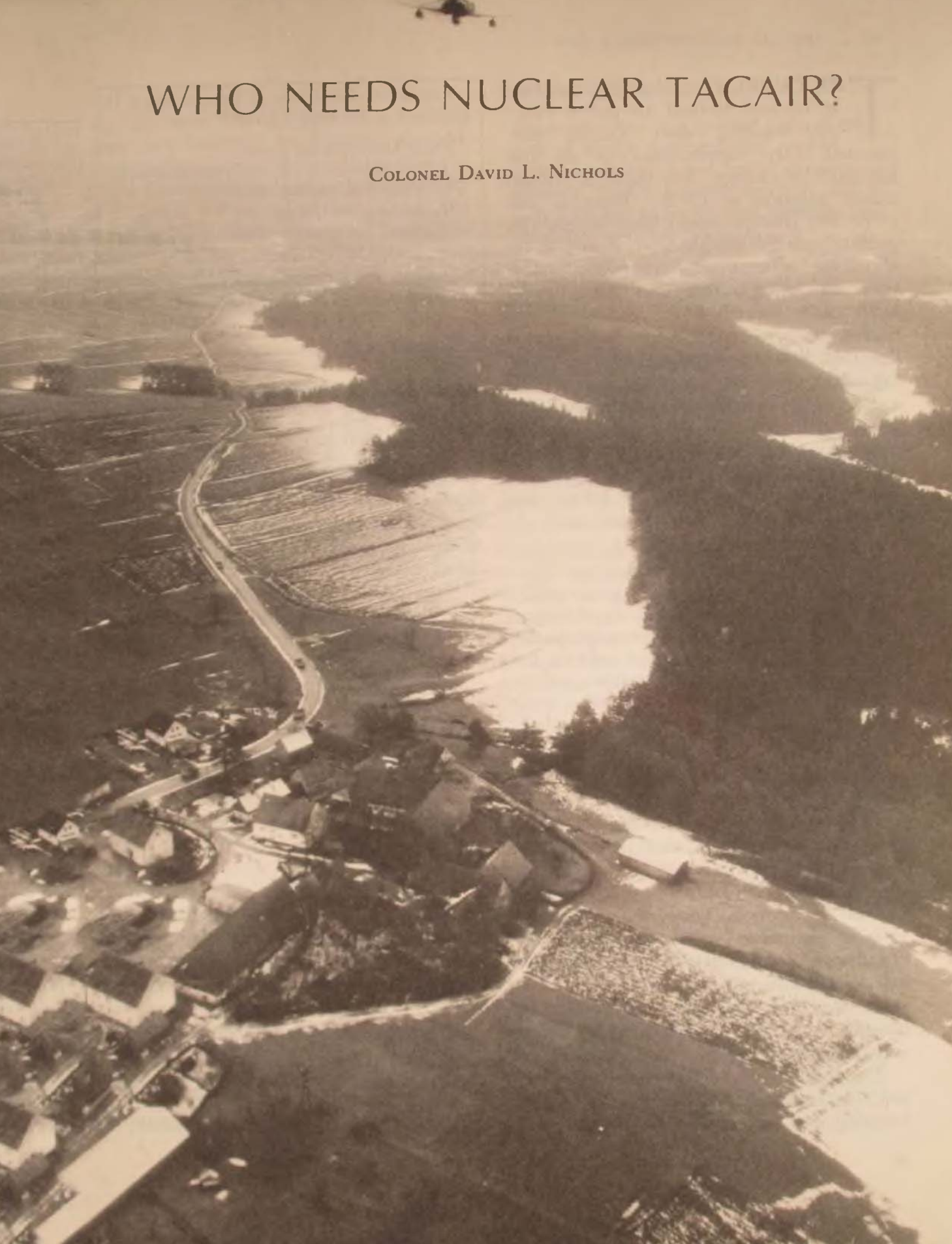
Aeronautical Systems Division, AFSC

It is customary in democratic countries to deplore expenditure on armaments as conflicting with the requirements of the social services. There is a tendency to forget that the most important social service that a government can do for its people is to keep them alive and free.

SIR JOHN SLESSOR, *Strategy for the West*, New York, 1954, p. 75

WHO NEEDS NUCLEAR TACAIR?

COLONEL DAVID L. NICHOLS



THE CURRENT and traditional role of nuclear tactical air power (TACAIR)—standing alert against preplanned, fixed targets—may be on the threshold of change. But there is considerable question as to the direction and scope this change should take: Should the nuclear role be modified, or should it be eliminated altogether? Two related questions are being raised that must necessarily cause the Air Force to reassess the nuclear TACAIR mission. One derives from the fact that some critics view nuclear TACAIR as obsolete; the other comes from a Presidential challenge to the military services.

Beginning with the Kennedy Administration, Presidents have asked for more flexibility within our nuclear forces; for instance, President Nixon's statement:

> Our forces must be capable of flexible application. A simple "assured destruction" doctrine does not meet requirements for a flexible range of strategic options. No President should be left with only one strategic course of action, particularly that of ordering the mass destruction of enemy civilians and facilities. *We must be able to respond at levels appropriate to the situation.*[1] (Emphasis added.)

Accordingly, the Department of Defense has been examining and modifying our nuclear policy to provide such flexibility. This policy requires a clear and evident capability to fight, in concert with our allies, at any level of conflict, conventional as well as nuclear. The options must be visibly applicable with precision, discrimination, and restraint and therefore believable. The critical objective is deterrence or, if that fails, early war termination on terms acceptable to the United States and our allies.[2]

The credible war-fighting capability of our theater nuclear forces is a basic and essential element of the deterrence posture; moreover, in the case of the North Atlantic Treaty Organization, these forces provide much of the political and psychological glue that holds the Alliance together. Although NATO's first line of defense against conventional attack under the Alliance's agreed strategy is its conventional forces, the strategic and tactical nuclear forces contribute greatly to deterrence of both conventional and nuclear attacks. The aim of our strategy is to deter attacks at all levels of conflict through a credible defense capability with a mutually supporting triad of conventional, theater nuclear, and strategic forces.[3] Theater nuclear forces fill what would otherwise be a critical gap between strategic deterrent and conventional forces. This capability is required to avoid the undesirable alternatives of conventional defeat or, worse, escalation to general nuclear war. Our theater nuclear capability is derived from combined ground, sea, and air forces; this article focuses on the potential of tactical aircraft, recognizing that they constitute but one element of an integrated combat force.

This article is not intended to provide proven solutions to nuclear TACAIR questions; those must be developed by the Air Force primarily through the resources of TAC and USAFE. Hopefully, this discussion

NATO Triad

Strong Conventional Forces
Able to operate if necessary in combined conventional-nuclear combat

Theater Nuclear Forces
Tailored for limited, selective use or to complement conventional forces

Strategic Force Components
Deter escalation and provide limited response, to aid in conflict termination

will serve instead as a catalyst by identifying the need for change and presenting some new concepts to stimulate thought. The concepts are aimed at giving the National Command Authority more flexibility of response so as to better counter the Warsaw Pact threat to NATO and take greater advantage of the inherent characteristics of manned aircraft. The ultimate goal, of course, is to enhance our deterrent posture.

Some recent critics of nuclear tactical air power for NATO say that these aircraft

- —tempt pre-emptive attacks because of their potential nuclear use and hence are destabilizing;
- —are highly vulnerable to nuclear attack by IR/MRBM's against their fixed air bases;
- —cannot be relied upon to support the land battle because of sophisticated Soviet air defenses;
- —no longer have a theater nuclear role because other systems are more suited to the mission; and
- —degrade a large part of NATO's initial conventional capability when tied to nuclear alert commitments.

Factors Forcing Reassessment

First is the argument of critics that the current nuclear TACAIR posture has become obsolete, vulnerable, and destabilizing. For example, a recent and widely read book from the Brookings Institution called for

> termination of Quick Reaction Alert, which many analysts believe increases the possibility of a nuclear exchange because systems kept on QRA constitute a standing *invitation* to preemption.

The book also states that

> the maintenance in a constant state of readiness of certain nuclear-loaded aircraft . . . poised to deliver strikes against theater *and* strategic targets appears decidedly out of step with the desire for true flexibility that characterizes present NATO strategy.[4]

old concept

Unfortunately, this argument gains undue credibility because our concept for the employment of nuclear TACAIR is outdated. While other nuclear forces evolved along with the threat, nuclear TACAIR has been, in concept, essentially maintained as adopted in the 1950s and early 1960s, when forward-deployed fighters were used to augment our then limited-range strategic air forces. The capabilities of TACAIR delivery systems have greatly benefited from advancing technology, but the mission concept has remained unchanged since 1952, when the first F-84 fighter-bomber was given a nuclear role in Europe. This role was based on a massive-retaliation "trip wire" strategy, which is no longer credible. The present era of strategic parity with the Soviet Union requires more flexibility. Moreover, with our strategic Triad of bombers, ICBM's, and SLBM's, plus the advent of MIRV's, we have enough nuclear warheads to strike a broad range of high-priority, fixed targets. In a numerical sense, TACAIR adds little to this overall capability. Thus the role for nuclear TACAIR is being rightfully questioned.

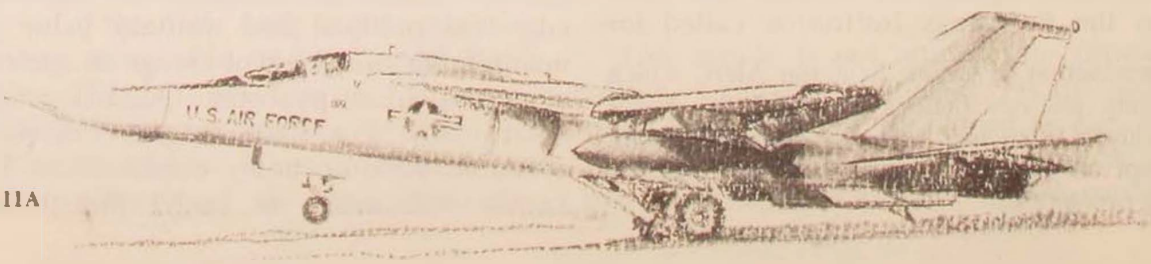
Although some make the narrow argument for complete abolition of nuclear alert by TACAIR, the more prudent acknowledge the political and military value of maintaining some level of TACAIR on nuclear alert, particularly peacetime Quick Reaction Alert (QRA). For some targets, currently available yield/accuracy combinations for TACAIR will result in target destruction

with lower collateral damage, as compared with missile systems now available. More important, TACAIR on nuclear alert is the only means whereby some of the NATO allies can participate in the nuclear strike role. This sharing of risks and responsibilities in nuclear strike missions among the NATO allies is an important political benefit. Nevertheless, improvements in utilization of TACAIR are needed.

the challenge

Advocates are asking for TACAIR to do more, recognizing that the NATO Alliance faces some tough odds in the event of war. For example, NATO's defense is complicated by a lack of depth and by long lines of communication between North America and Europe, whereas the Warsaw Pact has an advantage in both depth and location, which makes it easier to reinforce their battlefield units. "As far as can be judged, mobilization by the Soviet Union in particular could be very speedy, and it has been estimated that the 27 Soviet divisions in Eastern Europe could be increased to between 70–80 in a few weeks—if mobilization were unimpeded."[5] Worthy of special note is the fact that surface-to-surface missiles and artillery cannot effectively engage these reinforcing units before their full force is thrown into the battle, primarily because of the difficulties that ground forces have in locating nonfixed targets more than a few kilometers from the front. Another problem is a legacy of the post-World War II occupation zones that now results in certain difficulties in shifting NATO ground forces rapidly across corps boundaries to offset any Warsaw Pact force concentrations. Consequently, NATO forces might be overrun rather rapidly unless added firepower were made available on a timely basis. In addition to the Pact's numerical superiority in manpower and combat divisions, they also have a considerable advantage in the number of tanks—about 20,000 compared to NATO's 7000 in Northern and Central Europe—and a similar advantage in long-range artillery.[6]

It is not certain that NATO ground forces could hold their own against these odds; therefore, some advocates for a more responsive TACAIR posture feel that it would be useful to free greater numbers of aircraft to provide increased support to ground forces with nuclear as well as improved conventional ordnance, such as precision guided munitions, thereby offsetting the Warsaw Pact's advantages relative to NATO. Since TACAIR is no longer a *necessary* extension of the strategic nuclear forces, now is the time to look seriously at this trade-off. Besides, the Secretary of Defense has given guidance that directs the services' attention toward providing increased support to the battlefield.[7] But to date we in the Air Force have been slow to accept this new and challenging opportunity. Un-



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less we pick up the challenge soon, a much-needed capability may not be available when needed.

Characteristics of TACAIR

The often vociferous arguments against nuclear TACAIR generally ignore the fact that manned aircraft possess several inherent characteristics important to theater forces, particularly the flexible use of these forces.

TACAIR's advantages in mobility, range, responsiveness, tactical versatility, penetrative ability, firepower delivery, target acquisition/battlefield assessment, and recovery and recycling—all give flexibility to theater forces.

Mobility. Tactical air forces may be rapidly deployed and are able to operate from relatively austere bases. This contributes to responsiveness, survivability, and concentration of firepower where it is most needed. Mobility includes vertical dispersal (launch for survival), which is a unique capability of aircraft.

Range. The range of tactical aircraft permits bases sufficiently distant from the land battle, which contributes to survivability and provides the theater commander the flexibility to shift the firepower quickly throughout the theater of operations.

Responsiveness. Having firepower where and when needed is of utmost importance to the land battle. TACAIR provides such responsiveness with quick and selective reaction. During early 1972 a deteriorating situation developed in Southeast Asia that required additional firepower. Within 36 hours of notification, elements of CONUS-based TACAIR were flying combat missions against enemy field forces. Forward-deployed units, of course, are more responsive and can be brought into action within minutes.

Tactical Versatility. TACAIR can conduct a variety of missions with a variety of munitions against a variety of targets, independent of or in conjunction with ground forces. Versatility is enhanced by having man—the most intelligent sensor available—on the scene with a weapon system that can immediately respond to his commands. This characteristic makes up for some target-acquisition deficiencies of other systems.

Penetrative Ability. TACAIR can employ a variety of tactics, including electronic countermeasures (ECM), to penetrate enemy defenses. This has been successfully demonstrated in each of our past wars. The sophisticated antiaircraft artillery, surface-to-air missile, and interceptor network established over North Vietnam was no exception; they were never able to prevent TACAIR (or SAC) from putting bombs on the target.

Firepower Delivery. TACAIR firepower is accurate and fast-reacting and can employ nuclear weapons with a wide range of yields. Selective target destruction accrues from on-the-spot target acquisition and use of rules-of-engagement, a variety of weapons, and high degrees of accuracy.

Target Acquisition/Battlefield Assessment. TACAIR has an advantage over artillery and missiles in its ability to acquire targets, particularly maneuvering targets that are five kilometers or more from the front. Additionally, aircrews can often detect changing priorities that develop during fluid combat situations and can shift their attack to more important targets. An integral feature of this characteristic is battlefield damage assessment and timely intelligence of enemy positions and movements. In recent conflicts air reconnaissance has provided approximately 85 percent of all intelligence information once the conflict was started.[8]

Recovery and Recycling. Tactical air forces are not one-shot systems. They can be used repeatedly for a wide variety of missions, thereby increasing options available to battlefield commanders.

New Concepts for Improvement of TACAIR

Granted, the present nuclear posture does not take full advantage of TACAIR's characteristics. For example, alert aircraft ready to strike fixed, preplanned targets are, in the final analysis, being used somewhat like missiles. But TACAIR has much more to offer; therefore, new concepts should be considered.

nuclear alert

TACAIR should continue with the alert role, particularly peacetime QRA; however, the overall alert concept needs to be modified to allow more flexibility. The total number of fighter aircraft currently committed to nuclear strikes on fixed targets during increased levels of nuclear alert should be significantly reduced. Allocating additional Poseidon SLBM's to NATO would provide a prudent trade-off; the fixed targets would still be covered, and additional TACAIR would be available for a wider variety of tasks.

Probably the most important aspect of TACAIR in the QRA role is the evidence of readiness and resolve. To our allies, QRA aircraft provide a link to U.S. strategic forces. To potential enemies, they represent a retaliatory capability against both conventional and nuclear attack. QRA aircraft that are visibly ready and tested on a routine basis demonstrate better than anything else that we have the capability and will to use theater nuclear weapons should the need arise. This role is well established and influences the Pact's perception, which in turn enhances deterrence; however, this posture could be improved.

QRA aircraft could be postured against mobile/on-call targets as well as the currently preplanned fixed targets. There are several benefits to be derived from such a concept, but the principal advantage would be the added flexibility given theater commanders to strike the fixed targets or shift resources to battlefield support. It would be attractive for flexibility purposes to relieve all TACAIR from their current requirement for preplanned missions against fixed targets, but some number must remain committed for reasons such as the following:

- —Should theater nuclear war go beyond controlled and limited expenditures of nuclear weapons, relatively unstructured tasks such as attacking mobile/on-call targets may be beyond our capabilities. We may be able to carry out only highly structured tasks such as preplanned missions; therefore, some TACAIR should be postured to support this contingency.
- —Fixed targets could be covered by Poseidon, but these missiles are not as discriminating or accurate as TACAIR with low-yield nuclear weapons. Consequently, some fixed targets are not suitable for SLBM coverage.
- —In the event a situation precludes striking the preplanned targets or if other targets deserve priority, it is well within the capability of QRA aircrews to switch. Such a policy would allow QRA aircraft to cover either fixed or mobile/on-call targets from the same posture.

conventional-nuclear mix

Another consideration is the impact of terminally guided conventional munitions. It seems reasonable that this technological advancement, so successfully demonstrated in Southeast Asia and the Middle East, provides opportunities for trade-offs. For

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example, terminally guided 2000-pound conventional bombs used in favorable weather conditions now provide single-shot probabilities of kill for certain categories of targets that were previously only achievable with nuclear weapons. *As technology improves the all-weather capability of terminally guided weapons, some portion of TACAIR on QRA or in an increased readiness posture could be loaded with conventional munitions.* This segment of the force would be more flexible because it would not be tied to the rigid command and control requirements essential for nuclear forces.

dual-loaded alert

Another approach with considerably more potential would be a *QRA posture that loads both conventional ordnance and nuclear weapons on the same aircraft.* It is time consuming (up to an hour in some cases) to up-load an aircraft with weapons; however, selective downloading can be rather quick. This quick downloading could lead to greatly increased flexibility.

An F-4, for example, could have a nuclear bomb on its centerline station and conventional ordnance on others. If launched for a conventional strike, the nuclear weapon could be downloaded in less than five minutes, detracting little, if any, from responsiveness. If launched for a nuclear strike, the crew would take off with all stores, incurring no delay. The conventional weapons could be jettisoned after takeoff, if desired. This conventional-nuclear QRA mix would be a capability uniquely adaptable to TACAIR, since no other weapon system can be launched against an enemy with both nuclear and conventional munitions on board. It would have the advantages of nuclear QRA plus the flexibility to release conventional resources rapidly to support the battlefield.

interdiction

Air interdiction operations are conducted to destroy, neutralize, or delay the enemy's military potential before it can be brought to bear effectively against friendly forces.[9] Deep interdiction attacks do not have immediate effect on the battlefield but can be of considerable importance in long wars of attrition or in areas where the enemy's lines of communication are severely restricted. Hence, interdiction well beyond the forward edge of the battle area (FEBA) would be a rather marginal investment of TACAIR during a conflict with the Warsaw Pact; however, shallow interdiction against Warsaw Pact maneuver units to cut off immediate reinforcements and relieve pressure at the FEBA would have prompt effect

and would be particularly appropriate for nuclear TACAIR.

It is estimated that the Warsaw Pact would organize in two echelons. The reinforcing echelon would be located well behind the initial front and in position to augment the main effort or to exploit a breakthrough. These second-echelon divisions, maneuver units in assembly areas, or units on the move—20 kilometers or more from the FEBA—constitute valuable targets for TACAIR in preventing these forces from being used to sustain the offensive.[10] The targets would consist mainly of enemy armor, artillery, mobile surface-to-surface missiles, command posts, and surface-to-air missiles. Their destruction would have a prompt impact on the ground war, and, because of their distance from the FEBA, coordination with ground forces would be simplified. *TACAIR, more than any other system, has the target-acquisition capability and weapon-delivery accuracy to neutralize these nonfixed targets before they can influence the battle.*

It might be possible to engage the fast-moving spearhead units before they come into contact with the friendly ground forces, but this would be a brief, transitory phase. Once these units are in contact with friendly troops, air attacks would fall within the purview of close air support. However, the bulk of Warsaw Pact divisions—the reinforcing units—would not be engaged, and if significant numbers of these could be rapidly attrited, the momentum of the attack would be blunted.[11] NATO ground forces—with close air support and nuclear artillery, if needed—could cope much more easily with the reduced pressures of spearhead units denied their expected replacements.

To a large degree, the necessary fighter aircraft, weapons (conventional and nuclear), and trained personnel are in place to take on this task. What is lacking are doctrinal concepts and joint planning and training by Air Force and Army units. In time, other refinements should be added to enhance the capabilities, but there is *no need to wait* for such developments; the basic ingredients are now available.

Although the current stockpile of nuclear weapons can be employed in this role, we should pursue some improvements to enhance the capability. Because of the way current nuclear bombs have been designed, TACAIR is somewhat limited in its ability to *airburst these weapons accurately* over *nonfixed targets* or to ground-burst "clean" nuclear weapons. Either of these capabilities would be useful to minimize collateral damage.

Information-gathering systems also are needed to detect tactical targets to a depth of several hundred kilometers. Reconnaissance (recce) platforms, such as RF-4s or remotely piloted vehicles (RPV's), could cover the area of interest. Also, the SR-71 could make a valuable contribution, particularly for high-altitude/wide-area coverage. Moreover, near real-time readout of the reconnaissance data is now being developed.

Of particular interest is Tactical Air Command's Quick Strike Recon activities. The objective of this project is to provide battlefield decision-makers (Army and Air Force) with near real-time reconnaissance. The concept envisions recce aircraft relaying important segments of images via data link to a ground processing / interpretation unit, which in turn would extract appropriate intelligence and pass it to computerized map displays available to decision-makers. The concept also considers the use of recce aircraft in a forward air control role (FAST FAC).

This looks attractive in that the recce aircraft has potential for more "hunting" time than munition-laden fighters; and after finding and fixing the target, the recce

aircraft is already on scene to assist with the kill. It is easy to visualize scenarios where this would be productive; for example: (1) a recce aircraft covers area of interest; (2) target images relayed to ground; (3) recce aircraft prepares to assume role of FAC while fighters are en route; (4) FAC directs conventional or nuclear attack. In the nuclear situation he could deliver a marker (approximately 100 feet CEP) that a standoff weapon could terminally guide on for an airburst delivery, or the FAC could direct strike aircraft to the target for other types of delivery. The FAST FAC aircraft could also be equipped with LORAN and act as a Pathfinder for strike aircraft. These uses suggest some of the possibilities for striking on-call / moving targets with precision and reducing collateral damage through airburst of a relatively small nuclear bomb.

close air support

Close air support, air action against targets in close proximity to friendly forces, requires close, accurate coordination. Close air support complements the organic firepower of land forces and can provide the additional strength necessary to break enemy strong points, exploit breakthroughs, and prevent friendly defensive positions from being breached or overrun. It can also be employed to cover withdrawal movements or reconnaissance patrols into enemy territory.[12]

There does not appear to be significant reason to perfect a nuclear close air support capability with TACAIR. Since nuclear artillery can possess the necessary range and has good all-weather accuracy plus other advantages, it should be the preferred delivery system if nuclear firepower is needed. The constraints on TACAIR would obviously be very rigid to protect friendly forces and consequently would limit its potential use against enemy forces in contact with friendly units. Moreover, improved conventional close air support aircraft such as the tank-killing A-10 should be able to provide enough firepower to complement the ground forces' organic firepower, particularly *if* reinforcing Warsaw Pact units are placed in jeopardy through shallow interdiction.

TACAIR could be a supplement or hedge against poor artillery survival or availability; but the word "close" would require a new definition in the nuclear environment: five (?) to 20 kilometers from friendly troops. In the case of Europe, most Warsaw Pact artillery would fall within this region.

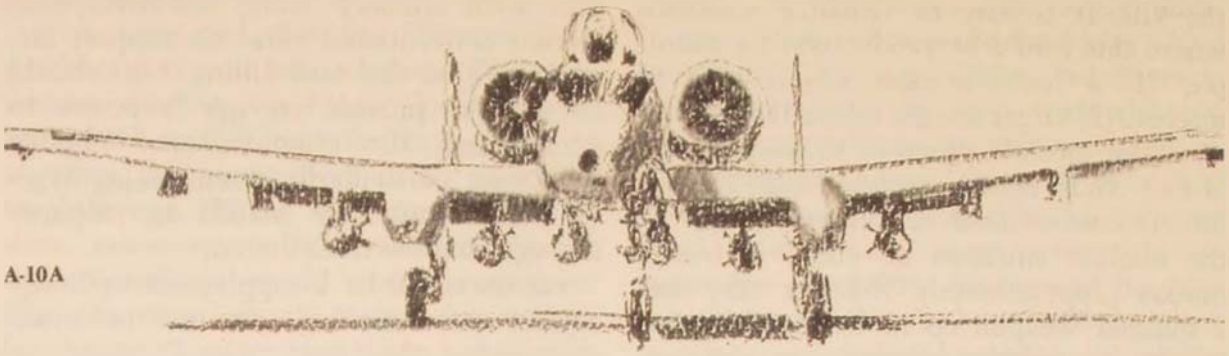
other considerations, including vulnerability to nuclear attack (e.g., Soviet IR/MRBMs)

The foregoing points do not exhaust the potential uses of TACAIR in theater nuclear conflict. For example, nuclear TACAIR could also be used against Warsaw Pact forces that might succeed in penetrating the FEBA and are no longer in direct contact with NATO ground forces. Attack of these units by TACAIR could quickly inhibit movement and reduce the breakthrough force's effectiveness. Also, nuclear TACAIR could be used in air defense suppression by attacking major AAA and SAM positions that have multiple guns or launchers. These concepts should be added to those that merit serious consideration by the Air Force.

Vulnerability of TACAIR

Before this article is concluded, a brief look at the TACAIR vulnerability argument is in order.

Yes, TACAIR bases are vulnerable to nuclear attack, but *this is true whether or not TACAIR has a nuclear capability.*



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Moreover, if conventional TACAIR is as essential for defense in Europe as is claimed by those arguing to take TACAIR off nuclear alert, then the Warsaw Pact has as much incentive for nuclear attack on a "conventional" TACAIR base as on a "nuclear base."

The solution is to reduce vulnerability through a combination of measures such as dispersal, hardening, rear bases, and perhaps some limited airborne alert but *not* to denuclearize TACAIR. Denuclearizing would not change the vulnerability issue, and it would seriously degrade the capabilities—and consequently the credibility—of our theater nuclear forces. We must depend to a considerable extent on deterring Warsaw Pact nuclear attacks on NATO air bases by striving to keep the nuclear conflict limited (an argument for shallow interdiction / battlefield support with nuclear TACAIR) and by having a highly survivable system such as Pershing, Poseidon, and B-52s for nuclear attacks on Warsaw Pact air bases in retaliation for nuclear attacks on NATO air bases. This concept is clearly recognized in USAF's Basic Doctrine:

> . . . initiation of hostilities at one level should not be viewed as a failure of deterrence at all levels. Even during hostilities, some degree of deterrence will continue to operate. The enemy may be deterred from using certain weapons, attacking certain locations and categories of targets, or otherwise escalating the conflict.[13]

THERE is need for nuclear TACAIR, and the need extends beyond our current posture of standing alert against preplanned, fixed targets. This does not suggest that we should terminate nuclear alert. Fighter aircraft on QRA are the most visible demonstration of our capability and willingness to use nuclear weapons should the need arise. The Soviets perceive and respect this, and NATO's theater deterrence may not be credible without TACAIR on constant alert. But today's nuclear alert concept, which ties large numbers of fighter aircraft to targets that could be covered in part by other systems, is outdated. More aircraft must be made available for battlefield support—conventional or nuclear, whatever the case may be—because TACAIR has unique and important capabilities that could be brought to bear against Warsaw Pact maneuver units. These units, which are vital to Soviet grand strategy, can be placed in jeopardy by TACAIR more than by any other system we possess. Effectively attriting these units before they influence the land battle would likely be critical to the outcome of a NATO / Warsaw Pact

war; therefore, it would seem incumbent upon us to exploit TACAIR's potential in this area to the fullest extent.

Now is the time for the Air Force to accept the challenge and answer, in no uncertain terms, the question: "Who needs nuclear TACAIR?" If the Air Force does not take this initiative, the critics of TACAIR will become more vocal, and if not convincingly challenged they may prevail in altering the force structure by default. In answering the question and developing the capability, the Air Force will have to work closely with the Army in several areas:

—updating *concepts* for use of TACAIR to better support today's requirements;

—developing the *procedures* and *tactics* necessary to support the land battle with nuclear munitions;

—adapting the *existing hardware* to support this concept and later developing new hardware as needed to enhance the capability; and

—establishing the necessary *training* criteria and *joint exercises* to perfect TACAIR's capability to support the battlefield with nuclear as well as conventional weapons.

This obviously is not an easy task, but TACAIR can do it. If this opportunity is missed, the alternative may be a future theater force denied the vital capabilities of nuclear TACAIR.

Hq Ninth Air Force, TAC

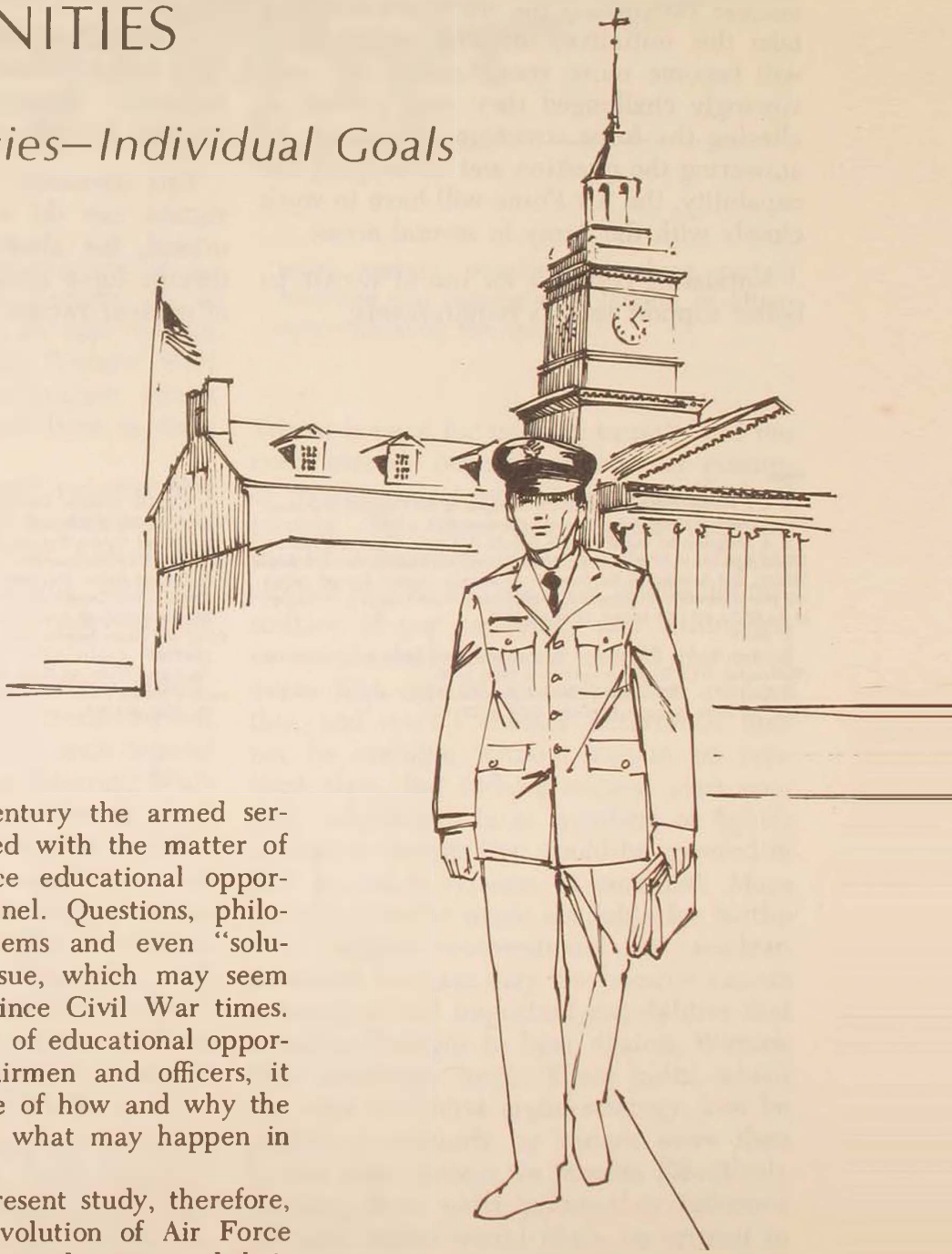
Notes

1. *U.S. Foreign Policy for the 1970's*. A Report to the Congress by Richard Nixon, President of the United States, 9 February 1972, p. 158.
2. A Statement by the Honorable Donald R. Cotter, Chairman, Military Liaison Committee to the Energy Research and Development Administration (ERDA), and Assistant to the Secretary of Defense (Atomic Energy), before the Joint Committee on Atomic Energy, United States Congress, in support of the ERDA FY 1976 budget, 12 March 1975.
3. *Ibid.*
4. Jeffrey Record, *U.S. Nuclear Weapons in Europe: Issues and Alternatives* (Washington, D.C.: Brookings Institution, 1974), p. 60.
5. Quoted in "The Theatre Balance Between NATO and the Warsaw Pact," *Air Force Magazine*, December 1974, p. 100.
6. *Ibid.*, p. 101.
7. Program Decision Memorandum for Defense Agencies and Defense-Wide Programs, 29 July 1974.
8. *Tactical Fighter Weapons Employment*, Tactical Air Command Manual 3-1, Part Two, Department of the Air Force, 30 September 1971, p. 7-11
9. *Tactical Fighter Weapons Employment*, Tactical Air Command Manual 3-1, Volume III, Department of the Air Force, 15 August 1974, p. 1-1.
10. Major General Leslie W. Bray, Jr., USAF (Ret), "Tactical Counterforce," *Air Force Magazine*, June 1974, p. 38.
11. *Ibid.*
12. *United States Air Force Basic Doctrine*, Air Force Manual 1-1, Department of the Air Force, 15 January 1975, p. 3-2.
13. *Ibid.*, p. 1-1.

VOLUNTARY IN-SERVICE EDUCATIONAL OPPORTUNITIES

Air Force Policies—Individual Goals

DR. ARMAND J. GALFO



FOR more than a century the armed services have struggled with the matter of voluntary, in-service educational opportunities for their personnel. Questions, philosophical positions, problems and even "solutions" concerning the issue, which may seem new, have cropped up since Civil War times.

Today, at a high point of educational opportunities for Air Force airmen and officers, it is important to take note of how and why the programs developed and what may happen in the future.

The purpose of the present study, therefore, was to determine the evolution of Air Force policies regarding voluntary education and their

relationship to the goals of individual servicemen.

The Historical Perspective

Current Air Force policies and programs, which provide the opportunities for the serviceman to improve his education level, derive from a long history of efforts for, and against, the concept. Early records show that the first attempts to establish nonmilitary education in American armed forces were the Army post schools, but these were often based on compulsory off-duty attendance and generally aimed at giving black troops a rudimentary education.[1] It is not clear how well the program was received by the individuals or whether it would have worked on a purely voluntary basis.

But although the desire of the individual American serviceman to further his own education during the last century is difficult to document, the policies reflected in Congressional permissive legislation and armed forces implementation of laws to provide for voluntary educational opportunities can be traced back to an 1838 statute. That particular law allowed the administrative council at each Army post to hire a chaplain who would act as a schoolmaster.[2] During the Civil War the Union Army provided, in some instances, for the education of its black soldiers;[3] but such activities all but ceased at the end of that conflict, and White says: "The *Army and Navy Journal* was considerably understating the situation when it commented in 1873 that 'our Army is not, as a whole, alive to the subject of education. . . .' "[4]

Some efforts to establish an organized system of voluntary education in the Army began with a provision within the Army Reorganization Bill of 1866, sponsored by Representative James A. Garfield and supported by representative Robert C. Shenck, Chairman of the House Committee on Military Affairs (both men were former Civil War generals). The bill made possible the detailing of Army officers to colleges and universities and also the establishment of post schools for enlisted men. Instruction in the post schools, according to Garfield, was to concentrate on United States history in order to instill patriotism, but also for another purpose: ". . . the more practical one of reducing crime and vice rates by eliminating idleness. . . ."[5]

In his history of the Army post schools, White goes on to note that ". . . during the next decade little notice was taken of the requirement. Army officers were either unaware of it or were ignoring it, despite supplementary orders by the War Department. . . . Ignorance of the measure was evident when Brigadier General F. O. C. Ord wrote to the Adjutant General in 1871, requesting authority to establish post schools. . . ."[6]

As the provisions of the 1866 act became better known, a storm of controversy swirled around its implementation. To some extent this resulted from the fact that Congress never chose to vote for specific funding to carry out the concept. Thus commanders who did wish to put the program in practice usually were hampered from a lack of trained teachers, buildings, and even fuel to heat rooms set aside for on-post education. Just as serious, however, was the opposition of many officers, who listed myriad reasons for noncompliance.[7] Even the *Army and Navy Journal* ". . . philosophized, although somewhat ungrammatically, that a soldier would take advantage of existing opportunities if he had a desire, but 'if he don't [*sic*] want to learn you can't compel him to by regulation. Like a horse, you may drive him to water, but you can't make him drink.' "[8]

A flurry of suggestions to solve the prob-

lem of the lack of well-trained, inspiring teachers was made in the late 1800s: use of officers and/or noncommissioned officers; sending interested soldiers to a normal school in Ohio; and the establishment of an army normal school. None of these ideas seemed to set well with the War Department. By the late 1800s the department had moved to a position in which it still officially sanctioned the idea of opportunities for servicemen to further their education, but the implementation was given over to civilian welfare and religious agencies.[9]

Why the department had turned away from a policy of service-run schools to some extent may be discerned from philosophical differences that developed concerning the relationship of education to the purposes of the armed forces. White presents the conflict in this way:

> For the idealists, post schools were a fundamental step toward the army's destiny of becoming the educator of those who lacked a good civilian education. . . . Those who chose to leave the army after their last enlistment would be better citizens on their return, having learned true citizenship in the army. . . . By the 1890's this view was on the wane. . . . there were those who took a narrower and more practical view of the army's mission. The army's duty was to defend the nation, not to educate or civilize it, and the home and community must bear the responsibility [for general education]. . . . Technological innovations and changes in the tactics of warfare, however, made it necessary that the enlisted man be better trained and more intelligent and self-reliant.[10]

The Army began to need more intelligent men, but the best way to achieve it, according to those who opposed nonmilitary education for servicemen, was to raise enlistment standards.

It is not surprising, therefore, that the War Department adopted what appears to be a compromise position between the opposing philosophies. As a result, even at the time of World War I, nonmilitary education was considered by the War Department as a matter of no direct concern to its function. Instead, since personal educational goals were taken to be a facet of welfare and morale, the problem was left to be resolved by volunteer civilian agencies. During World War I, however, the War Department, although it did not assume responsibility for education other than military training, did back efforts by the YMCA and other groups to provide off-duty education.[11] After the end of the war, though, the YMCA education officers were transferred into the Army Education Corps, and the War Department set up an education and recreation program, which continued on a very limited basis for about twenty years. A new initiative in the direction of off-duty education came with the Mobilization Regulations of 1939. The regulations provided for a committee of civilian and military experts on welfare that by 1941 became an advisory Joint Army-Navy Committee on Welfare and Recreation. The committee was instrumental in the establishment of educational programs for service personnel.[12] During the same year the "Morale Branch" of the Army was brought into existence, and it included an education section; by 1942 the name of the branch was changed to Special Services. Emphasis by Special Services during World War II was on correspondence instruction, although preparations were also made for ". . . a large-scale on-duty program after hostilities ceased."[13]

In 1945 the Information and Education Branch of Special Services, which was responsible for voluntary education programs, was separated from Special Services in the European Theater as an "I and E" Division, and the concept soon spread throughout the Army.[14]

By the time the Air Force became a separate service in 1947, voluntary in-service educational opportunities for personnel in the form of correspondence courses through United States Armed Forces Institute, the use of the G.I. Bill for off-duty study, and tuition assistance had become firmly accepted as ways to help the individual serviceman to improve himself educationally.

Individual Goals

The assignment of voluntary education to "morale" functions during the early part of the twentieth century is indirect evidence that considerable numbers of service personnel tended to "vote with their feet" in regard to the issue. Morale as an area for voluntary education continued into World War II and grew in Topsy-like fashion.

During World War II, for example, Houle says:

> A school established in Italy by a unit of the twelfth Air Force was one of the first comprehensive schools of its type in the Mediterranean theater. It originally offered some thirty-five courses. A few classes were taught by competent teachers without texts. In other classes USAFI textbooks were used. Observers testified to the interest shown by the students and the ability of their instructors.[15]

Documentation of the numbers of people who took part in the programs is difficult, since no reports of the activities were required.

The most comprehensive studies of the relationship of volunteer education programs to individual objectives and motivation came about very recently as a result of the decision to end the draft and go to all-volunteer services.

One of the first studies to note the relationship was conducted by Allan Fisher and Mari Harford and reported in 1973. The authors said, "the most frequently endorsed reason for enlistment was *to learn a trade or skill valuable in civilian life.*" They added, however, that the second reason for enlistment receiving a majority endorsement was *the opportunity for advanced education and training.* Further, ". . . additional analysis indicated a higher percentage of Air Force enlistees endorsed this reason compared to enlistees in the other Services."[16] These results led Fisher and Harford to say that the findings ". . . suggest that both draft-motivation and financial incentives should be evaluated in proper perspective, considering the complex of additional, more powerful reasons for enlistment."[17]

A later study reported by Fisher and Martha DiSario showed the strong incentive that in-service educational opportunities would have for young people to enlist in the armed services.

> In November 1972, the single most frequently endorsed incentive to enlist in the Regular Force was a fully paid college education. . . . this incentive appeals to the 16–17 year old "target segment" of the youth population (including higher aptitude high school students) and shows no racial differences. In contrast, a $3,000 enlistment bonus was less frequently endorsed, was more popular among low-aptitude high school students, and had a higher appeal for non-whites than whites . . .[18]

In their study of incentives for the all-volunteer force, William Beusse and Andrew Dougherty compared monetary and nonmonetary inducements for service enlistments and said, "the inescapable conclusion is that compensation incentives have not lived up to expectations. However, there has still been very little attention paid to non-compensation incentives."[19] The authors go on to review studies by Johnston and Bachmand which support the view that ". . . paid schooling

would attract a higher percentage of young men than the alternative of higher pay."[20]

Furthermore, the Beusse and Dougherty analysis of a 1973 DOD Personnel Survey presented convincing evidence that: (1) in-service voluntary educational programs have a positive effect on re-enlistment intent; and (2) education incentives to re-enlistment can have a beneficial impact upon the quality of the force.[21]

In a separate study, Beusse found that even when general intelligence and time in service are controlled for in a relationship equation, the individual's level of education remains positively related to pay grade achieved. This provides indirect evidence that general education is related to career progression apart from the individual's mental ability and time in grade.[22]

Although the evidence is very indirect, the remark made in 1866 by James A. Garfield in proposing off-duty education as a way to reduce crime and vice rates by eliminating idleness comes to mind. Beusse and Dougherty brought up an interesting point in regard to the relationship of education level to disciplinary problems:

> Lower disciplinary rates is another area of potential benefit to the service. Many studies have shown that disciplinary problems are inversely related to educational level. A recent compilation of Army court-martial data found that although only 14.3 percent of the total enlisted force had less than a high school education, the non-high school graduates comprised 65.1 per cent of the servicemen brought up on court-martial charges.[23]

In a study of the results of a 1973 DOD survey it was found that for Air Force personnel: (1) in-service educational opportunities can be the single most potent source of motivation for both officers and enlisted men to follow a service career; and (2) younger and lower-grade male officers of all races choose voluntary educational opportunities as the major reason to stay in service.[24] The most surprising result of the study, however, had to do with why in-service educational opportunities are a motivator.

> Another finding of interest was that among participants in off-duty educations idealistic and personal motivation seem to take priority over pragmatic considerations. About two-thirds of these people who said they were taking part in the programs also said they were doing so to obtain a higher level of education or to improve their general education. Only about a third checked answers such as "to increase their knowledge for the current military job or a future civilian job," or "to increase chances for promotion."[25]

Finally, the study indicated that educational level itself is related to a desire for further education; it is the younger, more highly educated officers and airmen who say that the opportunity to complete a degree while in service would serve as the most powerful motive to follow a military career.[26]

Current Air Force Policies

At the very highest levels, the people who formulate policies that affect the voluntary educational programs in the armed forces continue to support the concept strongly. For example, in a memorandum dated 4 February 1975, Air Force Major General Oliver W. Lewis, who was then Director, Directorate of Personnel Programs, wrote: "The broad availability of on-base programs which provide truly feasible opportunities for our college graduate officers and airmen to pursue graduate level study is a major asset to the Air Force. These opportunities support the attractiveness of the Air Force in terms of both initial personnel procurement and career retention. Further, they provide the

means for our people to develop advanced skills applicable to their career development and to their post-service life."[27]

In a similar vein, General George S. Brown, Chairman of the Joint Chiefs of Staff, wrote on 31 October 1974: "Indeed, it is an exceptional feat of American imagination and ingenuity that our educational institutions have extended themselves to every corner of the world, affording the men and women of the Armed Forces the opportunity for higher education which complements and supplements his or her job."[28]

Finally, Dr. James R. Schlesinger, then Secretary of Defense, writing his welcome to those attending the Sixth Worldwide Armed Forces Educational Conference held at the University of Maryland, said: "In this time of limited funding the one resource that continues to grow is the individual. This growth is through education. That is why we consider our educational opportunities so very essential to maintain the All-Volunteer Force. You may rest assured that continuing to provide these opportunities is, and will remain, one of top priority."[29]

According to Thomas Ford and Robert Quick, although the current education services voluntary off-duty program of the Air Force ranges ". . . from pre-high school and skill development through post-secondary academic and occupational opportunities leading to associate and baccalaureate degree, as well as a broad range of graduate study, . . . it is graduate study which has grown most rapidly in the last half decade. . . . Since the establishment of the USAF Personnel Plan, we have had the objective that graduate degree completion should be available to our people at all major bases. Early in 1974, this objective was revised and made more specific."[30]

But will support for the concept of voluntary education opportunities in the armed forces continue? One disturbing event has occurred very recently that does not bode well for such programs. On budgetary grounds, the Office of Management and Budget proposed termination of the G.I. Bill. The Defense Department immediately raised objections: "Although the current G.I. Bill is very costly, we believe educational benefits are a major recruiting incentive, particularly for the higher quality individual."[31]

DOD has made a series of counterproposals, which include: (1) lower stipends; (2) restrictions on the use of the Bill by men in-service to undergraduate work and within "fields of utility" loosely related to the general purposes of the armed forces; and (3) an increase in the service-funded partial tuition assistance program for the personnel during the first three years of service when they would not be eligible for G.I. benefits of the counterproposal.[32]

The Air Force is most concerned with the effect that some of the proposals might have on graduate education. In a memorandum to the Assistant Secretary of Defense for Manpower and Reserve Affairs, Assistant Secretary of the Air Force Taylor said:

> . . . we do not wish to see usage of the G.I. Bill by active duty personnel limited to undergraduate study. You may be under the impression that graduate level in-service G.I. Bill usage is negligible. However, during the first terms of the current academic/fiscal year, over 10,000 Air Force officers and over 1100 enlisted personnel were participating in part time graduate work. Of these, 26% of the officers and 66% of the airmen were using G.I. Bill benefits. We have no objection to limiting post-service benefits to undergraduate programs.[33]

Regardless of the way the current issue is resolved, it is apparent that pressures to reduce voluntary educational programs have begun.

Conclusions

For more than a century, the concept of voluntary military educational opportunities has gradually developed until now, within the Air Force, individuals can pursue their educational goals at all levels within loosely defined "fields of utility." Yet the view that education outside the scope of military training should be provided for service personnel was not easily accepted. After each war, as funds have been cut back, those within the military who opposed the idea have moved to reduce such programs. However, the idea not only refused to die but has come back and grown. Literally millions have raised their educational levels while serving in the military.

At the beginning of the century, the War Department came to support the efforts of voluntary agencies to provide off-duty educational opportunities. Acceptance of the idea resulted from categorizing them as "morale" programs. Then the Army discovered that it was unnecessary to "lead the horse to water." Finally, it was realized that educational improvement might be helpful not only to the individual but to the service as well.

The controversies surrounding the concept of voluntary educational opportunities for servicemen have concerned the notion of general education of the individual. As military occupations have become more complex, the relevance of nonmilitary education has become more difficult to assess. Thus policies have seemed to waver on the issue, and rising levels of ability and education have tended to increase the percentage of servicemen who wish to pursue further education while in the Air Force.

What will happen to education policies as a result of the current economic crunch? History indicates that service-funded educational opportunities will be reviewed, particularly those which allow individuals to choose programs nonrelevant to the military. The basic question, of course, is, What is relevant? Since educational goals and technical military needs are not always congruent, it might be useful to determine the relationship, if any, between education level, regardless of its military relevance, and the military as an institution within a democracy.

Another question that might be considered is the nature of the inverse relationship between disciplinary problems and education level. Whether the relationship is one of cause-effect is another matter that should be studied.

Why is it that a higher level of education is related to career progression regardless of intelligence level and time in grade? If an individual's effort at self-education is *responsible* for the relationship, it would challenge the principles regarding transfer of training proposed at the beginning of the century and accepted by psychologists and educators ever since.

Those who control the purse strings and those who make the policies should be kept aware of all the possible implications that arise from restrictions on service programs. Current Air Force policies, based on the idea that voluntary educational opportunities are an important facet of recruitment and career development, seem to be very sound. Programs based solely on those points, however, could become an easy target for budget curtailment, since recruitment and career continuation have almost ceased to be a problem. Failure to study the many aspects of the voluntary educational opportunities might well bring them to an end, which would be unfortunate for the Air Force and the other services.

Williamsburg, Virginia

Notes

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Oh, did you know, that Starlings have been known to congregate in a flock of 15–20 million birds—that the highest birdstrike occurred at 37,000 feet—that a chicken was hit at 800 feet AGL—or that the heaviest birds which fly weigh in excess of 20 lbs?

MICHAEL R. GROST
TAC Attack, January 1976

PROFESSIONALISM AND THE CANADIAN MILITARY

LIEUTENANT COLONEL J. H. POCKLINGTON,
CANADIAN FORCES

"Plus ça change, plus c'est la meme chose."
ALPHONSE KARR, 1849

THE ROLE of the military has altered throughout recorded history by virtue of changing political demands, but it has stabilized, to some extent, since the emergence of the professional military officer. The origin of the profession can be traced to a government proclamation in Prussia in 1808, which stated that an officer's commission would be based on military education and professional knowledge. This departure from previous standards for officer candidates, such as aristocratic background or mercenary ideals, also projected the military professional as primarily a servant of the state. Modern nations have made provision for similar military establishments and depend on this professional corps to provide internal security and the means to exert military pressure, if deemed necessary, in the pursuit of national policy.

The advent of intercontinental strategy, nuclear stalemate, and cold war philosophy raises basic problems to the military as applied to their role and the effect on their expertise. The unification of the three National Defence operational elements into the present Canadian Forces has been a traumatic experience to many, but in the present era the military professional's role in society has not changed. However, his professional education must continue to expand to prepare him effectively for his contemporary responsibilities.

The military professional has advanced in expertise much as has the doctor or lawyer.

This evolution has resulted in raised standards of education, but the change in education standards has not changed the basic philosophy behind the profession. Man advances within the structure of his chosen society, but the use of new tools has little impact on that basic structure. Sir Robert Aytoun (1570–1638) once wrote an essay to an inconstant mistress wherein he stated, "Thou art not what thou wast before, what reason I should be the same?" In this passage he was probably referring to tactics as applied to the art of love and not to his professional strategy as a poet. Similarly, the roles that modern states expect their military people to perform may affect the application of the military art but should not alter the basic education requirements of the professional officer per se. The problem becomes one of definition. At what point is there a division of expertise between military art and professionalism? By delineating these areas, we should be able to determine what expertise could be expanded to promote professionalism and how the Canadian military officer's education program could be adjusted to improve his professional capabilities.

the military professional

The raising of the military art to professional status was a spiritual concept. It was recognized that the military officer had a specialized skill that could be committed to the will of society. This military skill could be harnessed to the sociological aspirations of a nation by ensuring that institutions, controlled by the political factions, provided professional training. This training was distinguished from functional trade training in that the spectrum of knowledge was limited to that which was applicable to all aspects of the profession of arms. Through this medium a professional military concept evolved.

The common military knowledge acquired at service institutions is the driving force behind the military profession. Service traditions, ethics, and standards of performance are inevitable by-products of this interconnected military skill training. A military officer must be exposed to periodic intensive formal training throughout his career. In this manner the spiritual requirement of professionalism will be maintained. From this background the foundation is laid for professional character.

The distinguishing characteristics of the military profession as a special type of vocation meet the criteria of Professor Samuel Huntington, who indicates it must have three essential elements: expertise, responsibility, and corporateness. The military professional is an expert with specialized knowledge and skill in a significant field of human endeavor. He is a responsible expert, working in a social context and performing a service that is essential to the functioning of society. He is a member of a corporate group, who share a unique social responsibility and who consider themselves apart from other groups or members of society. Apart from these three elements of professionalism, a distinct sphere of military competence does exist, which is common to most officers and which distinguishes them from most civilians. The direction, operation, and control of a human organization whose primary function is the application of violence is the peculiar skill of the military professional.[1]

From the foregoing, a distinction between military art and professionalism begins to take shape. The professional aspect could be stated simply as the management of manpower and resources in pursuit of any national policy that is designated as the responsibility of the military. The military art is the functional application of military resources to obtain a tactical

advantage. Strategy must inevitably span and affect both these areas of expertise, and it is in this field that military education must continuously expand if professional competence is to be maintained.

strategy and the professional

To be effective, the military must be in a position to understand the political motivations behind any application of force. It has become increasingly apparent that any neglect of the political reasons behind a military action will result in the application of force out of proportion to the requirements of domestic or foreign policy. Professional advice submitted in the form of a military strategy based on a false understanding of the politico-military situation will lead inevitably to loss of prestige. A lack of confidence in the military to maintain the capability to propose strategic responses compatible with the civilian master plan will result in degradation of the profession. Conversely, if the nation-state is confident that the military officer is not only capable of managing his men and resources but can be counted on to propose rational strategy in accordance with the aspirations of society, the military profession will flourish.

The professional education of the military officer must be directed primarily to the arena of world strategy and the international position of his country as it is affected by the alliances and encumbrances of his government. It is obvious that expertise must be maintained in the command, control, and logistic support of modern weapon systems; but concern with this aspect of military affairs, at the expense of politico-military strategy, will result in misguidance.

It is not uncommon that a nation's military hierarchy is accused of neglecting science in the conduct of war. The evolution of a modern weapon was often opposed by the men it was designed to help. The cavalry or artillery officer who fought the changes in his tools of combat offered by the tank and aircraft neglected his trade to protect visual contact with his professional past.

Since World War II there has been an increasing tendency towards the reverse. The specialization of civilian industry has had its effect on the military profession. The competent military specialist is much in demand, and his advice is a necessity when dealing with the complexities of a modern weapon system or the movement of a modern army. However, a danger lies in depending too heavily on such experts when a whole problem must be considered logically. When the problem is strategic in nature, it will have political connotations, and then specialist and professional logic must intertwine to formulate a correct solution.

specialization

The choice of military hardware or organization, or a national strategic policy, is dependent on constraints. The constraints emanate from society and are thus dependent, to some degree, on the whims of the civilian element that controls the military. To a large extent, all proposals are tempered by political, economic, and technical (PET) considerations. The specialist-oriented officer will be primarily concerned with the technological aspects of a problem, whereas the professional military officer will be cognizant of PET as an entity and will be in a position to offer technical advice based on a reasonable appreciation of the economic and political constraints applicable.

All too often a strategic concept will be proposed and urged by the military for the sole reason that it is the ultimate scientific

solution. A narrow-minded approach can result in a military leader's urging the adoption of a strategy or procurement of a weapon based on his specialist expertise only. Such a leader may be demoralized when his proposal is turned down, but his error should be recognized in the proper light. He neglected the priorities of the PET situation, and, therefore, his professional education may be lapsing.

An analogy is apparent between the medical and the military professions. Both suffer from a contemporary loss of professional prestige. The medical general practitioner has given way in recent years to the medical specialist. At the same time the medical profession has become more suspect by society. The medical specialist has increased his technical expertise at the expense of the political (mental) and the economic restraints that may be apparent in his patients. Similarly, the surgeon who rises to be administrative head of a hospital may maintain his narrow specialty to the detriment of the hospital staff and the community that the hospital is designed to serve. It appears, then, that specialization could be the villain of the professional.

professional role of the specialist

The military professional's role in society could be fractionalized if the specialized nature of his functional employment is allowed to interfere with his study of politico-military strategy. His role in society has not changed, but he is in danger of losing his professional status if he leaves the study and application of war to his political masters and applies himself only to his specialized function and its application to tactics.

The attempt to retain military officers in the service by granting extra professional pay to those trained in special trades is a poor expedient. Such action can do nothing but degrade the military profession per se, because line officers, such as aircrew, may be excluded from the organic group. Unless the military organization is prepared to exclude specialists who receive extra privileges from the profession of arms, the practice can do nothing but degrade the entire professional officer corps.

The military profession is presented with a dilemma. Military experts are required to adapt to rapid technological change and at the same time become more flexible and quick in their response to a multitude of military situations. Each strategic role assigned to the military has its political overtones. An officer is expected to apply his professional education and his military specialty with equal expertise.

The military professional has always studied history as a basis for individual self-improvement. However, there has been a tendency to study the military aspect of history and neglect, to some extent, the political nature of a conflict. In this age of rapid communications, such neglect is unacceptable. The military professional must be capable of keeping his forces at readiness during a cold war situation and performing a flexible response in the event of open armed conflict. The security requirements of his nation will force him to accept both defensive and offensive roles varying in intensity from local police action to total nuclear war. One avenue open to the specialist military officer in solving his dilemma is to intensify his effort to improve his education in the politico-military field of strategy.

nonprofessional specialists

The contemporary expedient of specialization has given rise to an erroneous ideal of professionalism. The business, scientific, and industrial communities have attempted to assume professional status because of

their group cohesion and common goals. Although no formal oath of office is required within these specialized groups, an individual is often accepted or rejected on the basis of "professional" ethics. The major factor missing in these groups is their lack of dedication to society. Their dedication looks inward rather than outward to the world.

At this point it is interesting to note that society has attempted to maintain the medical profession by outside pressure on the group. It may develop that the basic reason for socialized medicine and universal medical insurance coverage was to revitalize the medical profession by removing the economic pressure between patient and doctor. By this expedient, society, through government intervention, has assumed responsibility for the continuation of the profession by paying the way. The doctor of medicine has assumed a closer relationship with the military, under government auspices, than ever before.

Socialization of the old professions is really an attempt by the people to free the individual specialist of some responsibility and allow him, while specializing, to remain within the profession. The court-appointed and -paid lawyer and the social welfare officer are specialists in the professions of law and nondenominational religion. The state is paying their way and thus ensuring that professional assistance is available to society regardless of specialization. Further, the corporate nature of a profession is maintained by the simple expedient of socialization.

Since Prussian military pre-eminence, the professional officer has always been paid by the state. The military officer, therefore, should be in a position to retain his professional qualifications and at the same time advance the expertise of his specialty. However, the military officer must appreciate that he will be required to devote more time and effort to the study of his basic profession or else he will relegate himself to the position of a non-professional in the eyes of society. He must also subjugate his specialist function to a secondary position and look with disfavor on those who attempt to place his specialty in a position of prominence over his professional knowledge and understanding of war.

the Canadian experiment

Although it may not be particularly obvious, the act by the Canadian government unifying the armed forces affords the Canadian military officer corps an expedient to advance the profession of arms. The division of the forces into three distinct entities has been enigmatic to military professionalism in the past. For example, the officer who has followed a career as an aircrew specialist in the Air Force has had his professional education relegated to the periphery of his studies. His study of war has been channeled to the air arm, often at the expense of the other two elements. His understanding of political strategy has been narrow and subjective. As a result, he has been concerned primarily with developing an ability to further air force influence and prestige even at the expense of the army or navy—his professional brothers. In recent years, his pay has been increased over his fellow operational officers. This has tended to set him apart from the group. All these forces have degraded his possibilities of achieving professional status. He has been encouraged to assume the role of a middle income specialist, content within his specialty and his narrow comprehension of aerial warfare. His stature as a professional soldier has been built on a false foundation. He depends on his uniform, rank, position, and trade within the military structure to pro-

vide him with a semblance of professionalism. Society suspects his motives and rightly so.

One should not get the impression that the air arm is alone in the art of false professionalism. Examples can be drawn from any of the services. Further, the fact that an officer has been exposed to a professional military college or a civilian university during his early studies does not make him less susceptible. The early ties of a military education within a single service component can orient an officer to the traditions of his service rather than military professionalism. In a similar fashion, the university graduate may feel a closer fellowship with graduates of his science specialty than he does to fellow military officers or military traditions.

Unification of the Canadian military forces should assist the officer corps in its drive for professionalism. The melding of professional education into a single college system will promote understanding of all areas of military expertise. The professional officer must be a perennial student of all phases of the military art if he desires recognition by his political masters. His studies must continue to stress his role in society. He must recognize his responsibilities to the nation, and he must seek to attain and maintain those high intellectual and ethical standards requisite to a profession that merits the trust and respect of the society from which he draws his authority and which he is duty-bound to defend. A unified military education system could ensure that such ideals are projected into the Canadian military profession.

The doubts expressed in the Canadian Government 1964 White Paper on Defence, regarding the traditional patterns of organization by individual services, were an indication that military professionalism was slipping. The act of unification might never have been considered by the government if the three services had performed their military roles in a truly professional manner. In that respect, it is not suggested that the military avoided their responsibilities. On the contrary, the Canadian soldier, sailor, and airman each can be justly proud of the manner in which he achieved his assigned mission. The lack of professionalism was apparent, however, when duplication of effort and service rivalries were allowed to replace logic when a military solution was requested by the government.

the future of professionalism

The unification of the Canadian Armed Forces will not, in itself, promote professionalism. Unless the military hierarchy recognizes the potential that exists in unification to advance the professional outlook of the officer corps, the rivalries that existed between the three old forces will remain. Further, the act of dividing the Canadian Armed Forces officer corps into a multitude of service components may increase the tendency for an individual to give priority to his specialty at the expense of professionalism.

The Canadian military must not be complacent within the unified forces. The latent opposition to unification that still exists within the Canadian Forces has a subtle nature. It is apparent within the officer corps as a "wait it out" attitude. The professional officer cannot afford to wait when the basis of his career has been questioned and is still suspect by his employer. To make unification work effectively will require more than a change of clothes and adjustments to service organizations. There must be a redefinition of professional goals. The redefinition is necessary, not because the goals are outdated but because they must be placed in the context of the unified forces. A modified version of

the "constabulary forces" suggested by Janowitz[2] may be the concept required by the unified forces if professionalism is to be maintained and promoted in the future.

PROFESSIONALISM is distinguished by three distinct elements: expertise, responsibility, and corporateness. In the military, the strategic concept of political security spans the areas of expertise and responsibility. The specialist function of an officer must not be allowed to take precedence over responsible strategic logic. All aspects of politics, economics, and technology must be considered in depth and with appropriate priority when devising a professional strategic concept.

The basis for military professionalism is inherent in the military officer corps. However, problems have been encountered in the corporate nature of the corps to the extent that intrinsic professionalism has been degraded. The officer corps has been offered a unique opportunity to revamp the corporate structure of professionalism in the Canadian Forces. What is necessary is a unified military education system, with a curriculum that expounds the military responsibility to society and the complete spectrum of national strategy.

Complacency cannot be tolerated. The opportunity to revitalize professionalism is present but may be lost if the military officer is forced to limit his professional perspective to the internal mechanics of integrating the forces. In such an event, specialization could become more important than his professional expertise, and professionalism in the military would be degraded.

Professional education and expertise must be the paramount goal of the military officer. To quote from *The Armed Forces Officer* (1950):

> Given an officer corps composed throughout of men who would make the eternal try toward bettering their professional capacities and furthering the working efficiency and harmony within all forces, the United States would become thrice-armed though not producing one new weapon in its arsenals.[3]

Unification of the Canadian Forces can provide the catalyst for such a movement in the Canadian military.

Hq 25th NORAD Region / DO

Notes

1. Samuel P. Huntington, *The Soldier and the State* (New York: Random House, 1957), pp. 8–11.
2. Morris Janowitz, *The Professional Soldier* (New York: Free Press, 1960), Chapter 20.
3. P. 3.

MANAGERIAL STYLES

Lieutenant Colonel Merrell E. Dean

A MANAGER'S style of managing has been a continuing cause of concern to his organization, his subordinates, and, at times, the manager himself. All have recognized that the manager's style is one of the major contributors to the performance and effectiveness of his unit. The desire to define how a manager should conduct himself while working with others has led to investigations into those variables that may affect levels of managerial performance. This article examines, in summary form, investigations by various management authorities on the subject of managerial styles. These investigations have been developed into three theories of managerial style: trait, behavior, and situation.

Throughout this article, the emphasis will be on the manager's style of leadership. Since there is no single, universally accepted definition of managerial style, the common practice has been to consider the manager's leadership style as his style of managing. Most of the authorities cited in this article use the terms "managerial style" and "leadership style" interchangeably. However, it must be remembered that leadership is only one mechanism that managers may use to motivate others toward organizational goals.

trait theory

From research studies conducted during the 1940s and 1950s, the trait theory of styles focuses on "what the leader is." Leadership is thought of as a function of a finite number of characteristics that differentiate the successful from the unsuccessful leader. Edwin Ghiselli cited the traits of initiative, self-assurance, individuality, supervisory ability, and intelligence.[1] He qualified the trait of intelligence by suggesting that the level of an individual's intelligence was an accurate indication of the probability that he would achieve success as a manager—until a certain intellectual level is reached. Above this level, individuals with higher and higher scores were less and less likely to be successful managers. Other researchers brought in even more traits—personality, height, image, charisma, etc.—until at one time ninety traits had been identified.

However, Ralph Stogdill found little or no positive relationship between a manager's traits and his success.[2] Eugene Jennings concluded that fifty years of study had produced nothing to distinguish leaders from nonleaders.[3]

Overall, the trait theory has made a contribution to the study of effective managerial styles, but not as much as was once thought. Seemingly, traits do not consistently distinguish the best leaders, the list of traits keeps growing, many traits are difficult to measure, and the trait theory ignores other important variables in the leadership situation.

behavioral theory

Dissatisfaction with the trait theory led to a new theory that focused on the behavior of a leader. The behavioral theory of managerial styles was prominent during the 1950s and 1960s. This theory focused on "what the leader does" by attempting to observe and describe the leader's style of behavior. This theory comprises several approaches: a continuum of styles, independent styles, and two-dimensional models of styles.

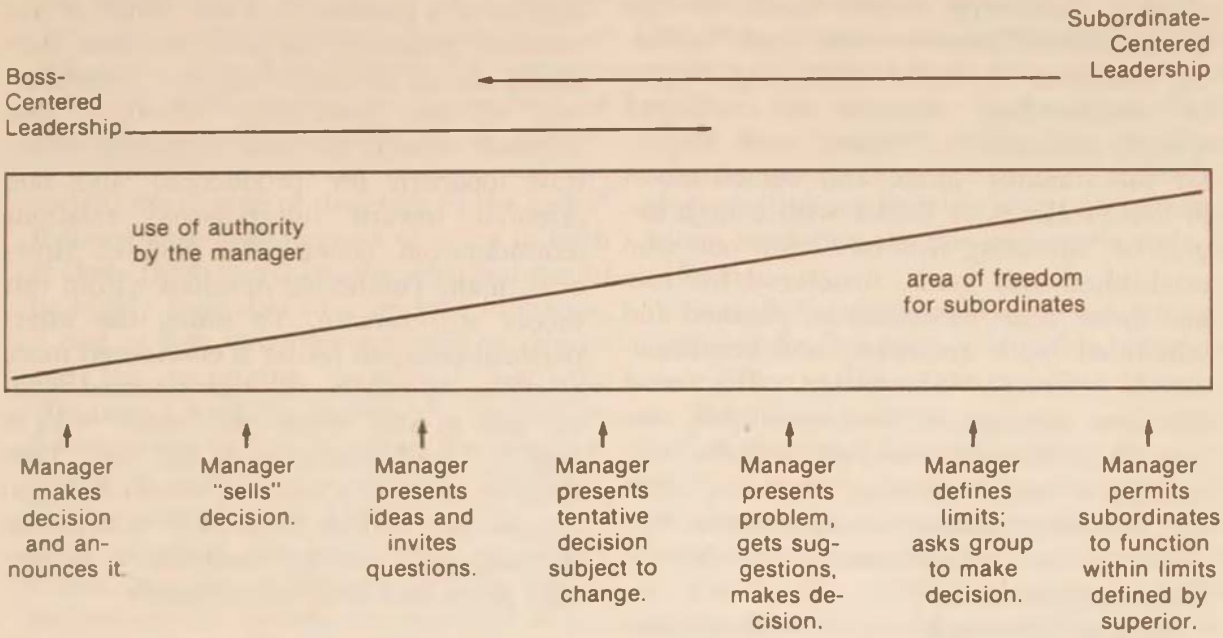
Continuum of Styles. Robert Tannenbaum and Warren Schmidt developed a continuum of leadership behavior to describe a range of behavioral patterns available to a manager.[4] They related the leader's actions to the degree of authority used by him and the amount of freedom available to his subordinates. The leader's actions described on the left characterize the manager who maintains a high degree of control, while those on the right describe a manager who delegates authority. Tannenbaum and Schmidt felt that a leader should not choose one style and adhere to it strictly but should be flexible and adapt his style to the situation. (See diagram, page 43.)

Independent Styles. Although flexibility in styles had been stressed, a number of independent leadership styles were analyzed, including the *autocratic*, the *benevolent-autocratic*, and the *supportive*.

Autocratic behavior is usually identified with a leader who commands and has many sanctions at his disposal. He is considered almost totally job-oriented, with little or no concern for the people in his organization. This leader is the one who has all the answers, and people serve only to carry out his instructions. Many times he has been thought of as being dogmatic and arbitrary in his actions. However, M. E. Shaw discovered that, in problem-solving situations, autocratically supervised persons used less time and made fewer errors than did democratically supervised subjects.[5]

Advanced as a style of behavior by Robert McMurry, the *benevolent-autocratic* leader is described as powerful and pres-

tigious but one who can be communicated with and is interested in his subordinates' problems.[6] He structures the activities of his subordinates, makes policy decisions affecting them, and enforces discipline. He may encourage participation in planning, but in executing he is the "chief." However, James Gibson, John Ivancevich, and James Donnelly, Jr., say even this style has been weakened by recent changes in attitudes within our society.[7] This may particularly be true for younger generations as they express desires to shift away from any authoritative or paternalistic environment.



The Tannenbaum and Schmidt Continuum of Leadership Behavior

The *supportive* leader is one who is considered as being somewhat democratic and participative in style. He is one who supervises his employees generally, not closely. This type of leader specifies objectives and communicates them but then allows subordinates considerable freedom in accomplishing the tasks. Rensis Likert concluded that employee-centered supervisors tend to have higher producing groups than job-centered supervisors.[8] Stogdill, Coons, Argyle, Blau, Scott, Jennings, and Gibb each had similar findings from their research. However, others do not agree. Spector and Suttle found no significant difference in output between an autocratic and a democratic leadership style.[9] M. Patchen said that close supervision does not necessarily reduce a subordinate's freedom; the subordinate may perceive close supervision as interest in his welfare.[10]

Varying ideas within and between these three independent approaches to leader behavior were never reconciled. However, independent approaches such as these did

help to provide the groundwork for the development of subsequent two-dimensional behavioral models.

Two-Dimensional Styles. By developing models to display dual dimensions of a leader's style, researchers were able to consolidate many of the independent thrusts of studies. From group dynamics, Bales founded the Great Man approach: the individual who is both the best idea man and the best-liked member is the best leader.[11] Roger M. Stogdill, Alvin E. Coons, and others at Ohio State University developed a leadership model based on the dimensions of "consideration" and "initiating structure." A leader with a high degree of "consideration" was one who developed a work atmosphere of mutual trust, respect for subordinates' ideas, and consideration of their feelings. A leader with a high degree of "initiating structure" was one who established unit goals, structured his role and those of his subordinates, planned and scheduled work activities, and communicated pertinent information. The most effective manager, it was concluded, was one whose behavior was high in both "consideration" and "initiating structure," with the next-best manager being the one who was high in "consideration" and low in "initiating structure."[12]

Another approach to a two-dimensional theory, the managerial grid, was developed by Robert R. Blake and Jane S. Mouton. Their model was based on the manager's assumptions regarding his "concern for people," the satisfying of their needs, and his "concern for production," the reaching of production objectives. To Blake and Mouton, the best manager would be one who couples the two concerns to provide the highest level of contribution and accomplishment.[13] Their model and its accompanying surveys have possibly been the most widely used instruments to identify managerial styles. However, there is an important caveat associated with this model: it may identify a manager's assumptions and concerns without identifying his actual leadership behavior. The model has had its most informative value when surveys are completed not only by the manager himself but also by his subordinates and superiors concerning him. Blake and Mouton subsequently expanded this model into a three-dimensional grid.

Overall, the behavioral theory has made a valuable contribution to the study of managerial styles. It has provided a classification of a number of styles. Much of the research generally supports the idea that styles can be characterized by a combination of two leadership behaviors, one oriented toward the task (initiating structure, concern for production) and one oriented toward interpersonal relations (consideration, concern for people). However, many conflicting opinions within this theory still remain. To some, the interpersonal-oriented leader is considered more effective; to others, the task-oriented leader; and to still others the leader who is high in both dimensions is the best. Thus there developed a need for research to integrate the various ideas and incorporate the impact of varying situations on leadership styles and their effectiveness.

situational theory

Deficiencies in past theories have provided the stimulus for the most recent of the theories, the situational view of leadership. Leadership is explained in the interaction between the leader and variables in his work situation—his personality, his followers, the task, and the organizational environment. Paul Hersey and Kenneth Blanchard see the manager's leadership process as a function of the leader, the followers, and the situation.[14] D. Katz and R. L. Kahn feel that leadership acts are

all different for different organizations, managerial levels, and situations.[15] At high management levels, interpersonal skills are more important, while at lower levels, task approaches are more necessary.

Fred Fiedler's Contingency Theory of Leadership Effectiveness is the principal situational theory. With more than fourteen years of research as a basis, Fiedler concluded that, to be effective, a leader must match his style, whether task- or relationship-oriented, with the demands of the situation. The leader must assess the situation for its degree of favorableness (or unfavorableness) to his style of influence. This favorableness (or unfavorableness) would depend on (1) the level of the leader-member relations, (2) the amount of power inherent in the leader's position, and (3) the degree of structure in the task.[16] If there were high degrees of value in each of these three variables, the situation would be highly favorable to a leader's influence; if one or two variables are high in degree and the remaining variable(s) low, the situation would be moderately favorable; if low values in the variables, the situation would be highly unfavorable to influence. If, for example, the leader-member relations are good, the leader has the power to fire, promote, or demote, and the task is spelled out step by step, the situation would be highly favorable to the leader and his influence. On the other hand, if the leader-member relations are poor, the leader has little inherent power in the position, and the task is nebulous and undefined, the situation would be highly unfavorable to the leader's influence. To Fiedler, it is easier to be the well-esteemed foreman of a construction crew working from a blueprint than it is to be the disliked chairman of a volunteer committee preparing a new policy.[17]

Fiedler concludes that a task-oriented style is more effective in situations in which the leader has very much or very little influence, and a relationship-oriented leader is more effective in situations only moderately favorable to his influence. In Fiedler's words, ". . . the appropriateness of the leadership style for maximizing group performance is contingent upon the favorableness of the group-task situations."[18] Although he feels the leader should diagnose the variables in his situation, Fiedler suggests that it may be easier and more effective for the organization to engineer the job to fit the manager than to change a manager's leadership style to fit the job.[19] In other words, the organization should match up a particular manager and his style to the demands of the situation or alter the variables within the situation, i.e., the power that goes with the leadership position, so that the situation becomes more conducive to the manager's style of influence.

Overall, the situational approach to leadership styles has been a valuable contribution. More realistic than previous theories, it shows that there is no "one best" style for all situations. Launching from the early efforts in this theory, greater research efforts are presently being conducted. Fiedler and others suggest that further research is needed to encompass more variables that may be within the managerial situation.

ATTEMPTING to define and determine a proper managerial style is an extremely complex task for any manager. This article has shown that such a task may be just as perplexing for authorities in the field of management. Summarizing some of their ideas, this author has presented the trait, behavioral, and situational theories of leadership styles. Although some leadership traits may still be valid, the trait theory seems to have less importance than in the past. The behavioral theory has formed

the basis for many managerial practices of today, but it still has some problems in providing an integrated style of leadership. The situational theory shows promise of integrating a theory of styles, but further clarification is needed. Overall, the evidence is becoming clearer that there is no single, all-purpose style of behavior that is effective in all managerial situations. Someday, experience and research may provide us with "the one best way." Until then, each manager must remain open-minded, informed, and adaptable.

Air Command and Staff College

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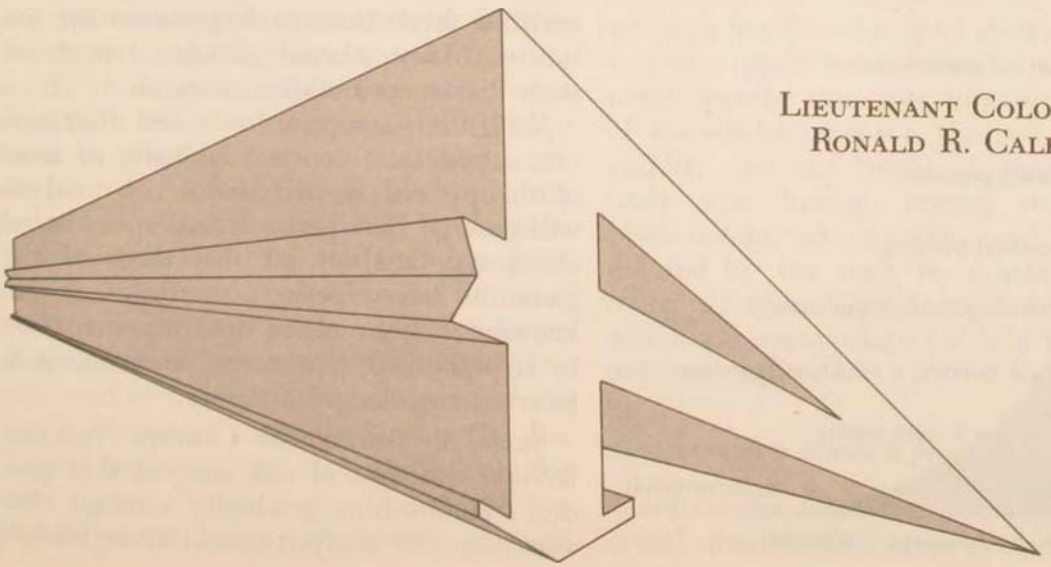
CAN ACADEMIC MANAGEMENT RESEARCH BE PROFITABLE?

LIEUTENANT COLONEL
RONALD R. CALKINS

MANY people, over the years, have questioned the value of academic management research conducted by Air Force students in graduate or professional education programs. There has been little rebuttal because, on the whole, it is almost impossible to trace the value of academic research. A stronger challenge, though, has been to question the ultimate value of the research findings to Air Force functioning. Does academic research just carry on traditional educational methodology or can it be both educationally and organizationally valuable? It is my belief that academic research can be both, which is the reason for this article. Unfortunately, academic management research is not as valuable organizationally as it should be. The reason for diminished practical value is that the majority of both academic and field research is incomplete. The "incomplete standard" for management research was caused by



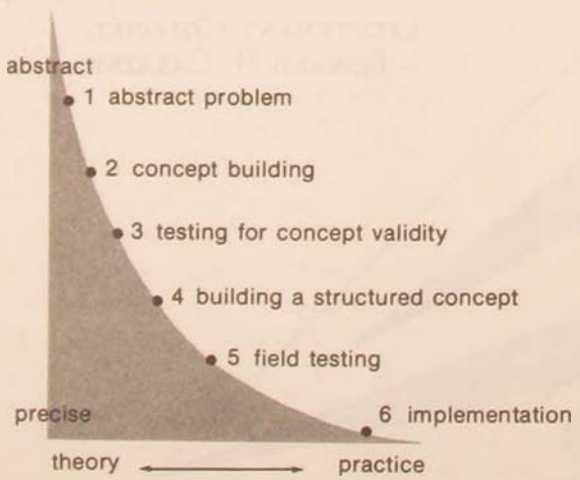
inadequate time, inaccessible data, and failure to concentrate effort on long-term priority problems.

I will support these assertions by discussing the ideal research process, the incomplete research process, and the problems with time and data, which tend to pressure both military academic institutions and field agencies into supporting an incomplete research process. The discussion will end with proposed solutions that were found to be useful.

ideal research process

The ideal management research process may be defined through six stages. The stages are represented in Figure 1 with the understanding that there is no clear-cut point of separation between stages. In fact, the process is more correctly conceived as a never-ending cycle through several levels of abstraction and generalization. For example, we might identify our problem as the difficulty in predicting the costs of a weapon system in acquisition. The requirement for cost prediction is nothing new—it has been with us a long time and will probably always be a part of the managerial job. Cost prediction, though, is a symptom. An example of the many problems in the cost of weapons is risk analysis. This risk analysis example will be carried through the six stages.

Figure 1. Stages of the research process



Stage 1: Abstract Problem. The process begins with the expression of an abstract problem. If we knew more about the risk involved with each step in the acquisition process as related to final cost, we might be able to do a better job of predicting weapon system costs. Someone coins a term and we begin to refer to this concept as "risk analysis." No one knows exactly what it is, and there are likely to be as many concepts as there are people who use the term. Nevertheless, knowledge about risk analysis may provide a predictive tool for the cost of weapons. The term is bandied around, and soon we have a management research problem called risk analysis.

Stage 2: Concept Building. Once risk analysis becomes an identifiable problem, the first research efforts are concerned with descriptive syntheses of belief from any sources of available knowledge merely to define the problem and render tentative and abstract solutions. The conclusions to these studies are nothing more than generalized predictions or hypotheses for the future. Many journal articles report on stage 2 concept-building research.

With the passage of time, and after several attempts, a concept inclusive of most of the present knowledge of risk analysis will emerge. The generally accepted belief about risk analysis, at this stage of the game, is based upon a synthesis of old knowledge from many disciplines applied to hypothetical situations. As such, it is inferred knowledge—a theory.

Stage 3: Testing for Concept Validity. Several concepts of risk analysis that predict relationships gradually emerge. Research on risk analysis should move toward

the generation of numerous studies that test parts of these predictive concepts in specific "real world" situations. For example, several studies might concentrate on testing the predicted sources of risk. Other studies might concentrate on predicted risk variables by contractor characteristic variables, and so on. For each of several major subdivisions of risk analysis, we should generate a number of studies that test theoretical predictions in specific real-world instances using real-world data. Over time, the many individual studies would derive and empirically test predictions from the risk analysis concepts in specific instances.

The first two stages consisted of old knowledge put together in new ways to arrive at hypothetical solutions. It is important to note that stage 3 is the first research in which new knowledge is being created with each test for the support of a predictive hypothesis. The creation of new knowledge is the key to real-world progress and whether management is or can become a science.

Stage 4: Building a Structured Concept. The testing stage consisted of many individual studies that, when taken together and synthesized, would tend to validate and define the parameters of a risk analysis theory in terms of generalization. In other words, in what situations and under what conditions does a risk analysis concept seem to predict cost relationships accurately? Now, a few studies should identify the research trends established by the new knowledge created by the many tests in stage 3. Here we hypothesize the future in terms of specific policy application to weapon systems acquisition programs. Many staff studies fall into this category of research. However, unless sufficient time has elapsed between two staff studies on the same topic, adequate new knowledge has probably not been generated through stage 3 testing to shed new light on the subject. This phenomenon could well be the basis for the phrase "reinventing the wheel."

Stage 5: Field Testing. If we were ever to codify risk analysis to the point of implementation, such a management program should be field tested in a representative situation before wholesale policy change is directed. Field testing has always been accepted for hardware but often seems to be ignored for new management programs.

Stage 6: Implementation or Practice. The implementation stage, while a part of the ideal research process, is not normally a function of researchers. An agency, aware of the research, would implement findings because the original symptom still exists and the new knowledge created by research would appear to offer a solution. Researchers would probably continue their analysis of associated problems in a continuing research cycle until theory and practice merge in complete knowledge about the problem.

If the ideal research process is a valid construct, then a conclusion related to the role of student academic research follows. The majority of student studies should be focused on the concept testing of stage 3 where a few broad-scoped abstract theories can in a sense be narrowed and tested in many specific situations to create new bits of knowledge about a theory's predictive validity and the limits of generalization. Only after enough testing studies have been conducted can the new knowledge created by the tests be synthesized into more structured predictions in stage 4, which are appropriate for field testing and implementation.

the incomplete research process

Compare the ideal research process to the actual situation as it often exists today. The

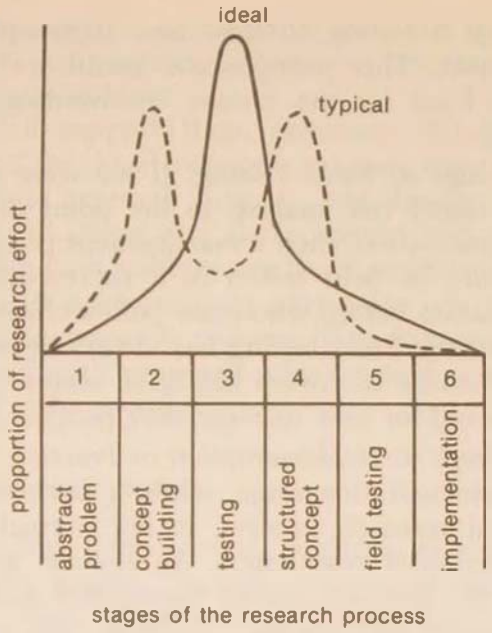


Figure 2. Typical versus ideal research process

comparison is depicted in Figure 2. The testing-of-concepts stage of the ideal research process is often slighted in both academic and field research; and as a result, much of our research has been of the stage 2 concept-building and the stage 4 staff study variety, without adequate generation of new knowledge through testing in stage 3. These theory-building studies of stages 2 and 4 do not create new knowledge, but rather the results are in a sense predictions derived by inference or relationships from a synthesis of old knowledge. Much of that old knowledge is based on theory, authority, personal experience, and expert opinion. Most of today's magazine and journal articles on management report on research that is based upon a review of the existing knowledge about the problem. Upon examination, the existing knowledge on which these articles are based is not new knowledge gained through tested predictions but rather old knowledge from retrospective analysis.

Decisions on real world problems are of necessity based upon staff study predictions rather than on fully tested hypotheses—all the more reason to emphasize theory testing as the standard for student academic research. For research to be useful, it should lead to management concepts that predict relationships. The only way to learn whether a prediction works is to put it to the stage 3 test in a real world environment. Academic research is one situation in which we can afford to test these predictions and in terms of the philosophy of science: create new knowledge.

Basic to the philosophy of scientific research is a belief that new knowledge can be created through testing predicted relationships. Without controlled testing we can only find knowledge through the slow process of retrospective historical synthesis in which we lack control and often data. Science forces the knowledge issue by (1) using historical synthesis to build a logical predictive relationship and then (2) finding or creating situations and data to determine if the prediction holds true. Science is indifferent to whether the prediction or hypothesis is supported, for in either case new knowledge is created by testing predictions.

The issue over hypothesis-testing research can cause friction between researchers and practitioners. The theory building in stage 2 and the more structured best possible solutions of staff study models in stage 4 merely synthesize old knowledge to infer possible solutions. Although these kinds of studies are often well done and useful for decision-makers, they are nevertheless incomplete research that adds little to knowledge needed in the modern management environment.

Figures 3 and 4 illustrate the idea of building knowledge. Figure 3 represents

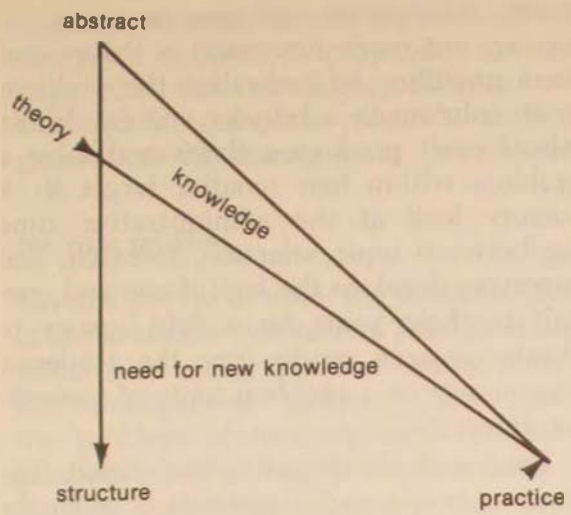
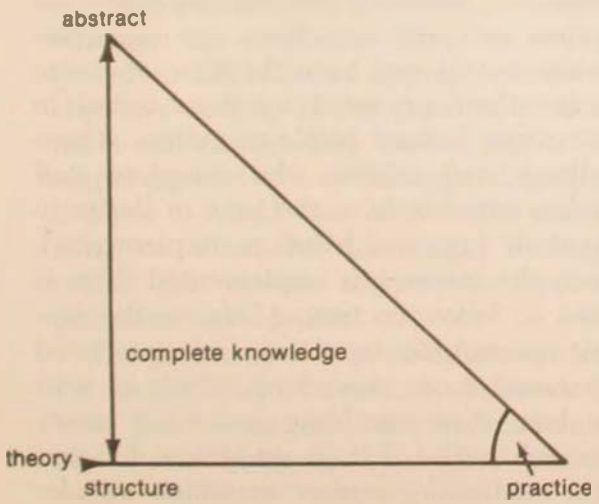


Figure 3. Relationship of incomplete knowledge to structured theory and practice

the state of today's incomplete knowledge about risk analysis. Figure 4 represents the ideal of complete knowledge when managers can predict with 100 percent accuracy. Note how structured and therefore more accurate is the predictive theory in Figure 4 as opposed to Figure 3. In Figure 4 managers can "practice what they preach" because there is no difference between theory and practice. Since the predictions are 100 percent accurate, we use the theory. We discard theories when they cease to be accurate predictors. For example, no one has "proved" Einstein's theory of relativity. It will always be a theory and only useful until replaced by a better predictive theory.

Figure 4. Relationship of complete knowledge to structured theory and practice



Unfortunately today's knowledge about risk analysis is as depicted in Figure 3. The continual cycling of stage 2 and stage 4 research studies depicted in Figures 1 and 2 will do little to create the new knowledge necessary to produce a more structured and hence more accurate predictive theory on risk analysis.

If one seeks solutions to problems, the ultimate answer is the total knowledge that scientific philosophers call law. The best research alternative appears to be the creation of new knowledge rapidly through integrated research projects in which the preponderance of research effort occurs in the tests of stage 3. To accomplish this, sound theory should first be developed on the basis of old knowledge and then tested for predictive validity through a series of situation investigations. Each of these stage 3 studies would provide possible modifications to theory as a result of the new knowledge gained from the test results.

The process is slow, but nevertheless faster than the alternative of recycling stage 2 and 4 studies until we find ourselves in the present stagnated situation. Today, our individual research studies consist mostly of stage 2 abstract management theories and stage 4 staff studies. One's favorite management theory is merely a matter of taste rather than a choice based upon the support of many validation-testing studies. Instead, we should have many

stage 3 validation studies that when synthesized in stage 4 could produce a mature research trend.

THE ideal research process is being aborted in academic institutions and field agencies alike. An overview of academic dissertations, theses, journal articles, and staff studies on management leads me to believe that the academic institutions and practitioners produce an overabundance of theory-building research and a paucity of theory-testing research. I cannot speak for practitioners in the field, but I can speak of the research conducted by academic institutions. Two major problems cause the low proportion of student-conducted theory-testing research. The problems are time and data. Time and data problems tend to pressure our academic institutions into accepting incomplete theory-building research as the standard for formal thesis and dissertation requirements.

the time problem

Generally, a lack of time creates pressure for research implementation before the research process is complete. Adequate new knowledge has not been gained to establish research trends. Two dimensions of the time problem may help illustrate the pressure to support theory-building as opposed to theory-testing studies. One of the dimensions is time and the narrow topic; the other is time and the broad-scoped topic.

Time and the Narrow Topic. My experience with agencies in the field has led me to the conclusion that a good number of the narrow and researchable problems submitted to academic institutions are of the "put out the fire" variety. "The boss wants the waiting lines at the hospital cut in half without spending additional funds." Companies and government agencies are not much interested in theory and seem unwilling to generalize the problem or its solution to a broader context. If the school can't produce a thesis and solve a problem within four months, forget it. A cursory look at the administrative time lag between topic selection, research, and reporting develops the fact of one and one-half to three years for a field agency to obtain research results from the academic community on a problem topic of immediate interest.

Time and the Broad-Scoped Topic. The topic of scope and magnitude is as in the example we have used: predicting costs of weapon systems in acquisition. Usable results through student research on such broad-scoped topics will likely require a number of years. Whether the ideal research cycle is accomplished through contract research, academic research, field research, or some combination thereof, it will literally require years to move through the concept-testing stage. Time is required to move through a mature research cycle and finally into field testing and possible implementation.

The time problem on broad-scoped topics is affected by many practical and political factors. Those faculty who use student research as a basis for consulting contracts may not have the time or desire to see their proposed solutions tested in any sense before implementation. Those military staff officers who complete staff studies may not have the time or desire to see their proposed solutions implemented. Once the research is implemented there is often no follow-up testing because the one-shot research contract is over or interested personnel have moved on. Students who conduct theory-building and staff study research suffer. If their study was not part of a continuing project in which all elements of a complete research process were

anticipated, students will be released with sheepskin in hand to perpetuate unknowingly the theory-building atrocity as a standard for complete research on future generations of management practitioners.

the data problem

Given a period of time, the research efforts of our academic institutions can use student research to nibble away at testing some of the management theories. This ignores the problem of securing data for testing predictions. The biggest single reason for the low proportion of studies that create new knowledge through stage 3 concept testing is data—either a lack of data or their practical inaccessibility. Given the constraints on an average student, it is difficult enough for him to synthesize and infer a predictive concept, more so to find an existing situation and data that will provide a reasonable test in a real-world situation.

The majority of management concept-testing studies require military agencies or companies, in the near vicinity of the school, that will support the student research effort. When a cooperative agency is found, the student must conduct extensive *a priori* analysis merely to determine whether the available data can be converted to information appropriate for the objective testing of his prediction. Sometimes our students find limited support and empty promises when the supporting agency is asked to spend some time in the research effort or when the data begin to suggest results that do not support the sponsor's preconceived solution.

The problems of time and data are critical to the kind of academic research that tests predictions in order to create new bits of knowledge. If my thesis is accepted —that academic research can be made more useful by increasing the proportion of theory-testing studies—then we should focus on some recommendations that may help alleviate the problem.

recommendations

Research Education. Academic institutions should instill a macro view of research, demonstrating the place of individual student academic research in relation to a dynamic research process, from problem concept to implementation. We should emphasize the desirability of many individual research studies that test predictions so as to create a body of new knowledge. This new knowledge, when taken as a whole, may be synthesized to establish research trends. Students and practitioners in the field may learn that each research study need not, in itself, produce a new Salk vaccine. However, each such study should very likely add new knowledge to the research cycle.

Research Management. Good research management should be directed toward integrating individual studies into a complete research process on a few priority problem areas. The managers of research programs should focus their efforts on a wide variety of techniques designed to negate the time and data problems that render stage 3 testing studies difficult to accomplish. Although the techniques cannot be clearly centered on either of the problems, we will concentrate on time first, then on data.

I think it fair to say that increasing the proportion of concept-testing studies at the expense of concept-building studies will effectively decrease the time required to complete an ideal research cycle on one broad topic. If this belief is sound, then those who manage research programs should stress—or even require—a high proportion of student studies that test predictive concepts.

One successful approach is to take full advantage of available time by integrating the student research program throughout the full interval of a student's academic program. If we create new knowledge through concept-testing research, then with a little thought research can be integrated throughout a curriculum consisting of many individual courses covering a multitude of subjects. An integrated research program should involve certain identifiable elements interwoven throughout the academic calendar. These elements should include faculty screening of topics before student arrival, early topic selection by students, a review of existing knowledge about the topic as term paper requirements in appropriate courses, instruction in the macro view of an ideal research process, and instruction in the tools of research. The tools should include the characteristics of research writing and some attempt to demonstrate how the theories and quantitative techniques developed in other courses are applied in research. A survey course in theoretical research design is necessary. Some kind of a research proposal, rewritten, critiqued, and approved, is a very helpful vehicle. These research elements should be structured and integrated to occur as early in the academic program as is practical.

In my opinion, it is sheer folly to place research in an academic square as you would a traditional course and expect a quality theory-testing study to begin and end within a three- or six-month period of time such as one academic quarter. Concept-testing research is an iterative process in which considerable research must be accomplished merely to define the problem and determine if data are available in a form necessary for testing. In applied concept-testing research there are so many possible delays beyond the control of students that time is wasted and research quality deteriorated if a research program is not designed to integrate the effort from beginning to end into a student's academic program.

One way to overcome problems associated with data is to relate the student research programs to faculty professional development. Several techniques are available to research managers. Partially successful but controversial techniques have included (1) soliciting topics, (2) requiring faculty members to personally screen all research topics from all sources, and (3) requiring each faculty member to submit for student selection some minimum number of topics that he has reviewed and found to be researchable. The faculty topic screening requirement will encourage faculty to initiate contacts with research sponsoring agencies. This contact usually provides some reasonable assurance, before topic selection by students, that data are indeed available for testing. This association of the faculty with sponsoring agencies often leads to ongoing relationships that generate a continuing series of student research studies. These associations also serve to keep the faculty in contact with the real world. Students are provided with ready-made situations where data are available to test and thereby create new knowledge. Individual academic research studies may begin to support the ideal research process and also become the foundation for much of the faculty professional development activities—which in time renders the teaching and the school more responsive to a profession's needs.

Research managers should find situations where data are available and advertise these data sources to the faculty. We have found both faculty and students will tackle almost any problem where data are readily available for stage 3 concept testing.

A potential service available to all management schools for obtaining data was

recently initiated with the establishment of the USAF Business Research Management Center. This agency, at Headquarters USAF level, is co-located with the School of Systems and Logistics at Wright-Patterson AFB, Ohio. The center is beginning to influence management research by coordinating between academic facilities that need to do research and agencies in the field that are willing to support research efforts with data. In this manner the center is attempting to influence the thrust of individual studies so that several studies may form a complete research process.

ACADEMIC management research is concentrating too much on theory-building studies and not enough on theory-testing studies. An efficient and complete research process requires the right proportion of both kinds of studies. I have suggested techniques to help academic research become more useful and profitable by moving toward a more complete research process. Although practitioners must render decisions based upon the best hypothetical solution of staff studies, perhaps we risk too much when such theory is based on old and incomplete knowledge. Air Force managers have access to the latest analytical techniques, sophisticated computers, and massive amounts of data. However, until we shift the emphasis of analyses toward theory testing to create knowledge, Air Force managers will continue practicing modern gamesmanship rather than mature science. Mark Twain expressed the difference when he said, "It's not what we don't know that hurts us, it's what we do know that isn't so."

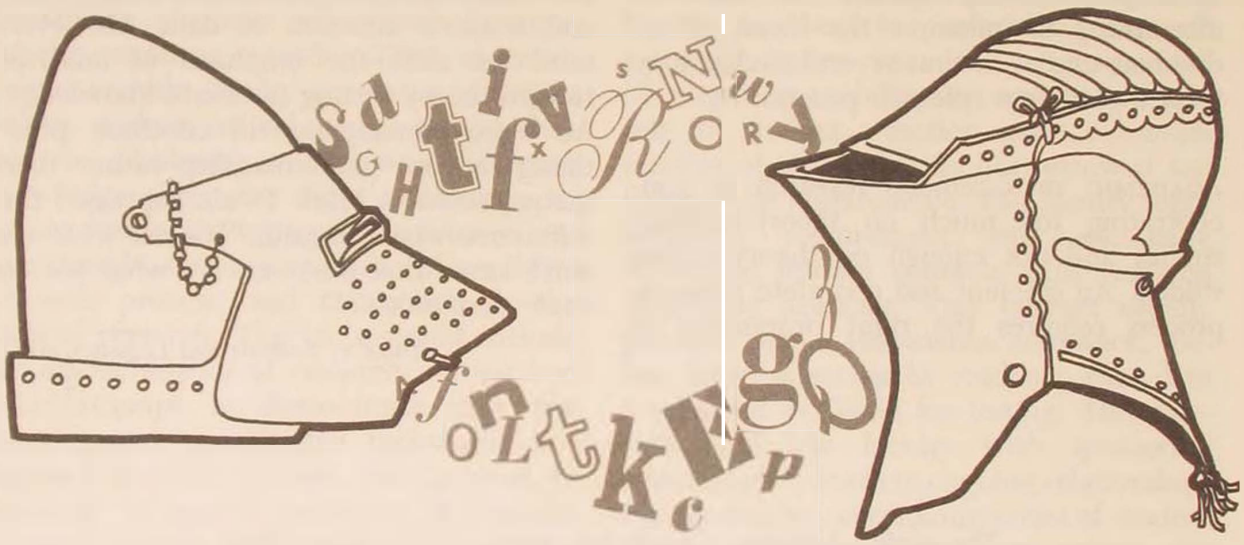
School of Systems and Logistics, AFIT

The world's high-time aircraft has retired to the Henry Ford Museum, Dearborn, Michigan, after logging nearly 85,000 hours and 12 million miles. The aircraft is a DC-3 which was built in 1939 and had been flying for North Central Airlines since 1965. Its logged time of 83,032 hours and 52 minutes is believed to be more hours than any other aircraft in the history of aviation. In its 36-year history, N21728 had worn out 550 main gear tires, 25,000 spark plugs and 136 engines. Of the 10,928 civilian and military DC-3s built by Douglas, an estimated 3300 are still flying.

—*Business and Commercial Aviation*
July 1975, p. 24

MILITARY TALK

MAJOR BILL WALLISCH



NO THEORY is worth its salt unless it can be applied or generalized to a specific situation. With the Source-Message-Channel-Receiver (SMCR) concept of face-to-face communication in mind, I think we should take a careful look at on-the-job "military talking."[1] Our special situation adds a new dimension to person-to-person communication, or at least magnifies some aspects of the elements thereof.

We always tell the new troops at Lackland that the salute was born in the days of bold knights, who, when encountering each other in the forest of old, would raise the visors of their armored helmets. So the legend goes, this kind of greeting, or getting a better look at Sir So-And-So, was the eventual forerunner of the salute. I submit to you that we still wear our suits of armor and that we still have difficulties "hearing" and "seeing" each other through all the "armor" we wear. What I'm talking about is our uniform, our special identification tag as professional military persons.

Now, this isn't going to be a treatise on why we should abolish the wearing of the uniform, the rank structure, or, for that matter, the salute. Indeed, I think that our uniform and special way of organizational life present some unique points of focus in

terms of human communication. We do wear a uniform in the military; and the uniform can set up special kinds of "noise" in our communication efforts.

When a supervisor meets face to face with a subordinate, a certain formality in communication behavior exists. For example, a colonel talking to a major will receive verbal acknowledgment for his rank in the form of "Sir." This formal element will be added to the encoding behavior of the subordinate as he speaks to his superior.

Every organization has its special status recognition and verbal rules for communicating up or down the rank structure. However, two highly placed executives from different geographical areas of the same company might not recognize each other as readily as do men in uniform. We "wear" our status. And that outward sign carries with it a certain formal, structured behavior in our speaking and interaction.

When a young airman meets his first sergeant, he automatically knows how a part of his verbal behavior must be structured. A segment of his message must be carefully constructed in order for him to make a good communication link between himself and his superior. By the same token, one who wishes to invoke a bad connection or deliberately arouse hostility in a receiver knows what to "alter" or leave out of his message. Ask or say what you will, but properly encode it.

In other words, some of the "strategy" of encoding is prescribed when you encounter a fellow military person. You, for the first time, encounter a new individual with whom you must interact verbally, and automatically you "read" him. I know you have watched eye activity in that split second of initial contact that happens when meeting someone new. The rank is usually first. Then, quick, to the left pocket for the following check: Let's see, command pilot, DFC, MSM, Commendation Medal, and he's been to Korea. The wings or badge (or lack of one) tells you something; the ribbons can tell whole histories in microseconds.

The left pocket alone tells us of successes, failures, age, length of time in service, and other subtle "clues" about this person. The neatness of the uniform, the correct or incorrect placement of its subtle parts, and the shine of shoe leather all contribute to an immediate "impression." The combinations are legion, and the implications would keep a Machiavelli at his manuscript for years. Your communications behavior—to some extent—will always be structured by that "suit of armor."

Perhaps to someone younger, not intending to stay in the ranks for thirty years, this visual picture might create an instant stereotype. Your message can be immediately zonked, because you are a "lifer." Your receiver may instantly decide not to listen to anything you say, because his evaluation of the source has told him that there can be little in common, that effective communication is impossible, and that he must "turn you off."

Now, many communication experts refer to receiver / source qualities as "fields of experience." That is, background, education, status, attitudes, and personality qualities all go into the makeup of individual fields of experience. Two master sergeants with Berlin Airlift ribbons and four clusters on their longevity ribbons don't have to ask a lot of preliminary questions of each other. There is an immediate "perceived" similarity in this forming SMCR situation.

One can almost picture these fields of common experience meshing together or overlapping in the interpersonal situation. Some experts say that the amount of overlap will be a pretty good indication of how successful the conversation (or persuasion) will be. I'm saying that it's prob-

ably a pretty good notion to consider, because we "wear" a good deal of our experience on the military uniform. A "good" interface, or meshing, or overlap might be identical uniforms. Remember, now, that I'm generalizing. Neither this theory, nor any other that I know of, will work every time.

If we perceive someone as being "like" us, we'll probably "listen up" to what he has to say. Or, if his field of experience generates proven authority or expertise on a subject, he will command attention for his ideas. In the military, we are better able to tell those with experience, authority, and specialized expertise by virtue of certain outward signs.

The communicologist calls this, among other things, "source credibility." All of the qualities, attitudes, or other personal differences are referred to as "variables." What this does is shift the focus a little, but it points to the same thing. A colonel with the silver star who wears the wings of a command pilot will have an immediate high credibility in my mind on the subject of flying. To a young troop, he may have low credibility on the subject of legalizing marijuana.

Source credibility for a speaker or for one who wishes to carry on a successful communication is dictated by many such variables. If a flight surgeon enters into a conversation about flat feet or gastrointestinal upsets, he will command attention. It would be pretty foolish for me to try to add to—or, heaven forbid, disagree with—what he said. No one really wants me to chime in while *the* "word" is being given.

Some of us, however, don't have such an easy "introduction." We don't have that kind of automatic source credibility. We must prove our expertise, sincerity, or even authority. That's when we really have to analyze, plan, and encode with a good deal of thought and natural cunning. I can think of no more difficult task than being one who has command authority yet still needs to establish source credibility with a particular audience. I know that many of today's Air Force problems put the "boss" in just that kind of situation. It's tough, challenging, and sometimes seemingly impossible.

There's another connection we can make here, too. Source credibility is what gives the opinion leader his command of audience. The flight surgeon, legal officer, or command pilot all have firsthand information on a subject about which we might need to know something. Though this is not quite like the true small-group situation, such specialized opinion leaders work in the same manner. This is a special case when an opinion leader *does* have a badge that says, "Follow me, I'm an opinion leader." Wings, medical insignia, the chaplain's pin, a controller's badge—and many others—all denote expertise as our military fields of experience converge. Sometimes an asset, sometimes a hindrance, our uniforms can control the nature and outcome of our communications.

It's only common sense that, in the eyes of the receiver, someone whom he recognizes as a highly credible source will be most effective in getting him to "listen." On the speaker's platform a quick announcement, like "Colonel Cooper has been to the moon," makes for immediate high credibility. In the person-to-person confrontation taking place between you and a somewhat unenthused troop, there may be a quick struggle for common ground on your part before the "word passes." When you are working to establish your credibility, you *are* working.

Human communication scientists and psychologists also look at the working situation in terms of the roles we play. To be a military person—a master sergeant,

captain, first sergeant, or major—is to have a specific "role" in life. It's no different from such role designations as housewife, doctor, or teacher. Formally this is called "role theory," and it's got to be the same thing Shakespeare was talking about when he likened us all to actors on life's stage. Like it or not, we all have a part to play.

So, that military armor I was talking about—that outward indication of our field of experience—is also an indication of our role on the job. The badges we mentioned can narrow the role down even further, besides helping us with source credibility. The role can be read by all, but by some with "a fine-tooth comb." The little old lady on flight 21 out of Kansas City is sure everyone of us in blue is a pilot, but *we* automatically read the specific roles as we pass each other taking a seat in the plane. Unfortunately, there's really no way to "telegraph" our sincere concern for the welfare of a young troop by a badge or medal. That comes from inside and depends at times on some careful and delicate encoding.

The uniform tips us off about the military occupation—or whatever—and we can usually make generalizations about what kind of role that individual is expected to play. But the old folks said a long time ago that you "couldn't judge a book by its cover." Theory can only take us so far. When we go beyond the threshold of individual differences, we must deal with the special nature of each human being. Our observations and theoretic approaches are only an aid in taking the time to be careful about such individual considerations.

One can never be "all things to all men." Sometimes I think those in supervisory roles become overfrustrated when they fail to communicate effectively with "everyone." In some cases, no matter how much effort has been put forth, successful communication is impossible. Grave differences in perceived fields of experience (either real or imagined) put us in the position of talking to that "brick wall." The best solution then may be to carry out the goal of the communication through a third party who is perceived by the receiver as "alike."

Probably that old rule of thumb—Be yourself—is as firm as any in the first-encounter situation. It's especially noticeable when a person wearing or "standing" for one role attempts to deny or step out of that role for the sake of being accepted. I say "accepted" because role denial almost always hurts the organization. It's winning friends at the expense of the mission. In trying to lessen the barrier that may have been set up by the outward message, it is possible that one might "cast off" too much.

Once two individuals begin to interact, the perceived barriers set up by things like the uniform can be made to fade away. Personal, rational contact can do much to expose the person within the role. Perhaps the best kind of rapport is one of mutual respect. The young troop may come to respect your intention and the stance of the larger mission. Fields of experience may rapidly overlap as the two-way flow of communication between a military source and a military receiver begins to operate.

Some may think that the implied connotation of "role theory" is that of wearing something false or taking up a phony stance. Not so. The champion golfer, the expert marksman, the renowned artist, the skillful pilot, and the truly fine supervisor are all individuals who have accepted the challenge and responsibility of a specialized mission. This is the concept of role: doing your thing well.

Just as the golfer or surgeon must practice his style, so do we all "internalize" the meaning and the conduct of our roles.

Some roles, some of the careers people choose, demand more professionalism than others. This, I think, is particularly true of the military leader. The things "expected" of him, the rules under which he must function and which he must uphold, and the mission which he must carry out—all make for a difficult role. Professionalism is just another way of saying that he has deeply accepted—internalized—that challenge.

When an individual has deeply internalized his responsibilities, he is so perceived by those with whom he comes in contact. Even though this individual may be fulfilling a role not especially liked by another, his sincere and dedicated acceptance of responsibility may elicit respect. Dedication and "being real" can oftentimes give a source the credibility he needs to gain a foothold in the interaction situation. It's the ". . . but I do respect him" phenomenon.

THEREFORE, even though the fields of experience between two individuals may differ, it is possible to develop a commonality for communication through mutual respect. Credibility can be not only expertise, or common experience, but also recognition of deep acceptance for role responsibility or belief. We may disagree, but I respect you for your conviction. This, at least, is a beginning and keeps the channel open for a message.

On the other hand, a lack of role acceptance perceived by a receiver (either real or imagined) can have the reverse effect. It may be perceived that the speaker is insincere, insecure in his position, or only "playing" his role. Such source evaluation yields a low credibility image and is a pretty good indication that the conversation will not be fruitful. If someone *has* to talk to a "lifer," then let it be a good one. One's perceived image can be an important factor in establishing effective links of communication.

One's self image, then, will be an important part of encoding behavior. How we appear to others and the self-picture we personally hold of ourselves join to form a combination that equals source makeup or the personality that encodes a message. In the military we wear an "image," and we'll probably succeed if we speak in tune with that professional image. A consistent pattern will probably yield the best results. Instant communication will occur in some one-to-one situations, while others may fall on the other end of the scale. In the final analysis, the perfect SMCR process may be occurring when the source and receiver can both turn and say that this is an instance of *two* good men speaking well.

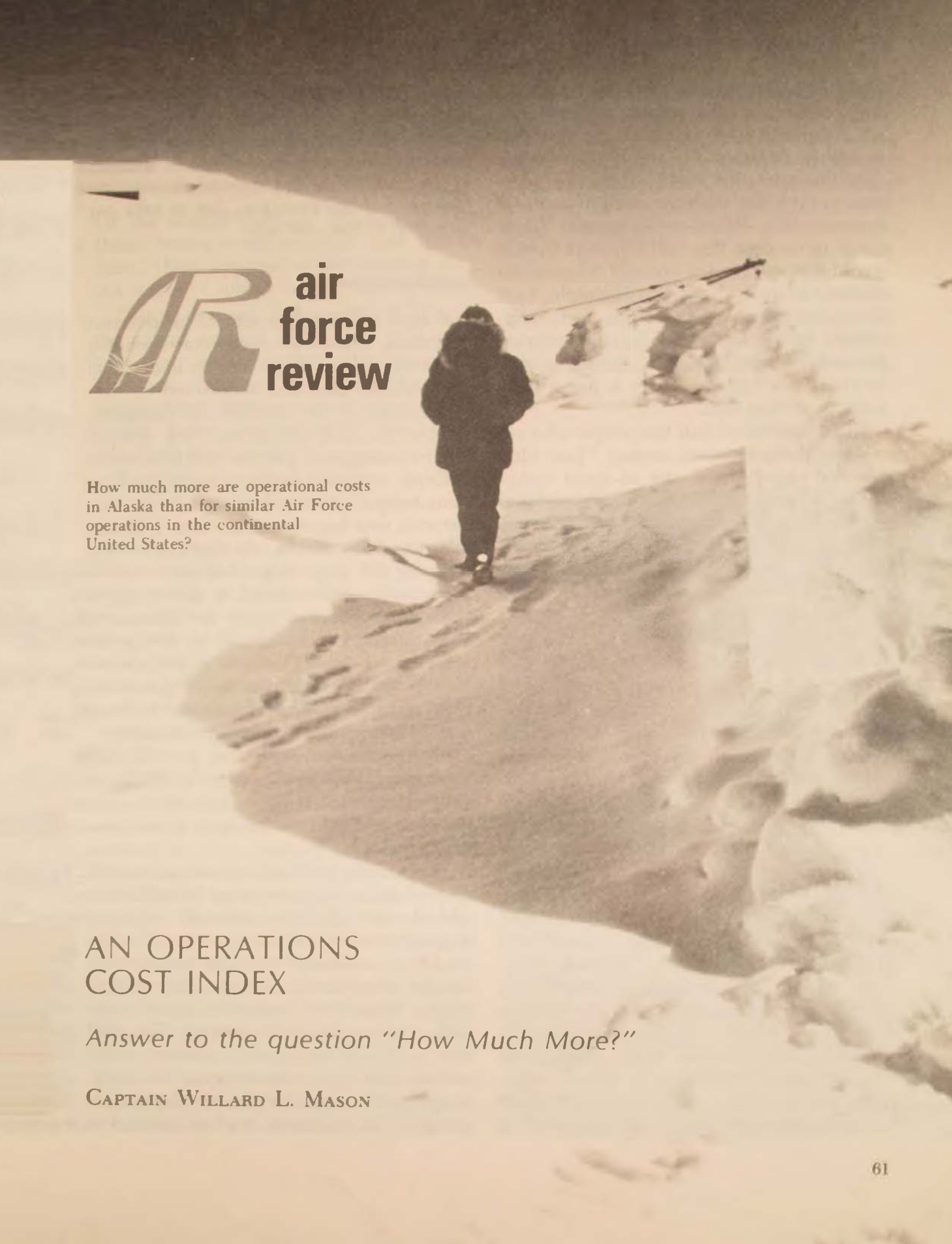
Our military environment does have an effect upon communication; it does structure certain parts of the message. Our special working uniform can be a help or a barrier. An analysis of the situation, taking the time to recognize this unique aspect of our organization, can improve communication greatly. A situation can always be made a little more bearable when one understands the underlying variables at work.

Hq Pacific Communications Area, AFCS

Note

1. For those not familiar with the SMCR model, or perhaps those interested in reading about it in more depth, I recommend David K. Berlo's *The Process of Communication* (New York: Holt, Rinehart and Winston, 1960).

air force review



How much more are operational costs in Alaska than for similar Air Force operations in the continental United States?

AN OPERATIONS COST INDEX

Answer to the question "How Much More?"

CAPTAIN WILLARD L. MASON

FOR ALMOST every Air Force operation there is some expert—a commander, comptroller, or financial analyst—who is able to answer the question "How much does this operation cost?" The same question put to the overseas analyst logically suggests this follow-up question: "How much more does this cost overseas than it would if it were in the CONUS?" The way to answer this second question is simple. Cost it out for overseas, cost out a similar operation for continental U.S., and subtract the second from the first. Simple, right? Well, as you will see, there is just a little more to it than that.

Right now about half the people who are reading this article are saying: "Just what I would expect from one of those comptroller weenies. He takes a relatively simple problem and makes it so difficult that only his comptroller brethren will understand the answer. I can see the terms coming now: EEIC, PPBS, FYDP, $Y = aX + B$! (Shudder!)"

On the contrary, dear reader, you will learn no deep dark secrets of the cost trade today. Instead you will be introduced to a problem that requires no more mathematics than arithmetic and little more economics than common sense. All you get to see is how the Alaskan Air Command (AAC) answers the question "How much more?" With any luck, someone will see applications for other overseas operations. With a lot of luck, someone will offer a better solution.

From every mission or operation, some benefit must be derived, e.g., readiness, training, coordination, etc. When an overseas mission or operation is established, some *additional* benefit should accrue relative to the conduct of the same mission from a CONUS location. For example, stationing fighter interceptors in Alaska rather than Duluth gives us an improved intercept posture that might be measured in crucial minutes. Placing a garrison of soldiers in Berlin also yields additional benefits, albeit not so readily quantified. We will leave this side of the cost/benefit analysis to the think tanks and the whiz kids in the basement of the Pentagon. Let us turn our attention to the cost side.

incremental costs

For each additional benefit of an overseas operation, there is some corresponding incremental cost. If we are to understand this cost, we must first understand the factors causing it. To simplify the discussion, reasons for cost differential are lumped into two categories, physical and man-made.

Every overseas location seems to have some unique climate. Northern Europe has the rain and fog; Southeast Asia, typhoons and monsoons; Alaska, ice and snow. Sidestepping the point that all these "weather pleasures" can be found in the good ole U.S. of A., one can easily see how these climatic features could add to equipment and support costs. The same is true for the various terrains, such as dense jungles or high mountains, and of course the mere fact of being overseas means that logisticians must cope with the problems of geographical separation. Clearly, the physical environmental differences of overseas locations add to costs, but what about man-made reasons?

The varying political systems and economies of some of our overseas locations also add to costs. Foreign nationals employed in positions that might overwise be occupied by U.S. citizens entail an indirect cost. On the other hand, cheaper labor sources might bring about negative incremental costs (bureaucratese for savings). The gold flow problem causes still another incremental cost. In some overseas locations, more costly bases might be maintained partially for reasons of local economic im-

pact or diplomatic value. The list of man-made causes for extra costs is at least as long as that of environmental causes.

cost measurement

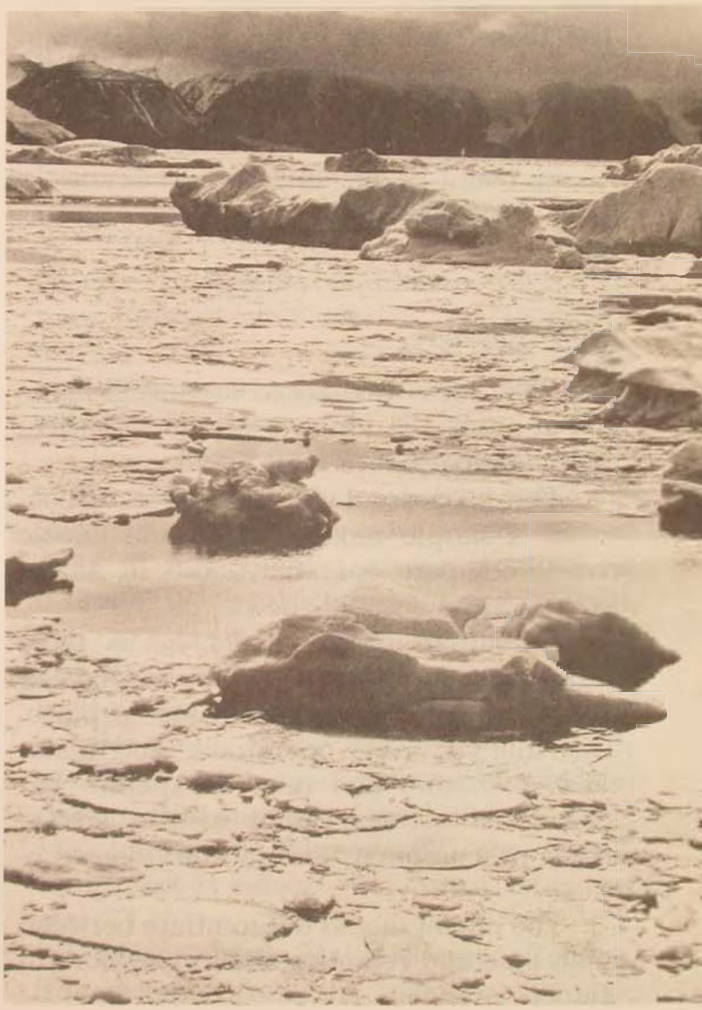
Of the several methods for dealing with these CONUS-versus-overseas cost differences, three approaches representing various stages of sophistication come to mind:

Cost-be-damned. During World War II the nation was not particularly concerned with the CONUS/overseas cost relationship. The main thing was that the fighting was taking place overseas rather than in the United States itself. Clearly the benefit side dominated the issue.

Modified subjective (skeptic). As time passed, threats seemed to diminish, and taxpayer cost awareness grew. Skeptics began to doubt the worth of the benefits. This marks the beginning of the numbers game insofar as incremental costs are concerned. All of us have heard such official statements as: "Costs of maintaining forces overseas are 'several times' greater than in the CONUS." Perhaps the phrase was the more precise but equally inaccurate "*three times* greater." Refinement was clearly needed.

Objective approach. Today we are faced with any number of indices that tell us how much more it costs overseas than in the CONUS. For example, the Bureau of Labor Statistics tells us that the Anchorage intermediate family budget is 31% greater than the U.S. urban average. Another set of indices contained in the military construction program tri-service guidances tells us that military construction in Anchorage, Fairbanks, and Point Barrow is 70%, 90%, and 250% greater, respectively, than military construction in Washington, D.C. These indices represent improvements but do not solve our problems so far as operations costs are concerned.

Obviously, we cannot afford the luxury of World War III just to ease the costing problem. Nor can we afford to keep reacting to unsupported contentions of the uninformed. This leaves us two choices: either use some indices that are handy or develop some indices tailored for operations overseas. We might as well choose the latter alternative because sooner or later someone in authority is going to ask us what the cost of raising a family in Anchorage has to do with the fuel costs of F-4s on alert at Galena AFB, Alaska, 200 miles north.



As a matter of fact, that is a fairly close description of how the question was actually posed.

An Alaskan Operations Index

The idea of constructing a model portraying the Alaskan cost differential for Air Force operations crystallized in the comptroller shop of the Alaskan Air Command during the late 1960s. The AAC Comptroller and his staff started the ball rolling by posing the following thesis:

> Granted, it costs more to conduct Air Force business in Alaska than it might cost in some other location in the South 48, but it does not cost nearly as much as is commonly supposed.

The thesis, through its suggestion of exaggerated costs associated with Alaskan Air Command operations, was posed primarily to point out that the strategic value of Alaska could be negated by cost myths. A study was then started to follow up this thesis.

study objectives

After the idea was kicked around in-house and at RAND, the following study objectives and guidelines were established.

1. The purpose of the study was to construct a simple model that would enable one to compare operations costs in Alaska to operations costs in the CONUS.
2. Operations costs are defined as those costs incurred in the conduct of ongoing operations from facilities already in place. This includes pay, operations, and maintenance monies and related expenses but excludes investment items such as RDT&E, major procurement, and military construction.
3. The model should differentiate between main base and remote station operations in Alaska.
4. The Alaskan main base situation is a theoretical main base near a large urban center. The remote station is a theoretical typical radar station. These are obviously generalizations based upon composite attributes of the many Alaskan bases and stations.
5. Alaskan main base costs should be compared to similar hypothetical main base situations in Washington, D.C. Remote station costs are relative to a hypothetical station somewhere in Montana.
6. The model should reflect the cost differential in index fashion relative to a base of 100%. For example, an index of 116 for Alaska relates to the CONUS base

index of 100, meaning that the Alaskan cost is 16% greater.

7. The model should express some range to account for generalization and make allowances for confidence of results.

model format

The format chosen to present the final indices is represented by the following matrix:

	Low Estimate	High Estimate	Best Estimate
Composite main base	XX	XX	XX
Composite remote station	XX	XX	XX

Thus, when the numbers are filled in, one can state generally that a main base in Alaska is expected to cost X% more than its CONUS counterpart. Alternatively, one could say that a particular base in Alaska is expected to cost more than X% (low estimate) but less than Y% (high estimate).

the first try at an index

With the index goals established, the analysts then turned to the actual work involved in calculating the indices required. This task was accomplished in three stages. First, a list was composed of those factors expected to influence Air Force operations in Alaska. Second, the specific costs affected by these influences were identified. Last, the actual indices—low, high, and best—were computed for each cost category defined.

Alaskan Cost Influences. The list of cost-influencing factors is seemingly endless, but for costing purposes the relevant reasons were reduced to the following list: climate and terrain, distance from major supply centers, availability of surface transportation, limited labor market, and competition for resources. A review of these forces highlights their impact on Air Force operations in Alaska.

Climate and Terrain. Although winter in the Anchorage area and along the Aleutian chain may be no more severe than in some of the northern CONUS locations, it is certainly something to be reckoned with, and the interior and northern Alaskan bases and stations are subjected to some of the harshest conditions in the world. To combat the effects of the long, cold, and windy winters, special measures are required for personnel, equipment, and buildings alike. In addition to being costly, the special equipment is subject to unusual wear and tear.

Distance from Major Supply Centers. The distance from the major CONUS sup-

ply centers affects cost in three ways. First, there is the cost for the extra distance over which the goods must be transported. Second, because Alaska is separated from the CONUS by Canada or a large stretch of water, there are some peculiar shipping tariffs applicable to Alaska. For example, it costs more to ship goods to Seattle if Alaska is the final destination than it does to Seattle if Seattle is the final destination. Third, because the time between deliveries is significantly longer, larger inventories must be kept on hand. This point is particularly noticeable at the remote stations.

Insufficient Surface Transportation. Because there are only 4000 miles of paved road, 3000 miles of secondary road, and 600 miles of railroad, it is frequently necessary to ship by air. Two of the Alaskan Air Command remote stations, Sparrevohn and Indian Mountain, as well as several communications sites, rely 100 percent on air delivery.

Limited Labor Market. The population of Alaska is only slightly more than 350,000. There are distinct limits to both the quantity of labor and the expertise available to employers. Recruitment from the Lower 48 is commonplace, and the employer (the Air Force) must bear the extra recruitment cost.

Competition for Resources. At one time the numerous federal agencies dominating the Alaskan economy were actually driving up the prices through interagency competition for resources. Because of new purchasing techniques and better cooperation, this problem has largely disappeared. However, another agency is now bidding up the prices. The oil and gas industry in Alaska is garnering Alaskan and West Coast resources that might otherwise be available to the military in Alaska.

Cost Categories. Obviously the total cost of conducting Air Force business in Alaska is comprised of cost in several categories, e.g., costs for pay, costs for flying, costs for supplies, etc. The analysts were faced with the decision as to which costs were pertinent to the model and which costs would give the best overall picture. Experts representing almost every major functional portion of operations in AAC were queried as to what costs in their functions were affected most by Alaskan influences. The answers ranged from the usual, such as more fuels for heat and power, to the unexpected, such as the costs associated with power poles slipping out of sight into the tundra. One person even brought up the cost associated with an airman's lessened morale because he is stationed at Shemya rather than Las Vegas.

To reduce the list to a manageable number, three selection criteria were used: (1) the degree to which Alaskan influences could be applied, (2) the total dollars involved, and (3) susceptibility to being measured. The following cost categories were thus selected: military personnel compensation, Civil Service personnel compensation, military family housing, facility maintenance and repair, supplies other than fuels, fuels for heat and power, purchased services, transportation of things, aircraft operations, operation and maintenance of vehicles, travel and per diem, equipment, and communications.

Indexing. For each cost category listed above, three indices were computed: low, high, and best. The low represents the best possible situation (all economies taken advantage of); the high represents the highest cost case. The best estimate lies somewhere in between, sometimes the average, more frequently the situation as actually perceived. The indices are each relative to CONUS counterparts as explained earlier. The method of computation differs according to the circumstances surrounding each category. Military pay, for example,

presents little problem. The low estimate assumes that some Alaskan troops receive exactly the same pay as their CONUS counterparts. The high estimate represents the case in which the Alaskan blue suiter receives special cost of living, housing allowance, or family separation allowance not paid in CONUS locations. The best estimate was the actual case somewhere in between the two extremes. The indices are computed by dividing AAC pay averages for each of the three conditions by average CONUS pay. Detailed financial statements and population figures allowed such computations to a reasonably accurate degree. "Supplies" represents a slightly more difficult category. Here one must consider the quantity variance (more volume) as well as the price variance (per unit cost). Furthermore, there are thousands of different types of supply items. A third example, perhaps the most difficult case, is the area of communications. Since there is no CONUS counterpart of the government-owned/contractor-operated military communication system in Alaska, our analysts had to be very ingenious. Being true economists, they simply *assumed* such systems existed in the CONUS and then costed out the assumptions. By now it is obvious that the final index results could not be totally objective. Rather, they must be a mixture of expert opinion and objective values, summarized in an objective, quantitative manner.

Weighting. All of the indices were combined into one total for each estimate (low, high, and best) based on a weighted average. Each separate index was weighted in proportion to its contribution to the total budget. Each contribution was made as "net" as possible, by considering each separate from the influences of the others. Supplies, for example, were considered after deleting the civilian pay and military pay involved in handling them.

After applying the indexing and weighting to the cost categories, the following results were achieved:

Main Base O&M Cost Index

Cost Category	Weight	Low Range	High Range	Best Estimate
Military personnel compensation	48.0	100	126	120
Civil Service personnel compensation	24.2	125	127	127
Military family housing	5.6	149	170	157
Facility maintenance & repair	3.7	100	190	114
Supplies other than fuels	3.5	106	112	110
Fuels for heat and power	3.4	112	117	113
Purchased services	2.3	128	143	136
Transportation of things	1.8	142	266	160
Aircraft operations	1.8	100	127	115
Purchased utilities & rents	1.5	20	170	125
Aircraft maintenance	1.0	101	105	102
Operation & maintenance of vehicles	.9	118	269	150
Travel & per diem	.9	100	100	100
Equipment procurement	.7	109	116	112
Communications	.7	63	78	70

Remote Station O&M Cost Index

Cost Category	Weight	Low Range	High Range	Best Estimate
Military personnel compensation	48.9	100	106	106
Civil Service personnel compensation	13.3	125	150	134
Transportation of things	12.7	177	199	188
Facility maintenance & repair	11.1	120	400	180
Fuels for heat and power	3.0	112	117	114
Supplies excluding fuels	3.0	106	114	110
Purchased services	2.2	128	143	140
Equipment	1.3	109	116	112
Purchased utilities	.7	20	300	180
Communications	.9	102	105	103
Aircraft maintenance	.8	100	100	100
Aircraft operations	.8	107	114	110
Vehicle operation & maintenance	.7	150	269	180
Travel & per diem	.6	200	300	250

When the appropriate weighted averages are computed, the final matrix is then complete.

	Low Estimate	High Estimate	Best Estimate
Composite main base	110	134	124
Composite remote station	117	161	131

From these results one can say that the average main base and remote station operations in Alaska cost, respectively, 24% and 31% more than the CONUS counterparts. Reapplication of the methodology two years later yielded respective indices of 125 and 123.

Postmortem #1. The overall results achieved from the first try at an operations index seemed satisfactory. There are many other indicators that suggest a 20 to 30% cost differential for Alaskan business, and the analysts felt their results were realistic. The methodology, however, caused two problems, one procedural and one practical.

Redundancy. It was impossible to eliminate all redundancy in the cost categories. For example, not much is left over for a vehicle operations and maintenance index when pay, supplies, and equipment are netted out. The same is true for aircraft operations, this problem being the result of the mixture of missions and budgets as cost categories—apples and oranges as it were.

Applicability. The greatest difficulty in "selling" the index to other commands and agencies also stems from particular cost categories selected. These categories do not lend themselves to operations of other services. Admiral Noel Gayler, CINCPAC, after receiving a briefing on the Alaskan indices, desired that his own staff pursue such a model for Pacific forces. In subsequent dialogue between AAC and PACOM, interpretation of the term "communications" was a symptom of the problem. The Alaskan interpretation of "communications" was as a cost category; the Pacific analysts viewed it as a mission comprised of several other categories. Matters were not helped by the fact that the communications area was and still is the toughest area to define. In another attempt to apply the methodology to larger operations, an Alaskan Command (ALCOM) index was attempted, based on a combination of Air Force in Alaska (primarily AAC) and Army in Alaska (USARAL) indices. The USARAL analysts first objected to the basis of measurement of "mission." Whereas AAC had specified no particular mission other than the one in being, USARAL desired to address specific missions such as artillery and field forces, specifying all indices on a man-year supported basis. Obviously, USARAL had some problems coping with our arrangement of cost categories. The problems were not solved, and a satisfactory joint index was never obtained.

the 1975 model

In 1975 a revised model was constructed. The basic approach previously described was retained, but one more criterion was added—applicability. The 1975 version was to be one that could be used by other commands, particularly the joint commands. Instead of having the mixture of cost categories and functional categories used in the first try, the 1975 version develops indices generally along traditional DOD budget lines for the following operations cost elements: *Personnel Expenses* including military personnel, military permanent change of station, Classification Act employee compensation, Wage Board employee compensation, and military family housing; and *Operations and Maintenance Expenses* including travel and per diem, transportation of things, utilities, rents, leases, communications, purchased and other services, aviation POL, aircraft depot maintenance and spare parts, supplies, and equipment and related maintenance.

Hopefully the use of DOD-wide cost categories, rather than one command's interpretation of costs, will enhance the usability of the indices. As a side benefit, this array also highlights the dominance of personnel-related costs or operations costs.

Results. New indices were developed for

each category represented, and they were weighted in the fashion previously described, using actual AAC fiscal year 1974 costs. This led to the following results:

Main Base Estimates

Cost Category	Weight	Low Estimate	High Estimate	Best Estimate
Military personnel compensation	55.6	100	117	115
Military PCS	6.9	279	293	290
GS compensation	5.6	125	127	126
Wage Board compensation	10.5	150	160	156
Military family housing	4.0	177	196	187
Travel & per diem	.9	96	162	142
Transportation of things	.3	123	140	132
Utilities, rents, leases	1.3	105	125	115
Communications	.5	100	173	123
Purchased & other services	2.7	125	141	131
Aviation POL	2.3	100	100	100
Acft depot maint & spare parts	2.3	100	100	100
Supplies	6.5	100	118	110
Equipment & related maint	.6	100	105	103
	100.0			

Remote Station Estimates

Cost Category	Weight	Low Estimate	High Estimate	Best Estimate
Military personnel compensation	55.0	102	105	104
Military PCS	10.0	105	117	116
GS compensation	.1	125	127	126
Wage Board compensation	10.0	167	173	173
Military family housing	0	N/A	N/A	N/A
Travel and per diem	.4	96	162	142
Transportation of things	1.6	100	200	150
Utilities, rents, leases	.1	140	200	170
Communications	1.2	100	173	100
Purchased & other services	5.6	125	141	131
Aviation POL	0	N/A	N/A	N/A
Acft depot maint & spare parts	0	N/A	N/A	N/A
Supplies	14.9	100	118	111
Equipment & related maint	1.1	100	100	100
	100.0			

The final cost matrix for the 1975 model is as follows:

	Low Estimate	High Estimate	Best Estimate
Composite main base	123	138	135
Composite remote station	110	120	116

Postmortem #2. Having constructed a better model, we were now faced with another challenge. It had taken us two years to convince our boss that a 25 percent differential was just about right for main bases. Now that he finally believed it, we had to tell him about the new numbers we came up with in the 1975 model.

Actually the differences between the first try and the 1975 model can be attributed to three factors. First, we are getting smarter. Many problems brought out with earlier versions have been solved, and most estimates are getting better and better. Second, costs change over time, and exactly duplicate results would not be expected. Third, it is possible that we have not hit upon the best methodology for treating some of the various cost categories. This applies to both Alaska and CONUS counterpart categories. One big influence on the 1975 model, for example, is PCS costs. Lumped together with pay in the earlier models, the PCS factor was probably understated in the first version. It is possible that the reverse is true now. Right now AAC Management Analysis studies are under way in several areas of the index. These studies should lead to an even clearer picture.

IN SUMMARY, we have constructed a simple index model that tells planners how much more Air Force operations in Alaska cost than similar operations in the CONUS. Planners can use this model to judge the relative value of the benefits gained. Furthermore, a general methodology has been established that should allow analysts to develop similar indices for other overseas areas.

Perhaps the biggest change in the index over the years since its origin has been the evolution of purpose. At first the index was perceived as an educational effort designed

to reorient collective thinking about costs of conducting Air Force business in Alaska. While there still exists plenty of naïveté about the high costs in Alaska, this re-education effort has been successful at many levels. However, even after the record on Air Force costs in Alaska is set straight, the need for such an index continues. The purpose of the index now is to provide a reliable management tool that can be used in making broad decisions regarding the placement and operations of forces in Alaska.

The basic concepts that justify pursuit of an Alaskan Air Command Operations Cost Index are as real today as they were six or seven years ago. There will always be a need to educate people—particularly those in high-level decision-making positions—on the costs of operations in Alaska. Likewise there is a continuing need to provide the objective economic and cost information necessary to judge the merits of maintaining operations in that state. Future efforts on Alaskan operations indices are planned to incorporate regional differences and discriminate between missions.

Because the basic concepts and the methodology should apply to other commands as well, there is no reason that similar indices could not be computed for other U.S. overseas operations. As mentioned earlier, some work in this area has already been accomplished in the joint Pacific Command. Also, comptroller grapevines tell us similar efforts are under way in the European Command. This high-level interest will surely spur some interest in operations cost indices, but high-level interest need not be the only driving force.

Although the operations index has been primarily a comptroller-related project, the technical expertise required in costing out the indices described in this article is general enough to invite studies from persons outside the comptroller field. New ideas are needed more than financial expertise. The subject is particularly adaptable to thesis-level studies by AFIT students or bootstrappers or to projects by professional education study groups. A fresh look at the problem by persons not immediately connected with it could lead to improvements.

Alaskan Air Command

I am disturbed by the fact that in the region which is easily observed, we admit the Russians are ahead. Whereas in those regions where observation is more difficult we still claim superiority.

DR. EDWARD TELLER
Strategic Review,
Winter 1976, p. 5

in my opinion

LEARNING— DESPITE THE INSTRUCTOR

Captain Charles Austin

DESPITE our instructor pilots, instructor navigators, classroom instructors, and hundreds of other military instructors, our Air Force personnel are still able to learn. Despite the thousands of mistakes we as instructors make, our students are still able to *gain understanding*. Realizing this phenomenon, I have searched for the answer to why our students are still able to learn. The search has led me to believe we are wasting millions of dollars every day on our Air Force training programs through ineffective teaching techniques. But, then, what can we expect from instructors who are not teachers but in many instances simply the most experienced people in their field of study? My solution to this teaching ineffectiveness is simple to state: we must change our training programs to learning programs; we must change the behavior-modification approach in the training programs to an approach that emphasizes the shaping of student understanding; and we must teach our instructors how to let the students learn. This solution is more difficult to achieve than to state. Before discussing how to effect this transformation process, let me establish the difference between learning and training. Then I will analyze a learning mode that will help Air Force instructors progress from a behavior-modification training program to a program of learning through a shaping of understanding.

Establishing the difference between training and learning is not an exercise in semantics but rather a distinction in perception. Allow me to define the two concepts as I view them. Training is a concern for what a student does. (What his behavior is; how he does a particular thing.) On the other hand, learning is a concern for what the student understands. (That is, how he perceives the subject matter within his environment.)

Both training and learning have a place in our Air Force programs. Training is useful if we need to train a person in a technical skill where he is required to respond to a stimulus like a machine or like an animal. But when we want a person to gain an understanding that he can use as a basis for judgment and responsible action, then we must allow him to learn. The basis for training can be found in the theories of physiologists and psychologists whose research is mainly based on animal study. For example, Ivan Pavlov and his salivating dogs show the classical application of concern for what a person does. In Pavlovian conditioning, an unconditioned stimulus, such as food, produces an unconditioned response such as salivation. But if you pair a conditioned stimulus, such as a bell, several times with the unconditioned stimulus, the food, the result will be a conditioned response.

As an instructor pilot, I applied this stimulus-response training methodology numerous times in the Air Force KC-135 flight simulators. In the simulators, I taught emergency procedures to pilots by requiring them to respond to stimuli, such as a red fire-warning light. However, this stimulus-response type of training was quickly forgotten by the students and wasted unless I continually (at a large cost) trained and retrained the students to respond to the stimuli. By retraining, I reinforced the proper response.

For behaviorists, such as B. F. Skinner, this retraining or reinforcement is a basic factor in the training process. Such behaviorists believe that a response can be reinforced either by presenting a positive reinforcer or by removing a negative reinforcer.

How effective is this stimulus-response-reinforcement type of training? The answer to this question can be discovered from the formal empirical study by the U.S. Army, Air Force, and Navy conducted in

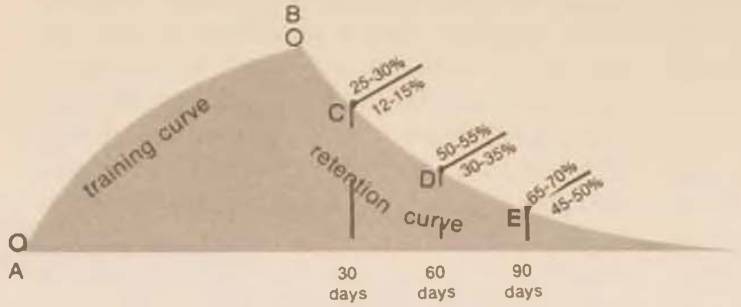


Figure 1. Training versus retention

1959–1960 on an Air Force B-47 crew. (See Figure 1.) The study showed that after a 30-day period a nonexperienced pilot would forget 25 to 30 percent of his aircrew training. This study also showed that after a 90-day period a nonexperienced pilot would forget 65 to 70 percent of his training. In Air Force pilot and combat crew training schools we spend thousands of dollars to train a pilot. For this investment, the study leads me to believe, we can expect this pilot, before he gets settled at his first assignment, to have forgotten 65 to 70 percent of what he was trained to do. Is this training cost effective? In my opinion, it would be more cost effective if the student could gain an understanding that would allow him never to forget. This depth of understanding is what I call learning!

The basis for what I perceive as learning can be found in the theories of well-known psychologists whose research is mainly based on human study. Max Wertheimer believed that learning involved a reorganization of the perceptual process. Wolfgang Kohler believed in insightful learning, in which a person has the appearance of a complete solution with reference to the total environment. Kurt Lewin believed in the life space of field theory, where the totality of facts determines a person's behavior. These psychologists believed, as I do, in learning as an internalization of the environment. This occurs when a person has an idea or gains some insight. He relates to previous experiences and builds onto this idea or insight with other insights and develops generalizations. He validates these generalizations internally, in his own mind, and develops understanding. This understanding is a learning process that will always remain with him. It will act as a basis for future learning experiences and judgments and give guidance to future actions. For instance, as an instructor pilot, I cannot train my student to respond to every emergency situation with which he might be confronted in his aircraft. However, I can help him gain an understanding of his total environment if he internally wants to accept and learn about it. From this knowledge of the general environment, he can draw specific facts to solve specific problems that I, as an instructor, might never conceive of as occurring. The student thus learns a basis for his own judgment. Therefore, I have been led to believe that people do not learn from external factors unless they internally accept the subject matter. Instructors are external factors, and unless the student actively seeks information from them, accepts their information, and then internalizes the external inputs or stimuli, he will not learn from the instructor. The

student may be trained to respond to the instructor and his stimulus, but he will not learn unless he internalizes the stimulus-response connection. Thus, despite the instructor, the student will learn.

Should we do away with instructors, then? No! The instructor plays a most important role in the student's learning process. But the instructor should realize specifically what that role entails. He should realize that his role is to provide a learning environment for the student, determine what motivates that student to learn, and then provide that student motivation to internalize the environment.

This instructor role is the basis for a nondirective instructional philosophy. But how do we fulfill this nondirective role in the Air Force when we don't have time in our fast pace and highly technical aerospace environment? Not true! There is a nondirective instructional method available to us that works. I have proved its success in Strategic Air Command's combat crew training program at Castle AFB, California. I have proved its success in teaching high school algebra and geometry. I have realized success with this philosophy in the Air University's Squadron Officer School. Let me share this philosophy with you, for I believe sincerely that this philosophy, if consistent with the learning experiences presented to the learner, will be effective, will yield 100 percent learning, and will save valuable men, money, and material resources for the Air Force. Let's analyze this nondirective learning mode in an easy step-by-step checklist format that we might find useful if we adapt this learning mode to our lesson plans.

There are three basic assumptions we must discuss and agree to in principle before we can develop the mechanics of this nondirective learning mode. First, we must agree that we do not really know how people learn. Can you say specifically that you know how people learn? Yes, we have clues to motivation, ability to memorize, skill in retention of "learned" information; but in fact we do not know how each individual learns. Next, we may not know how people learn, but we know that individuals do learn in differing ways. Therefore, we cannot expect each student to learn through the application of just one method of instruction. Some people are visual learners and others are oral learners. We could not present a lecture to a group of visual learners and expect learning to occur with each student. A single instructional mode may be more appropriate to some students in the class and less appropriate to others. The learned results will differ in accordance with the rightness of the instructional method used. Finally, it is the instructor's responsibility to select the varied instructional procedures best suited to support the learning of each individual student. To provide for this third basic premise, we must agree that each instructor must develop various and numerous lesson modes to meet the various needs of the students. I realize this requires the instructor to do a great deal of planning and organizing of his lessons. But if learning is to take place, he must consider different variations.

seven modes of learning

The variations that might be considered may include any or all of the following seven modes. First, some students may need individual textbook study in order to gain a functional knowledge of the field of study. Some people can just read a book and absorb everything required to understand. (I wish I could learn that way.)

Second, some students may learn best from schematic drawings, charts, and appropriate statistical information. They can gain an understanding by seeing total

structure in brief, nontextual form.

Third, some students may not be good readers or visual-type learners but can gain understanding through "hands on" experiences. These students learn best by fondling the switches or physically handling the subject matter. This mode is vitally needed for students who do not function well with abstract textbook approaches or schematic presentations.

Fourth, the failure or error experience technique is needed to allow students who learn best in this manner to discover and learn through experimentation and learning by mistakes. This is a variation of the "hands on" technique and is carefully designed to provide for mistakes. This technique allows students to find out what will happen through rather dramatic demonstration of error. For example, if a student does not realize that handling dynamite roughly is dangerous, the most dramatic way for him to learn is to let him handle the dynamite roughly. When it explodes, he will learn to handle dynamite more carefully. This is an absurd example, but it describes how we might provide a meaningful experience for a student so that through error he will gain understanding of the subject matter.

Fifth, some students need a study of "small segments" of the total field of learning. This is a building-block approach in which we allow them to construct each of these small-segment learnings into a large learning field. This mode provides students with understanding as each part is learned. Also, it allows them to treat or study small fields as their personal mode of learning because the larger field of study may be threatening to them.

Sixth, oral study in small groups and/or pairs of learners may be appropriate to other students. For these students, the practice of discussing the field of study may be the only way for them to commit learning to real understanding. For these students, textual approaches almost insure failure, even though they may have the potential to learn. I have seen numerous Air Force officers walk out of a lecture totally confused about a subject; but after a discussion in a small study group they were able to gain total understanding of the subject.

Finally, any combination of the foregoing learning modes may be needed by the students. Many function well when the learning modes are varied; in fact, some students do not realize that they learn better through other than a single instructional process. However, it is essential that the instructor realize it and take it into consideration when preparing his lesson plan.

the instructor's role

To effectively use a nondirective method of instruction, the instructor must also consider five other items.

- He must know his students. He must know as much as possible about each student's interests, verbal skills, manual abilities, social (human relationships) attributes, and, most important, how he learns best. If the instructor has one student who learns best by small-group discussion, he must be aware of that situation.

- Within the scope of the facilities available to the instructor, time limits allowed for preparation, and lead time in getting to know the students, the instructor needs to plan for those varied learning styles represented by the students.

- The instructor must have a thorough knowledge of the teaching aids available. Frequently, the failure of students to learn can be traced back to lack of understanding by the instructor of the learning resources available to support instruction. For example, I had a student pilot who was not a visual learner. He could not

understand how the KC-135 fuel panel operated by reading the book. I explained it several times to no avail. I finally observed that he seemed to be a "hands-on," experience type of learner. I got a mock-up fuel panel from the back of an old storage room, and I sent the mock-up home with him that night. I never had to say anything to him again about the fuel panel. Somehow, that night, he had fondled the fuel switches, had some "hands-on" experiences, and gained understanding of the fuel panel operation. Had I not known that mock-up was available for use, he still might not understand how to operate the fuel panel.

• The instructor needs to give careful consideration to maximizing the "participation" of each student. The instructor should not, through excess appreciation of his own skill, assume that, by doing all of the talking or demonstrating, he can reduce the failure rate and obtain the desired progress by students. Interpretation and understanding of learning more often than not are dependent upon students' being allowed to ask the kinds of questions that will lead to more precise understanding or sometimes to verbalize information as a means for clarifying understanding. I have seen so many instructors, honestly trying to help their students perform better, talk and talk to no avail. I, too, have been guilty of talking and demonstrating to some students on how to do a particular maneuver in the airplane, and they finally say, "How about just letting me do it, make a mistake, and learn from it." To learn, the student must participate in the environment.

• When presenting information to be learned, regardless of the mode, the instructor must make sure that each student recognize challenge in learning at each presentation. If a student feels that the learning is too simple to require serious attention, he is likely not to learn anything. The instructor must be aware of these situations and consider each as he applies the nondirective methodology in the classroom.

When applying the mechanics of the nondirective learning approach to the procedures for instruction, the instructor must complete at least five functions. First, he must establish the learning environment as completely as possible. In the learning environment, the instructor will want texts, reference books, schematic drawings, disassembled equipment, work tables, functions charts, and any other aids that will best meet the individual learning needs of the students.

Second, the instructor must create problems, which the students, in pairs, small groups, or single, must solve with the available resources carefully placed in the learning environment. These problems may be as simple as a question such as, "What is the relationship between —— and ——?" or as difficult as, "How does —— system function?"

Third, with the environment established and the problem presented to the students, the instructor should allow students to familiarize themselves with the equipment and other features of the learning environment. Often a few minutes of undirected time for free exploration at this stage may save hours of later instruction time. I have heard the never-ending instructor complaint that they don't have time available to teach everything they need to teach. So, how can they just give up this free time for exploration? In one instructional period I spent hours, with little success, trying to explain to a young pilot how an aircraft electrical system operated. Exasperated, I finally took a coffee break. When I returned, the student had somehow gained a complete understanding of the electrical system. He had not understood the direction in which one switch moved, and it

gave him a complete mental block. During the coffee break, he had played with the switches on a mock-up and gained an insight I could not or did not provide him. He just needed time to internalize the electrical system.

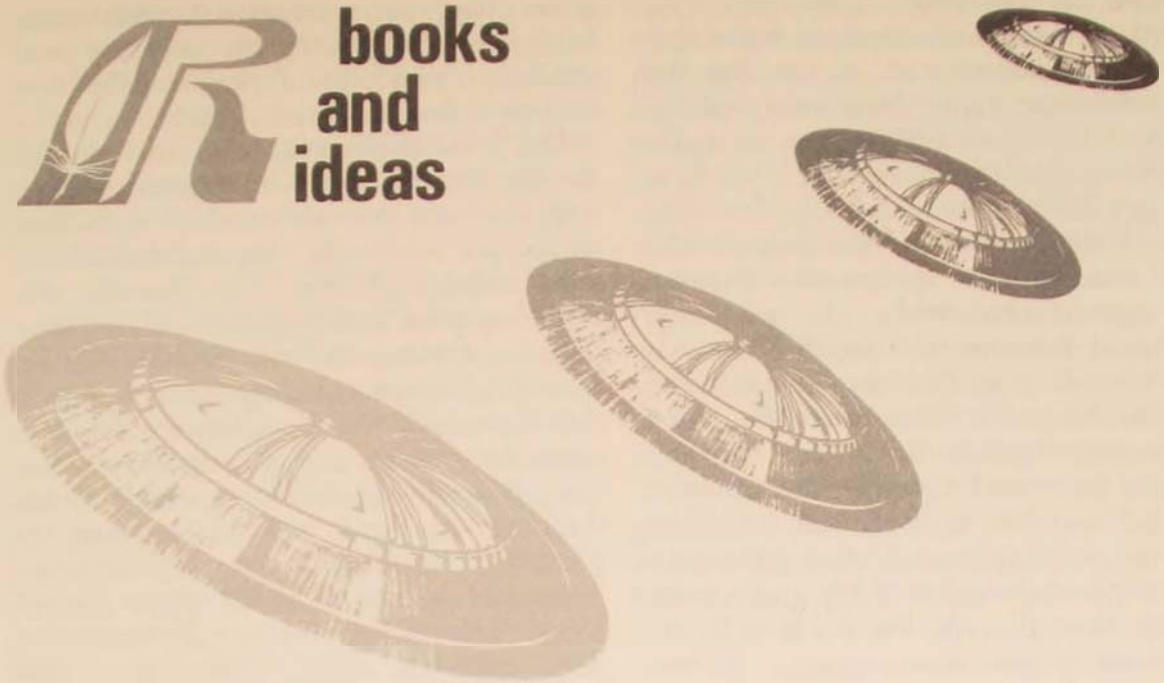
Fourth, after questions have been asked or problems placed in the learning environment, the instructor must circulate there and ask more questions to prompt careful thought by the students as they study and explore. The instructor should use questions that force participation, such as "Why do you think that this would work in such and such a way?" This type of question is much better than "Name this part!" or "What is the name of this part?" This question period of study may be as long as necessary to ensure that each student has some definite solutions or answers to questions.

Finally, at that time when students or a single student feels he understands a basic learning, the instructor must ask him to demonstrate his understanding and to explain it. This ability to explain is necessary if full understanding is to exist. As the student explains, the instructor must ask questions deliberately designed to confuse him. This will test the student's correct understanding or send him back to study some more. This learning process is not a difficult one to apply, and it has its rewards for all concerned.

The reward of such nondirective instruction is great understanding. For those students with superior abilities, it allows time for acquiring a greater understanding than the instructor may have planned in the same given time frame. It allows the student to learn by having an internal experience and gaining an understanding he will never forget. By contrast, in our usual training programs we constantly reinforce and reteach the same material to the same students, day after day, only to have them forget 65 to 70 percent in 90 days. There must be a better way!

THIS ARTICLE describes a better way. As instructors, we must understand the difference between training and learning, we must know how our students learn best, and we must provide the students with a learning environment that will best allow them to internalize the learning subject matter. For despite all of the instructor's external attempts to teach what he has already internalized, the student will internalize only what he is motivated to internalize. Only then will the student gain understanding and 100 percent learning. Only then will our Air Force programs be cost effective. In my opinion, we must consider the phenomenon that despite the instructor the student will learn.

Squadron Officer School, AU



UFO—A RECONSIDERATION

A review of David Michael Jacobs's *The UFO Controversy in America* and Lawrence David Kusche's *The Bermuda Triangle Mystery—SOLVED.*

James N. Eastman, Jr.

MAJOR Donald Keyhoe's article "The Flying Saucers Are Real" was widely read when it appeared in *True* magazine in January 1950. Many 14-year-olds sneaked the magazine into their homes and read avidly, conjuring up visions of little green men, or other unimaginable creatures, coming to conquer Earth. All the while they nervously listened for the sound of an approaching parent; in those pre-*Playboy* days, *True* was considered quite risqué. But as they matured, their capacity for faithful belief diminished, and flying saucers joined witches, Santa Claus, and the Easter Bunny in a childhood limbo. Over the years, reports of flying saucers came and went, but few of us ever saw one.

Then just over three years ago this 1950 14-year-old went to work for the U.S. Air Force function that maintained the records of the Unidentified Flying Object (UFO) investigations, a mandate which the Air Force had carried out since 1947. He read the letter in which then Lieutenant General Nathan F. Twining, commander of Air Materiel Command, told the commanding general of the Army Air Forces that ". . . the phenomenon reported is something

real and not visionary or fictitious." He listened to the saucer devotees argue that there were saucers—and accuse the Air Force of hiding captured saucers and the preserved bodies of little green men. He acquired a healthy disrespect for those who were UFOlogists. Gradually, however, the realization dawned that many who sought the answers to the UFO mystery were not cranks, kooks, or paranoids. Further, it became obvious that the Air Force's handling of Projects Sign, Grudge, and Blue Book, the three identifiers given to UFO investigations between 1947 and 1968, not only was frequently undiplomatic and irrational but in itself had tended to build the skepticism—and often paranoia—of those who believed that there was more to UFO's than the Air Force chose to reveal. Nevertheless, many of these honest, dedicated believers sometimes reacted with the same irrational approach for which they had criticized the Air Force—as though to balance the Air Force policy of complete nonbelief with often fanatical and ill-thought-out complete faith in saucer existence.

For these reasons, I was much interested in the galley proof of David Michael Jacobs's *The UFO Controversy in America*,† which became available to me just over a year ago. A quick scanning indicated that this should be the most thoughtful and best balanced consideration of the question yet to be published. Final publication has shown that my initial impression was correct. Dr. Jacobs uses the historian's objectivity and research methodology well in investigating the growth of the idea of manned UFO's, beginning with the spate of reports in the 1890s and following through to the present. Though he obviously believes that UFO's represent phenomena foreign to our Earth, his objective and scholarly consideration presents the case for both sides fairly and clearly.

Dr. J. Allen Hynek, who worked with the Air Force in its investigations and who originally was one of the chief debunkers of saucers, wrote the Foreword. Both he and Jacobs argue that too often the Air Force assigned, rather than found, explanations for sightings of UFO's. And Dr. Hynek, a leading astronomer, agrees with Jacobs that there is in the many reports sufficient cause for making a true scientific evaluation. Despite the often arbitrary means that the Air Force used in assigning explanations, it still failed to explain about 5 percent of the sightings reported—and Jacobs argues that many sightings never were reported officially because of the individual's fear of ridicule. Jacobs points out the failure of the Condon Committee, with which the Air Force contracted in 1966 for scientific study of all available evidence, to make a completely unbiased and objective report.

The Condon report does not conclude that UFO's do not exist. Rather, it concludes that study of existing reports and scientific reaction, in general, indicated that ". . . UFO phenomena do not offer a fruitful field in which to look for major scientific discoveries." It goes on to point out that ". . . nothing has come from the study of UFO's in the past 21 years that has added to scientific knowledge." At the same time, the committee agreed that ". . . our conclusion that study of UFO reports is not likely to advance science will not be uncritically accepted by [scientists]." The committee hoped that its report would help scientists ". . . in seeing what the prob-

† David Michael Jacobs, *The UFO Controversy in America* (Bloomington, Indiana: Indiana University Press, 1975, $12.50), xvii and 362 pages.

lems are and difficulties of coping with them." If scientists disagreed with the report findings, it would be because the report had helped them ". . . reach a clearer picture of wherein existing studies are faulty or incomplete and thereby will have stimulated ideas for more accurate studies." The committee believed that any resulting ideas for clearly defined, specific UFO studies should be supported both publicly and privately, since there were scientific areas in which knowledge was incomplete. These "Conclusions and Recommendations" are probably the most important part of the book—unscientific handling of the cases aside—since these are the first thing that the reader sees (and perhaps the only thing).[1] But Jacobs fails to recognize these strengths in the Condon committee report and dwells on the weaknesses, real and assumed.

But more important to the Air Force, Jacobs fails to understand that the Condon report never led the Air Force to conclude that there were no flying saucers or UFO's. The Air Force and those members of the Condon Committee who signed the report simply agreed that there was no evidence that UFO's represented a threat to U.S. national security, and so there was no reason for the Air Force, a defense service, to remain involved in investigating them. The internal conflict within the Condon Committee over the question of whether a true scientific study of the phenomena was necessary was beside the point so far as Air Force involvement was concerned. In fact, given the problems that had occurred over the years, it would probably have been better had another government agency, such as NASA or FAA, taken over the investigation.

Weak parts of Dr. Jacobs's book are those in which he discusses the "contactees," those earthlings whom space creatures have allegedly contacted. Gradually, the contacts built from simple observation to trips to the Moon, Venus, Mars, etc., as each contactee vied to outdo the experiences of his predecessors. Jacobs points out that the mission given these people by the space beings—namely, convincing man of the need for peace and brotherhood—is generally a logical reaction to disturbing international relations. However, in his critical analysis of these reports, Jacobs is often repetitious and disjointed. Though this could be as much a result of the material with which he is dealing as of his own making, the reader feels that this chapter may have been a last-minute addition.

On the day that Jacobs's book was released for sale, the Air Force transferred all records of Projects Sign, Grudge, and Blue Book to the National Archives. Hopefully, this will make all the extant records of which this writer is aware more easily available to those who are interested in Unidentified Flying Objects.

While Jacobs concerns himself with the general question of the existence of UFO's, there are other narrower aspects of the problem. An area that has come to figure prominently in flying saucer lore is the Bermuda Triangle. That area of the Atlantic Ocean in the triangle between Puerto Rico, Bermuda, and Florida has been the subject of mariners' tales and fears for hundreds of years. About 40 ships and 20 aircraft have been lost in this area over the last 150 years; some disappeared without trace. In other instances the crews have disappeared without obvious cause from apparently sturdy ships. There has grown a theory that this is the operational area not of visitors from outer space but of inhabitants of inner space: a people who live under the earth and venture forth in their subsea / airspace vehicles. This theory was postulated by Ivan Terence Sanderson in *Invisible Residents*.[2] There is also another theory that in eons past an advanced people came to visit Earth and, deep in the

Atlantic Ocean off the coastal shelf, left a homing device to guide to Earth future space visitors.

Both these ideas too often are treated seriously and with uncritical acceptance, as in Charles Berlitz's *The Bermuda Triangle* and John Wallace Spencer's *Limbo of the Lost.*[3]

Lawrence David Kusche, in *The Bermuda Triangle Mystery—SOLVED,*† undertakes a critical evaluation of this problem, which has become one of the parts, though smaller, of the total question of unearthly versus earthly beings. Mr. Kusche is a librarian, not a historian, and his work does not have the same scholarly trappings as Dr. Jacobs's work. One of the major hindrances to such a book in this subject area is the lack of solid documentation. Newspaper articles and such sensational works as I have mentioned are about all that is available. However, Kusche's book is just as valid and important as Jacobs's work to those who would do away with emotional interpretations and myths.

Kusche became a reference librarian at Arizona State University in 1972. As a result of frequent requests for information on the Bermuda Triangle, he discovered that there was little solid information available. He and a fellow librarian began a lengthy period of correspondence and research in public and private agencies, including correspondence with me concerning Air Force experiences in the area. A lengthy bibliography resulted, and further research led Kusche to the conclusion that many of the writings had become part of the mystery or legend. Now deeply involved, Kusche pushed forward to find an answer to the mystery. His background as both a reference librarian and a flyer gave him a solid foundation for both research and understanding of the aerial incidents involved. His work differs from a true history in that he makes no concerted effort to give the source for the legend entries. This is perhaps valid because the sources are often only repeating stories themselves and because, as Kusche states, "My concern . . . is with the incidents themselves and not with those who have publicized them."

Whatever the source of activity, the myth concerning the Bermuda Triangle has "grow'd" like Topsy. Those who wish to believe have taken an eclectic approach, shaping—or, more accurately, reshaping—the stories of disappearances to fit the preconceptions. It is with this misrepresentation that Kusche has concerned himself. He first presents the total myth. He then presents, in individual chapters, the myth of each disappearance. In each case, the myth is followed by the facts as known. Here Kusche gives the sources of his information. In many instances the tailoring of the facts to fit the legend is immediately apparent.

In others, revisions have been more subtle—a quote out of context here, a small misstatement of time there. For instance, in August 1963 two Air Force KC-135 tanker aircraft collided in midair southwest of Bermuda. Debris from these aircraft was found the next day. On the following day more debris was found 160 miles away, but this debris was quickly identified as having no connection with the two aircraft. Those who would make a mystery of the crash conveniently ignored the fact that the flotsam in the two areas was not related in any way. Rather, they questioned how, if the two tankers collided,

† **Lawrence David Kusche, *The Bermuda Triangle Mystery—SOLVED* (New York: Harper & Row, 1975, $10), xvii and 302 pages.**

the debris could be so far separated. The Air Force knew from the first day of the search that there had been a midair. But the myth quotes unidentified "officials" as scratching their heads and stating that "something very strange is going on out there." Logical examination of the true facts leads one to believe that the "officials" must have been the local dogcatchers in Yeehaw Junction, Florida.

Another incident cited in support of the legend involved an Air Force C-124 that "disappeared" on a flight to "Ireland." The legend says this happened in March 1950, but the Air Force lost no C-124s that month in the Atlantic. In fact, the reference appears to be to an aircraft which went down in March 1951 en route to England—and far north of the Triangle. More important, the aircraft did not disappear. Within 24 hours of its crash—or midair explosion—remains of the aircraft had been sighted by an Air Force B-29. The aircraft carrier *Coral Sea* found the ocean littered with debris, some of which it was able to retrieve and which was identified as being from the C-124. The seas were running high, and there were gale winds in the area, which made any chance of recovering bodies impossible.

Perhaps the best point about the Bermuda Triangle "mystery" was made by a U.S. Navy officer quoted in *Time* magazine in January 1975. He pointed out that the heavily traveled triangle between the Sable Islands, the Azores, and Iceland had been the region of many more unexplained disappearances than the Bermuda Triangle region.[4] But, as Kusche points out, the Bermuda Triangle is a manufactured mystery. It came about "because of careless research and was elaborated upon and perpetuated by writers who either purposely or unknowingly made use of misconceptions, faulty reasoning, and sensationalism." Constant repetition then lent the legend an aura of truth. Kusche, by his careful research, has revealed the elements of error and falsity surrounding the myth of the "Bermuda Triangle."

IN ALL, Jacobs and Kusche give us two necessary works. Jacobs, by his scholarly, reasoned examination, opens a new path of investigation that even the most skeptical can consider and accept. Kusche lays to rest much of the sensationalism concerning one specific area of the controversy, again making it possible to deal with the question on a rational basis. Both these works needed to be done.

Albert F. Simpson Historical Research Center

Notes

1. Edward U. Condon, *Final Report of the Scientific Study of Unidentified Flying Objects* (New York: E. P. Dutton, 1969), pp. 1–6.
2. Ivan Terence Sanderson, *Invisible Residents, A Disquisition Upon Certain Matters Maritime, and the Possibility of Intelligent Life Under the Waters of This Earth* (New York: World Publishing Co., 1970).
3. Charles Berlitz with T. Manson Valentine, *The Bermuda Triangle* (New York: Doubleday, 1974); John W. Spencer, *Limbo of the Lost* (New York: Bantam Books, 1973).
4. "A Deadly Triangle," *Time*, January 6, 1975, p. 66.

POTPOURRI

Aviation and Space Museums of America by Jon L. Allen. New York: Arco Publishing Co., Inc., 1975, 287 pages, $6.95.

How many times, at the insistence of the kids, have you pulled off the highway to visit a roadside "zoo," only to discover

that it consisted of a coyote, a turtle, a rabbit, and a family of tired and bored rattlesnakes? Aviation museums around the country have often proved to be similarly disappointing, too. Some collections have been so sparse as to be virtually nonexistent, consisting perhaps of a broken wing spar from a Spad or a leather flying helmet purportedly worn by "Captain Eddie" or some other illustrious flyer.

Jon Allen, author of *Aviation and Space Museums of America*, has compiled a list of 57 museums in the United States and Canada that meet his criteria for established, substantial collections. The book contains both a pictorial survey and a narrative on each of the museums, listing such essentials as the size of the collections, types of aircraft or spacecraft on display, location in relation to interstate highways and cities, operating hours, and admission fees.

All in all, this small book is full of information about interesting places to visit. One such museum is the Old Rhinebeck Aerodrome in New York, which has an excellent collection of World War I aircraft as well as Saturday and Sunday air shows, where the "old birds" take to the air. While not all the locations will be as interesting as Rhinebeck, the numerous locations seem to offer something for everyone's taste—even a soaring museum for those so inclined. The appendix to the book is also informative, listing various aviation organizations and publications.

While this book doesn't list every museum (for obvious reasons) and won't make the best-seller list, it should be of interest to aviation buffs and the general public as well. ROTC instructors, school teachers, and others will find it useful for planning "motivational" trips. There should be at least one museum within reasonable driving distance of just about any location in the country. Having read Allen's book, I am now prepared to avoid the roadside "zoos" and plan my trips so as to visit some of the real museums.

CAPTAIN ROBERT S. BARTANOWICZ, USAF
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Harry H. Woodring: A Political Biography of FDR's Controversial Secretary of War by Keith McFarland. Lawrence, Kansas: The University Press of Kansas, 1975, 256 pages, $12.50.

Not even the few historians who recognize the name Harry Woodring will dispute Keith McFarland's description of him as "the forgotten man of the Roosevelt Administration"; but McFarland also notes that Woodring's obscurity results from historical neglect rather than anonymity in his time. A banker and governor of Kansas, Woodring was appointed Assistant Secretary of War in 1933 for his early and faithful support of Franklin Roosevelt. In the fall of 1936 he was named Secretary of War.

Woodring believed the best way to defend America was to make her strong enough to deter any potential aggressor, and he strove to improve the nation's readiness posture. While preparedness was one of his basic national security tenets, another was a conviction that the United States must avoid being involved again in war unless attacked. Convinced that the goals of preparedness and noninvolvement could be attained only through strict neutrality and an expanded rearmament program for American forces, the Secretary began in the fall of 1938 to oppose and finally to obstruct openly Roosevelt's policy of providing aid to Britain and France. By the spring of 1940 Woodring's opposition had become so flagrant that "the President had no alternative to dismissing him," and he resigned in June.

Professor McFarland has done a fine job

of throwing light on one of the least known individuals in Roosevelt's Cabinet. Particularly useful are the well-placed summaries of Woodring's general "military philosophy" and of his attitude and position on specific issues such as air power, industrial mobilization, and the determination of military strategy. Moreover, the book provides illuminating examples of Roosevelt's executive style.

The major weakness of the book is one common to biographies—an overemphasis on the role and influence of the subject. Yet within the limits the author established for himself—the political biography of one man—*Harry H. Woodring* is a creditable study and a useful contribution to the history of American rearmament in the 1930s.

CAPTAIN ROBERT C. EHRHART, USAF
Department of History, USAF Academy

The Battle of New Market by William C. Davis. Garden City, New York: Doubleday & Co., Inc., 1975, 249 pages, $8.95.

The Civil War story of brilliant generalship and individual heroism pitted against superior numbers and equipment at New Market, Virginia, needed to be told, and William C. Davis has done just that in his incisive study, *The Battle of New Market.*

It was 15 May 1864, a Sunday. It was raining in the small village of New Market, nestled in the war-ravaged valley of the Shenandoah. The security of Lee's left flank depended on the success of the Confederate campaign to thwart the Yankee thrust into the Shenandoah. But the hero of the Valley, Stonewall Jackson, was gone, buried exactly one year before, in his beloved Shenandoah, at the Virginia Military Institute. The command of Confederate forces in the Valley had fallen to John C. Breckinridge of Kentucky, recently an unsuccessful candidate for President. Competent, dashing, cool under fire, a soldier's soldier, Breckinridge moved his force of just over five thousand men northward to meet the enemy. On his way he stopped at Lexington and reluctantly secured the assistance of the VMI corps of cadets. These young men, fourteen to eighteen years of age, sons of Virginia's finest families, were destined to gain permanent acclaim for their gallantry. They would suffer almost twenty-five percent casualties on the muddy field of honor at New Market.

The Union force moved also, southward, but not with the confidence of the Confederates. Morale was nonexistent. Dissension and dissatisfaction with their officers, many of whom were of German descent, were widespread. The commander, Major General Franz Sigel, was a man with ". . . all the trappings and mannerisms of a great general. Inside, however, perfectly hollow"—a vainglorious, incompetent buffoon. Along with his subordinate cronies, he managed to lose the campaign even though the Union soldiers outnumbered their opponents almost two to one and possessed more artillery than the Southerners. On the fateful day of the battle the Union forces found themselves in a defensive position, which should have been a significant tactical advantage. But superior numbers and firepower and a fixed position were not enough. Nothing could make up for the Union commander's lack of leadership.

Breckinridge attacked boldly at New Market, and after a full day's heated combat drove Sigel's force from the field in disorder. Only the failure of the Confederate cavalry to wreck a key bridge kept Breckinridge from destroying the Union force in detail. The gallant charge of the VMI cadets highlighted the heroism displayed by individual fighting men on both sides, but the key to the battle was leadership—

the brilliance of Breckinridge and the incompetence of Sigel.

Davis's book deserves the attention of those who aspire to lead fighting men.

MAJOR DAVID H. PRICE, USA, INFANTRY
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Survivors by Zalin Grant. New York: W. W. Norton & Co., Inc., 1975, 345 pages, $8.95.

The 1973 repatriation of American prisoners of war from the Vietnam conflict was an apparent success story for all America. Citizens of this divided land unanimously applauded the exemplary conduct and patriotism which their flyers sustained in an environment of indoctrination and brutal repression. They were acclaimed as heroes and uniformly enjoyed a reputation that was generally assumed to reflect absolute adherence to the strict tenets of military discipline and the Code of Conduct for U.S. fighting men.

Zalin Grant, in *Survivors*, examines a little-known aspect of the Vietnam POW experience. Although the majority of American prisoners repatriated in 1973 were professional Air Force and Navy aviators shot down north of the seventeenth parallel, some American combatants were captured outside of North Vietnam. *Survivors* is the true story of American soldiers and pilots captured in South Vietnam and marched north.

The title is appropriate. Through personal narratives, nine men trace their individual and combined ordeals. From the jungles of South Vietnam and Laos, where the effort to survive often resulted in reversion to a code more primitive than the surrounding environment, the account moves to Hanoi, where life was less harsh. Even in improved conditions, however, several of the nine continued to disregard all standards of military conduct and discipline. Semisophisticated indoctrination combined with despair to accelerate their moral disintegration. Treachery, betrayal, and defection became the self-prescribed order.

Outrageous conduct, however, was not unanimous. Colonel Ted Guy, the senior ranking officer, struggled to maintain a covert military structure under conditions less than ideal. He details his efforts to enforce discipline and, upon release, to prosecute cases of resolute misconduct. The frustration he encountered in this endeavor seems, in many ways, to reflect the general experience of the professional military during the course of the Vietnam conflict.

Survivors is presented in the men's own words. Mr. Grant offers no comments and draws no conclusions. Regardless of one's view of our experience in Southeast Asia, he will read with dismay the actions of Americans competing among themselves for favors from their Vietnamese captors.

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* Major Reynolds was a POW for seven years.

Détente without deterrence is delusion.
JAMES R. SCHLESINGER

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The Air University Review Awards Committee has selected "Transnational Terrorism" by Dr. Charles A. Russell as the outstanding article in the January–February 1976 issue of *Air University Review*.

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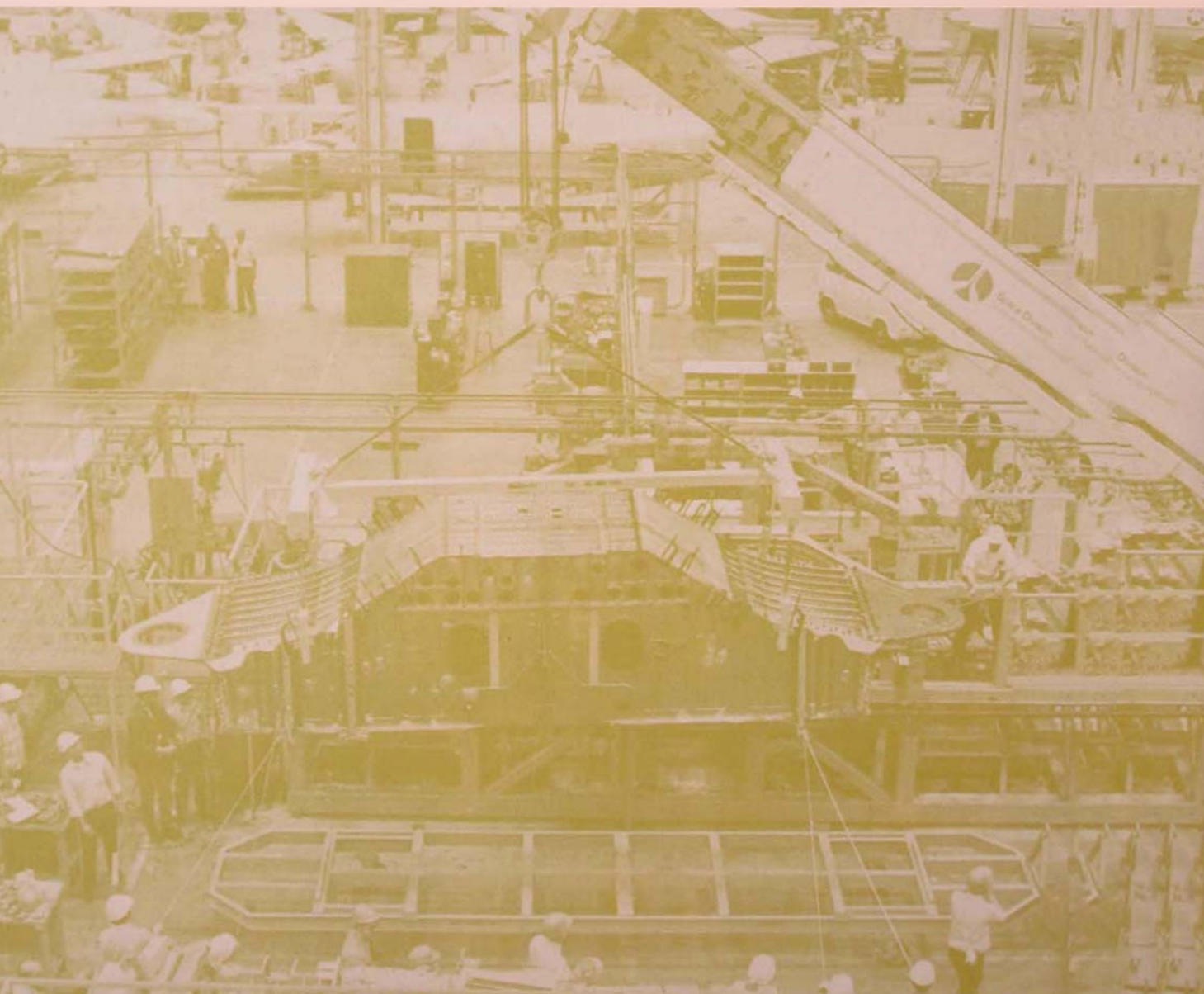

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