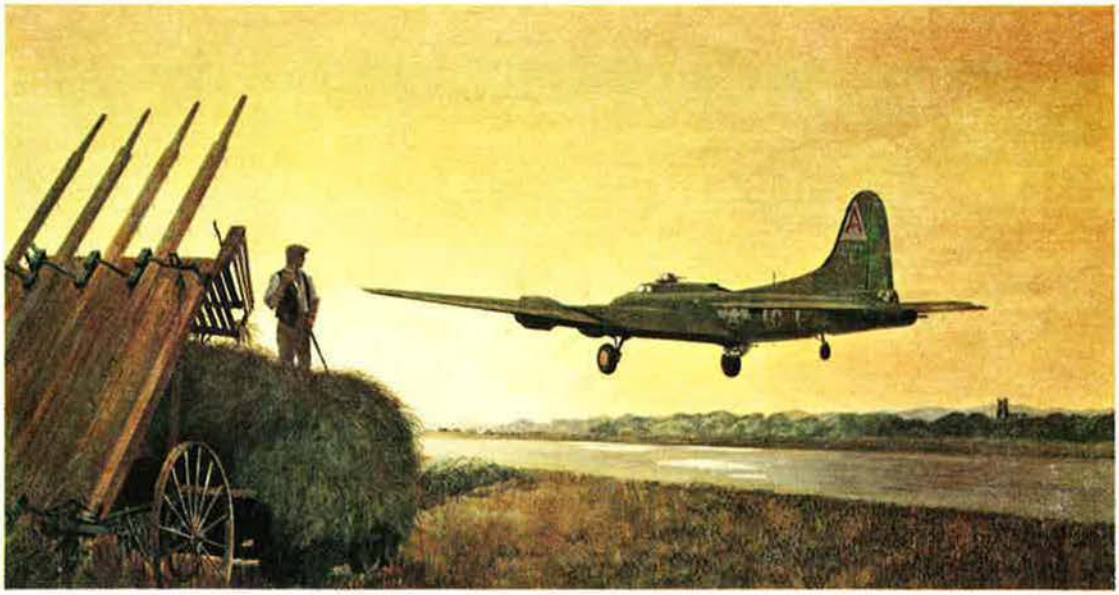
SEPTEMBER 1970 / $1.25

AIR FORCE

and SPACE DIGEST

The Magazine of Aerospace Power / *Published by the Air Force Association*



"Return from Mission,"
by Donald M. Hedin.
Courtesy, Air Force Art Collection.

USAF—The Momentous Quarter Century Since World War II

"Air Support—Vietnam '66,"
by George Akimoto.
Courtesy, Air Force Art Collection.

AWACS

Airborne Warning And Control System

The drawing above shows an eight-engine version of a Boeing 707-320 Intercontinental as it will look carrying the U.S. Air Force's Airborne Warning and Control System.

The large radome atop the fuselage will house surveillance radar antenna capable of detecting low-flying aircraft.

Boeing, under its Air Force contract, will provide two testbed 707s for intensive flight-testing of competitive AWACS radars.

Described as the nation's first priority need for air defense, AWACS would involve a fleet of flying command posts equipped with radar, communications, computers and displays.

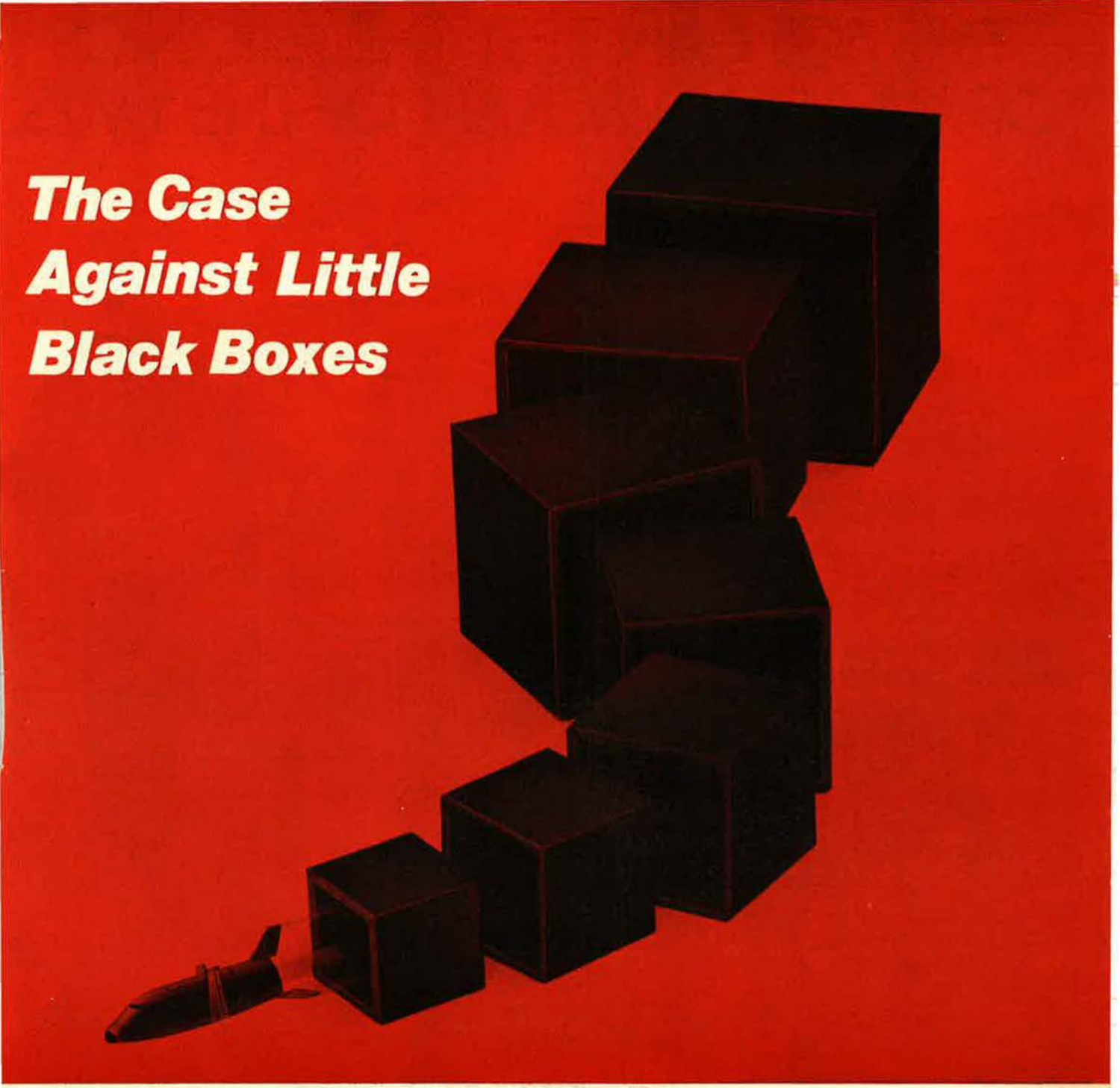
As an airborne tactical command post, the aircraft would provide minute-by-minute control of air-to-air and air-to-ground battles. As an airborne warning and control system the aircraft would detect, and direct the interception of, low and high flying missile-armed enemy bombers.

The proposed AWACS fleet would replace existing ground-based radars and older aircraft, resulting in substantial defense savings.

Prime Air Force AWACS responsibility is held by the Electronics Systems Division of the Air Force Systems Command.

BOEING

The Case Against Little Black Boxes



or one thing, there are too many of them. All over the irplane. And more are being added all the time as new vionic subsystems are developed or old ones nproved. All are doing vital jobs, of course. But the ogistics problems alone are staggering. Not to mention ne growing problem of interference during operation. It's time to take a new look at the overall problem. ime to find ways of combining many functions into a ingle box; to look at techniques for integrating ommunications, navigation, and identification nctions for military and civil aircraft.

These ways must also insure greater cost effectiveness and higher reliability. And no one is more qualified for all of these tasks than TRW.

At TRW, we have a broad background in communications and navigation equipment, in data processing, and in LSI technology. We understand the need for integrating these equipments and technologies. And it's being done...in our activities from Space Shuttle avionics integration to our advanced design and development work for user equipment and related terminals for NavSat and CNI application.

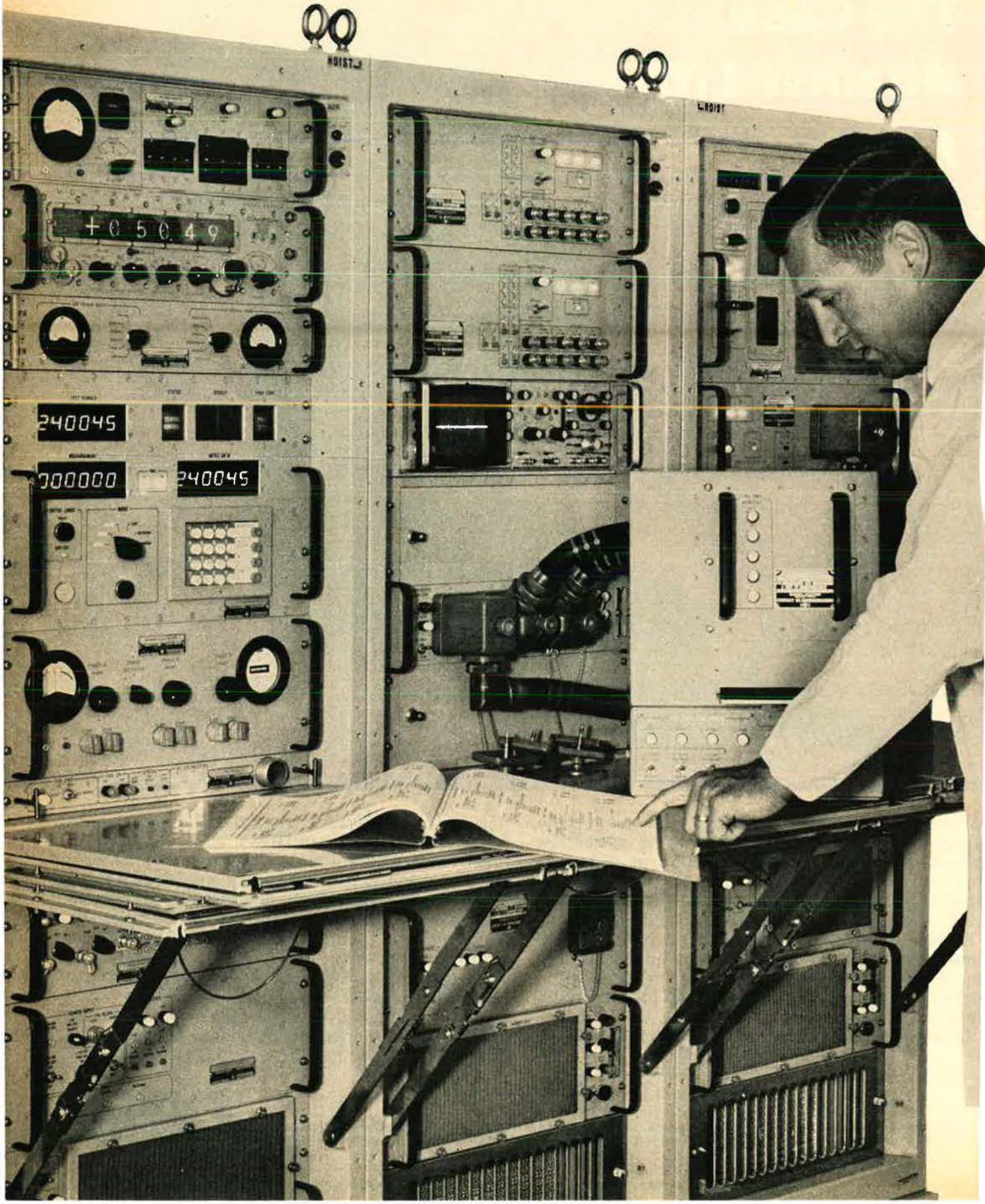
For more information about TRW's avionic capabilities, contact Marketing Services, TRW Systems Group, One Space Park, Redondo Beach, Ca. 90278.

TRW®

The Systems Group is a major operating unit of TRW Inc., where more than 85,000 people at over 300 locations around the world are applying advanced technology to products, systems and services for commercial, industrial and government markets.

TRW solutions to the "case of the little black boxes" will be highlighted at the AFA Convention and Aerospace Briefings & Displays. Plan to visit with our avionic specialists in Booth #232 on September 22-24.

THIS AGE CAN TEST THE AVIONICS OF ALL NEW AIRCRAFT OF THE 1970'S.



Historically, a new Aerospace Ground Equipment system has been designed for each new aircraft. This has led to recurrent problems. Less than optimum standardization, repetitive research and development costs, variable quality and reliability, and often a lag between delivery of aircraft and the system to support them.

What's needed is AGE that will support not just one aircraft but a whole generation. A system that will be on line when the aircraft goes operational. General Dynamics has designed and developed an AGE concept that meets these requirements.

First completely integrated system.

Our Electronics division, in support of the Fort Worth division, developed and delivered concurrently with the F-111, the first totally coordinated AGE system. It was available when the avionics were delivered.

The system is made up of integrated test stations. They use a highly flexible building block configuration that can readily be adapted for use with all advanced operational aircraft planned through the late 70's.

This AGE system, on line with the F-111, could be adapted to the new F-15, meeting 70% of its avionics AGE requirements with little or no change; another 15% with minor modification; and only 15% with new development. The system is also applicable to the AWACS and B-1, as well as other Air Force programs; and the Navy's F-14 and S-3A programs.

Automatic and manual testing.

The test stations are a combination of automatic and manual units offering the advantage of selective automation.

The multiple input design of this system virtually eliminates the possibility of an AGE shutdown when trouble is encountered at an input position, and allows simultaneous testing of several avionics equipments.

One AGE for all avionics systems.

The capability of General Dynamics' integrated AGE system ranges over the full spectrum of analog and digital avionics found in multi-mission aircraft, including flight control systems, mission and traffic control subsystems and penetration aids.

The AGE subsystems are configured to serve the full range of flight line, field and depot level requirements.

The adaptability and flexibility of this AGE concept also makes it feasible for application as an integrated shipboard test center for the Navy, or as an advanced electronics depot testing center in support of ground forces.

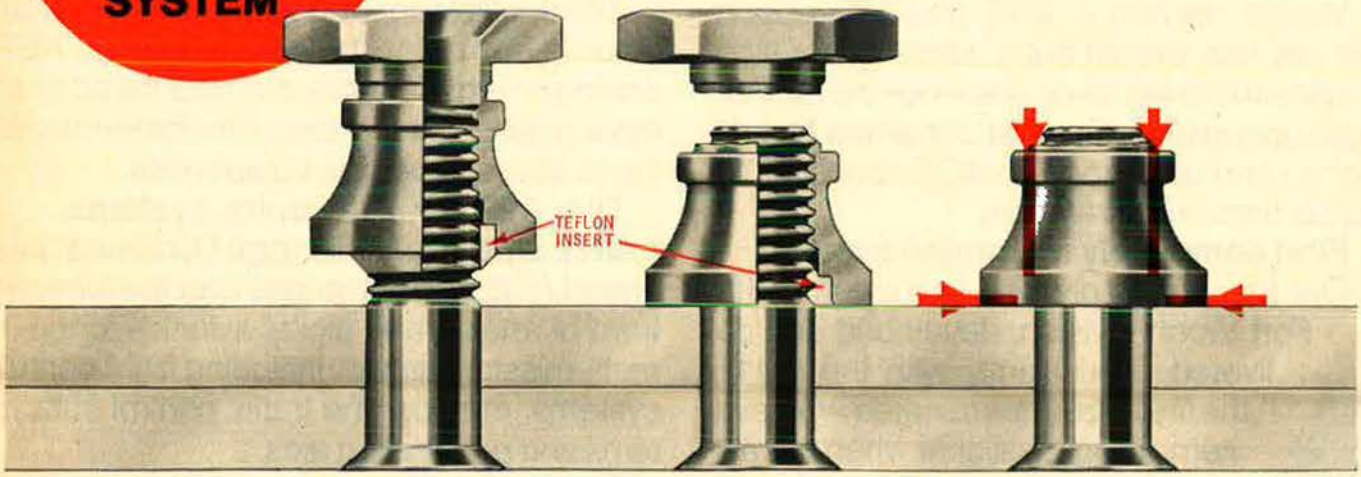
The universal AGE concept is just one example of how General Dynamics puts technology to work solving problems from the bottom of the sea to outer space... and a good bit in between.

GENERAL DYNAMICS

1 Rockefeller Plaza, New York, New York 10020

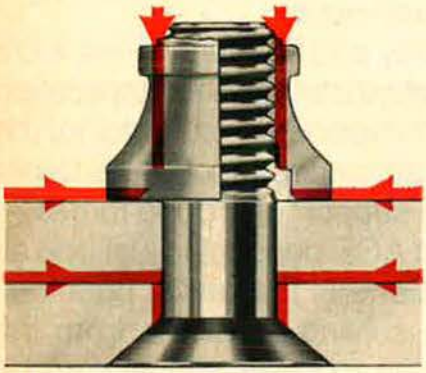
hi-Lok®
FASTENING SYSTEM

Stop fuel leaks with new Hi-Lok® sealing collars and pins

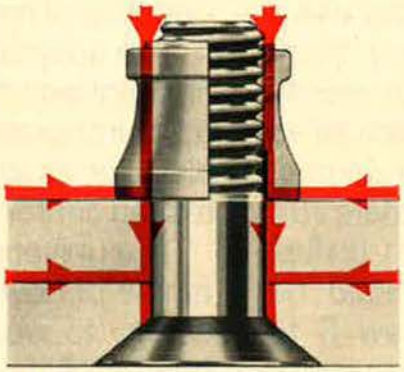


New Hi-Lok sealing collar being installed on standard Hi-Lok pin or threaded structural pin.

A Sealing collar on standard pin stops leaks from collar end (or head end of pin).



B Hi-Lok sealing pin combined with Hi-Lok sealing collar provides maximum control of leaks from any direction.



C Hi-Lok sealing pin used with Hi-Lok standard collar stops leak from head end of pin.

By using the new Hi-Lok Sealing Collar, a simple fix can be accomplished for fuel leaks through threaded fasteners in wing spars, beams and panels on in-service airliners and military aircraft. The new collar provides positive sealing in addition to controlled preload.

More than 10,000 leak-free flying hours have been accumulated on two heavy cargo military aircraft, known "leakers," since being field-fixed with Hi-Lok Sealing Collars. These sealing collars also are used in the integral tank structure areas of the Boeing 747, the world's largest and newest commercial airliner.

The Hi-Lok Sealing Collar for field-fixes eliminates need for sealing caps and for caulking with sealant compound.

The Hi-Lok Sealing Collar incorporates a Teflon insert fitted into the internal counterbore of the collar. During collar installation, in any pin grip condition, the insert cold-flows in the counterbore to tightly seal the area of thread runout and shank of the fastener. The sealing collar can be positioned inside or outside the tank area.

Hi-Lok fasteners also can be sealed from the head end of the pin. An undercut, made at the base of the flush head, is fitted with an approved O-ring. When sealing is critical, the Hi-Lok system additionally permits the new sealing collar to be used in combination with the O-ring sealing pin.

The Hi-Torque bolt, another Hi-Shear fastener development, also is available with an O-ring for use as a removable fastener in inspection doors or close-out panels.

Hi-Lok Sealing Collars are developed in materials including titanium alloy, Type 303 stainless, A-286 alloy and in aluminum alloy.

hi-shear CORPORATION

2600 Skypark Drive, Torrance, California 90509, U.S.A.
Telephone: 213/775-7271 and 775-3181

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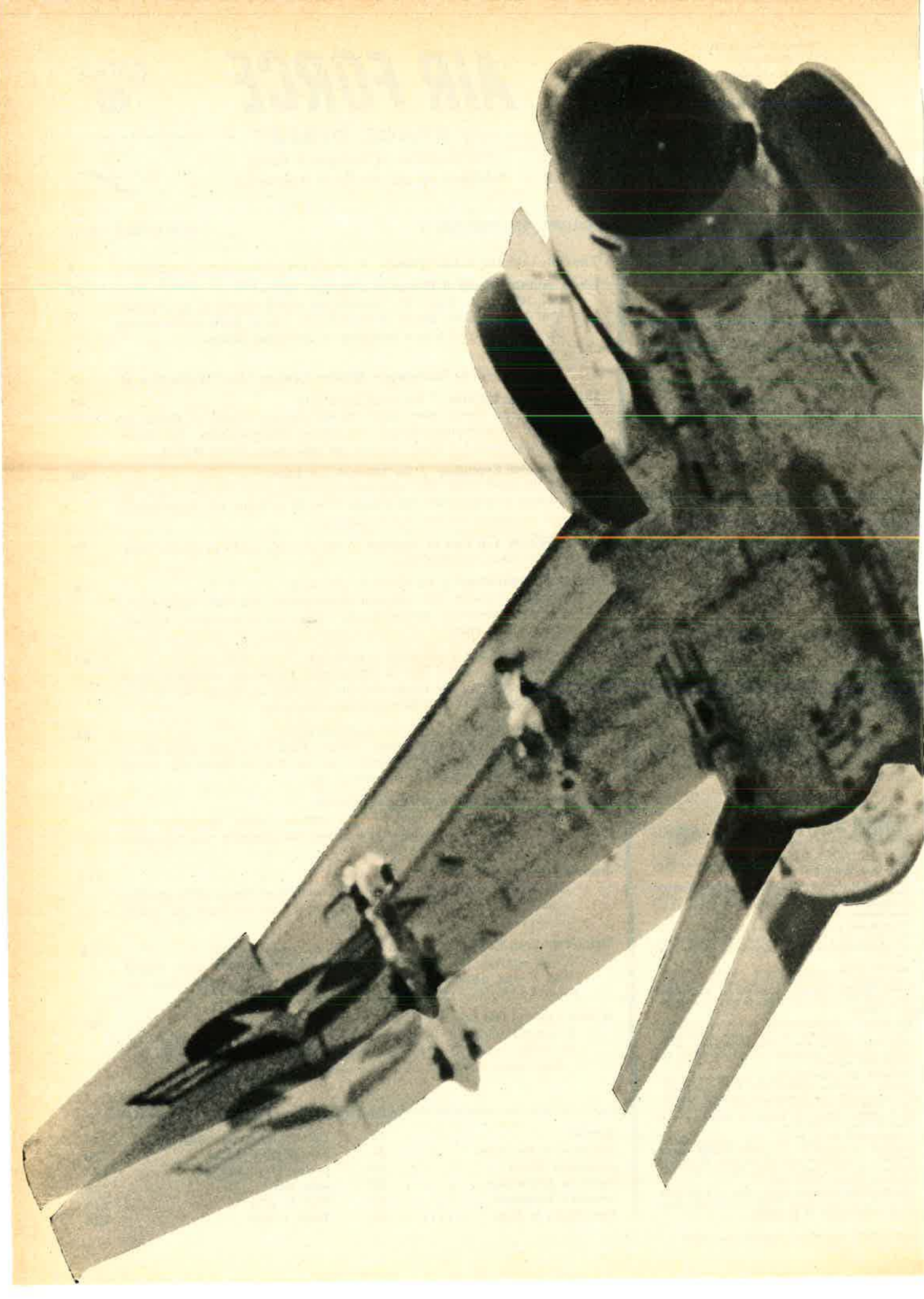
DEPARTMENTS



Westinghouse delivers airborne radar systems on time—within predicted costs. We've had a perfect record for the past three years, delivering as many as 84 systems a month. Note: they're on every F-4 fighter. The complete management team that achieved these results is still with Westinghouse, ready for more.

You can be sure...if it's Westinghouse

AN EDITORIAL

The Only Certainty Is Uncertainty

BY JOHN F. LOOSBROCK

Editor, AIR FORCE Magazine

ON HIS eightieth birthday, Maurice Chevalier is supposed to have been asked how it felt to reach that advanced milestone.

"Not bad," was the quick reply, "especially when I consider the alternative."

We have a good many years to go before reaching eighty but not quite as many, alas, as have passed since we were twenty years of age.

We have been led to these chronological thoughts, of course, through our pondering of the twenty-five years that have passed since the end of World War II, the years that are examined in some detail in this special issue of AIR FORCE Magazine. What really shook us was the realization that a youngster born on V-J Day could very well be a captain today.

All this is not to indicate any deep worry about approaching senility on our part. It is rather the result of suddenly realizing that the past quarter of a century has been a truly momentous one, with the pace of change accelerating at a rate that one neither noticed nor assessed at the time events actually were occurring. Take technology alone. The revolution began with nuclear fission, which ended the war. Then in rapid succession came the transition from a piston-powered Air Force to jet propulsion, air-to-air refueling on a mass scale, supersonic flight as a part of daily operational routine, intercontinental ballistic missiles and space exploration—all these along with incredibly giant leaps in electronics, communications, computerization, materials, fabrication, and all of the technological underpinning that transforms the minor miracles of yesterday into tomorrow's standard operating procedures.

The lesson is, of course, that we cannot predict with confidence where new technology will take us. We can be sure only that it will be further, in different directions, and at a wildly faster pace than we ever could conceive at any given point in time. And in recognizing this truth, we cannot forget that technology is apolitical. It follows no flags; it owes no ideological allegiances. It cares not which master it serves, nor whether it be bent toward good or toward evil ends. It will work for anyone who has the wit, the will, and the resources to employ it.

Even less susceptible to forecasting are the operational exigencies of the years ahead. In looking back, as we are, over twenty-five years, we observe with some trepidation that the big plays were never in the game plan. The Berlin Airlift was an improvisation—although admittedly a masterly one. The Korean War was another "play-it-by-ear" affair. And Vietnam—well, it was no sudden shock but a slow and unforeseen enwebment. And, while it is all well and good to blame the politicians for bad decisions, or to credit the Communists with superior cunning and dedication, the fact remains that thinking about the unthinkable is a *sine qua non* for the future because it very often is the unthinkable that happens. The only certainty is uncertainty or, to quote the famous Murphy's Law, "Anything that can go wrong, will."

Where, then, can one look for a constant in the equation? Perhaps it is man himself, the human element. But is this really true? With due respect to all of us relics of World War II vintage, a strong case can be made that today's crop of Americans generally is of higher quality than that of our generation. Certainly they are better educated, or at least more educated. They are harder working intellectually and, if not physically, it is because our generation has reduced the requirement. They are more dedicated, although not always to the kinds of causes we would like them to follow. They may be less obedient, less susceptible to discipline, but at the same time are more inquisitive, more demanding of new and better reasons for obedience and discipline. These attitudes may pose new problems for those charged with weaving this new breed into a military framework, but we should remember that in both World Wars the independent nature of the American soldier was put forth as a great military benefit, and there is no reason this cannot continue to be true.

Fortunately, the intellectual capabilities of the professional Air Force officer corps have progressed along with the accumulation of new challenges and more complicated requirements. Once again, no derogation of past leadership is implied or intended. It was more than sufficient for its time. But the new crop of leaders, with its higher educational levels and great reservoir of operational experience, should be able to close any generation gap that presently may exist.

We older types, therefore, have no reason to be up tight about the future of our Air Force. In 1799 a philosopher named G. C. Lichtenberg wrote:

"How do we spend our old age? In defending opinions, not because we believe them to be true, but simply because we once said they were."

We must resolve never to let this be said about us.—END

COST-CONSCIOUS TECHNOLOGY AT NORTHROP

This underwater vehicle designed by Northrop for the U.S. Navy to simulate a full-sized submarine will permit significant savings in anti-submarine warfare training.

Northrop saved more than 2,000 critical pounds in designing the 153-foot fuselage for the magnificent 747 airliner.

The most modern target in service for low-level surface-to-air missile training, the MQM-74A has the lowest cost per mission in its performance class.

Northrop is a major designer and builder of navigation and guidance systems for long-range subsonic and supersonic aircraft. The heart of one such system is this unique spherical platform.

More than 14,000 USAF pilots have graduated in the T-38 Talon, world's first supersonic trainer. Since 1961, more than 1,100 of the Northrop jets have logged over 2½ million hours in Air Force, Navy, NASA and German Air Force service.

Iran's new nationwide communications system will double the number of phones, provide a national TV network and expand telegraph and data transmission facilities. A Northrop-led consortium of multi-national companies is building the 8,700-mile system.

Northrop is one of the nation's biggest producers of special purpose, light-weight, low-cost digital computers for airborne electronics and navigation systems.

The Northrop F-5, in service with 15 nations, is designed to provide the needed performance level while taking into account purchase, maintenance and operation costs.

The Bell TwinHuey

Air Force like a blue shirt.

11 big reasons:

1. The UH-1N TwinHuey is a multi-mission ship for a multi-mission service. 220-cubic-foot interior. Holds 14 troops or six litters. Plug-in mission modules include guns, hoist, loud speakers, you could even have internal fire suppression tanks.

2. Full 13-foot clearance with rotors turning. Plenty of head room for med evac, rescue, troop deplaning, fire-fighting, SOF activities.

3. Twin-engine versatility. Back-up power means more dependability. Which means more usability: At night. In bad weather. Over water, boondocks, and metro areas.

4. Doors on both sides. Extra-wide, sliding doors. They don't blow closed. They don't get in the way of loading and off-loading.

5. Dual instrumentation. Good engine and flight instrument visibility from either crew seat.

6. For communications: The SLAE system — the most advanced light weight solid state system developed.

7. World-wide spare parts inventory with inter-Service support agreement between U.S. Army, U.S. Air Force, Navy, Marine Corps. Typical low Huey maintenance requirements.

8. Excellent single pilot control. No stability problems, consequently pilots love to fly it. No Chinese fire drill if you lose an engine. The other one compensates automatically. The correction's so smooth, you don't feel it or hear it.

9. Twin turbine powerplant. Two Pratt & Whitneys linked in a power-sharing gear box. Single-engine performance: better than excellent. Power reserve: 500 to 750 more horsepower than you need for ordinary operations.

10. Famous Huey dependability. Airframe proved by more than 10 million flight hours. Engines by 3½ million hours.

11. Value through versatility. The UH-1N's multi-mission capability makes it the most usable helicopter in the air. That's why it's to see multi-Service use.

fits the

The UH-1N TwinHuey is scheduled to be as standard as a blue shirt in six different Air Force commands: (TAC, MAC, USAFE, HQCOMD, PACAF, USAFSO).

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Defense Comparison

Gentlemen: The report by Edgar E. Ulsamer on his interview with Dr. John S. Foster, Jr., DoD's Director of Defense Research and Engineering, in July's AIR FORCE/SPACE DIGEST ["Technological Superiority—Key to US Security and Survival"], was excellent information for the public in general.

I hope, sincerely, that it is reprinted in one of the more widely distributed publications so that US citizens on a broader front may be exposed to and benefit from this significant status report on the defense preparedness of the United States as compared to that of the Soviet Union.

LT. COL. J. T. GILMORE, USAF (RET.)
Denver, Colo.

Cause for Alarm

Gentlemen: I was very impressed with the article in your July issue, "Air Defense—The Forgotten Front," written by John L. Frisbee. The Aerospace Defense Command is fighting hard to keep up with the ever-increasing Soviet threat, and [his] foresight in writing about our declining air defenses must be brought to the attention of the public.

I would like permission to reprint the article to be used as a valuable addition to our public information effort.

LT. COL. A. F. MCCONNELL, JR.
Deputy Director
Directorate of Information
Hq. ADC
Ent AFB, Colo.

Excursion/Incursion

Gentlemen: [Claude Witze's "Airpower in the News" item] in your July edition, entitled "The Wayward Press (cont.)" was a breath of fresh air in setting the record straight on the press omissions and misleading statements in regard to Cambodia.

I was delighted to see you refer to this campaign as "The American excursion into Cambodia." I get sick and tired of the numerous references on radio, TV, press, and in news weeklies which have inundated the American public with the derogatory and completely misleading term "incursion" when referring to this event. My copy of Webster's tells me that excursion means "a short trip taken with the intention of returning to the point of departure" and "a military sortie or raid." Incursion, on the other hand, is "an unfriendly entry; invasion; raid" and hence the implication that the US and South Vietnam are unwelcome invaders.

I would certainly like to see you expand editorially on this rank injustice to our fighting men.

MAJ. RODMAN W. BARNES, USAF (RET.)
Bellevue, Neb.

The Dassault Way

Gentlemen: "The Designers of Dassault—Men Who Take One Step at a Time" [August '70 issue] is a first-class job of reporting by Edgar Ulsamer. Having known the company and watched its development since 1950, I can vouch for most of what he says from firsthand experience. More recently, a five-year close association with the Falcon program has given me even more insight into the Dassault approach, and has made me even more of an admirer of the company and its way of doing business.

Sure, they're not perfect. Their first reaction to pilot criticism of the Mystère 20 prototype was one of shock, and an attitude of "take it or leave it." But they are smart, and cooler heads prevailed in short order, and the engineers came back to the meeting with notebooks. What came out of several such sessions was a Falcon tailored to requirements which more realistically represented those of American business fleets, and what followed was a highly successful program.

There are all kinds of legends about M. Dassault, as I am sure Ulsamer found out. They tell the story in the prototype shop of the time that Dassault came in and ran his fingers along the leading edge of a fighter wing. He found a couple of rough spots. He called the lead man over and asked if his team had done that kind of work. Yes, they had. "You," said M. Dassault, "are fired—now." A few minutes later, Dassault told one of his aides to keep the guy on the payroll, but to see to it that he didn't work on wings again anywhere.

There are also stories about Dassault viewing a mockup of a completed airplane in a darkened room, by the light of strong portable units placed to create long highlights on the surfaces of the aircraft. He looked for smooth contours, and this was one way to get an eyeball check. It is said that whole fuselages have been redesigned because of this.

My early contacts with the engineering and design teams was a reminder of my first jobs at Grumman. The first project team I worked on totaled nine guys, and we were responsible for the development of the J2F-5, the last of the biplane amphibians for the Navy. We got it designed, and 144 built, with a tiny team with high morale and hard work, and the word from the top to get them the hell out of the assembly hall so that the TBF line could start.

Then I worked on the TBF-1, and we had three guys . . . to productionize the outer wing panels for high-rate production. I think there were two guys on the center section, and another two or three on the fuselage. Maybe two or three handled the problems of equipment, two on electrical and radio and one or two on hydraulics. Probably there were five on powerplant and other assorted problems, and, what with aerodynamicists and structures guys on part-time assignment, the whole group may have been as many as forty or fifty engineers. And we built an awful lot of TBFs, and it did a lot for the Navy.

I worked on some proposals at Grumman, also, and can understand the reasons why Dassault can do it their way and why no US company now can. The Grumman proposals used to go out in a paper folder with a gummed label on the front, and there were maybe a dozen pages inside describing the airplane and roughing out its performance. I imagine Dassault does the same thing.

But can you imagine anybody doing the equivalent for the F-15 proposal? Remember the picture of the wall of cartons that contained the Fairchild Hiller proposal on that airplane? Now you have to have a cubic acre of proposal paperwork, and a full corporate vice president in charge of the program, or the Air Force won't even talk to you.

If you want to do it Dassault's way, then the USAF is going to have to do it the French Air Force way, and I don't think there's a chance in hell that will ever happen. Otherwise there

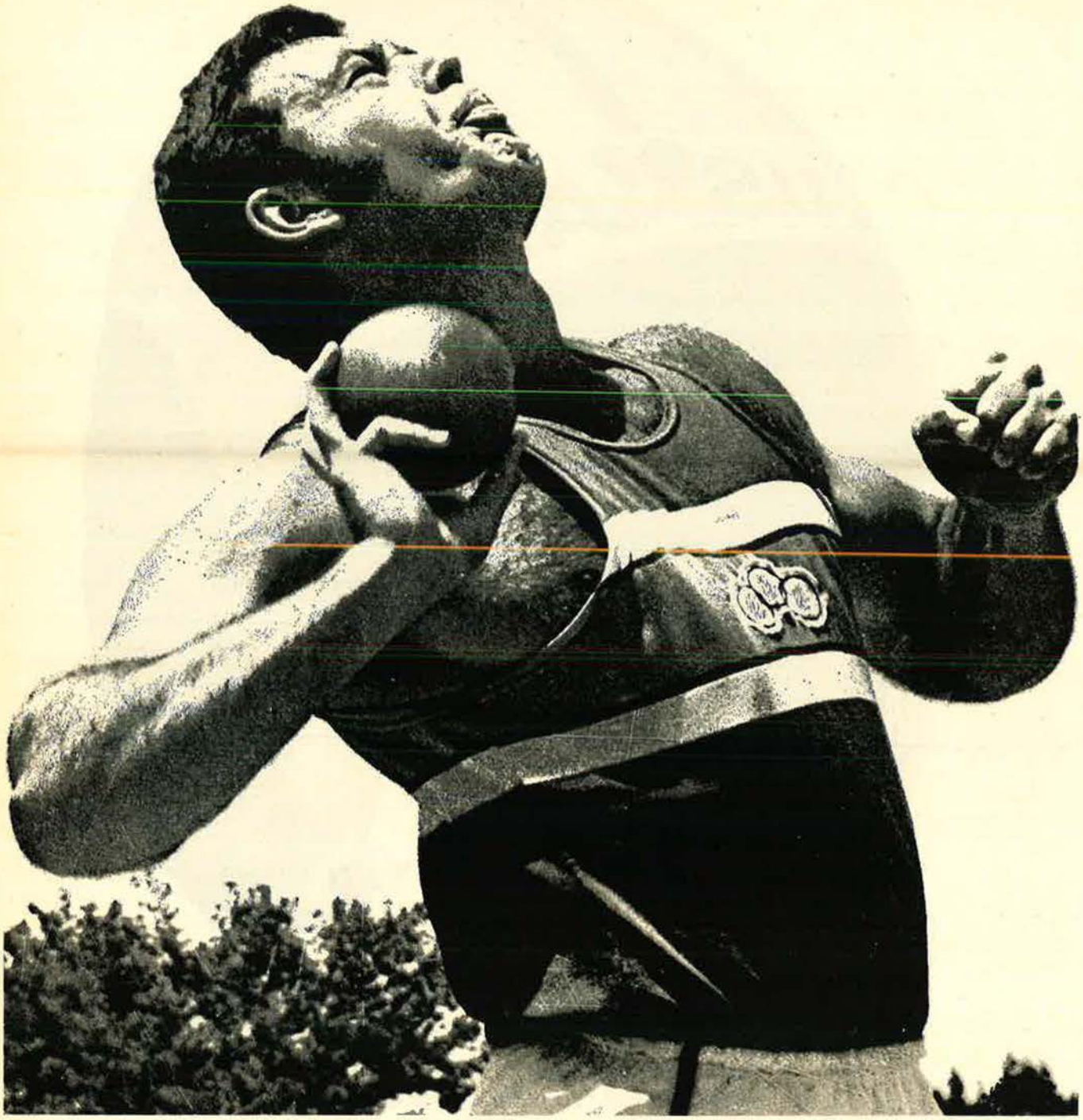
(*Continued on page 15*)

We wear well together

Having worked with you for your first 23 years, we feel like a part of the Air Force family. We're proud of the relationship—and send our best wishes for this happy birthday and all of those in your future.

SPERRY
FLIGHT SYSTEMS DIVISION
PHOENIX, ARIZONA 85002

SPERRY RAND



champions don't just happen

Neither do the leaders in industry. Especially ours. And the fact is that we started out as number one when this business got off the ground in 1942.

We've continued to increase our lead ever since . . . By doing this job faster, better, more economically than the competition. Isn't this what you expect from Champions?

aerojet solid propulsion company

FIRST IN SOLID ROCKETRY, IN ALL WAYS

will be a slew of unemployed bird colonels, B/Gs, etc., drifting around the halls of the puzzle palace on the Potomac looking for old proposals to read.

Forgive the lengthy letter; I get carried away when I see people wondering why a job can't be done simply.

DAVID A. ANDERTON
Technical Consultant/Aerospace
Ridgewood, N.J.

Canberra's Role

Gentlemen: Reference is made to the item on page 26, July issue ["Aerospace World"], concerning improvements to the B-57 Canberra and its supposed new role. The detection and attack of targets at night and at low altitude was the precise role that the Canberra was selected for in the first place.

As chief of AFRDQ-TA, Hq. USAF, in the early 1950s, I wrote the requirements for what we designated as a "night intruder." The first effort was for an "interim, off-the-shelf" aircraft that could immediately replace the aging B-26 being used for this mission in Korea. I was also a member of the investigating group that tested the Canberra, XB-51, B-45, AJ-1, and CF-100 for this role and recommended the Canberra to a senior officer's board for adoption. At that time, it was realized that the most serious deficiency to this mission was the lack of poor-weather, night-sensor, and weapon-release systems. However, it was felt that the Canberra had sufficient size and space to accommodate these systems when available at a later date. As it now turns out, much later.

The fact that the B-57 has frequently been termed the most successful air-ground attack aircraft in terms of ordnance load, unrefueled range, loiter-time ability, and low attrition rate in the Vietnam War attests to the wisdom of the senior officer's board decision nearly twenty years ago.

COL. FRANK ALLEN, USAF (RET.)
Colorado Springs, Colo.

Time for Constructive Action

Gentlemen: I read with interest the article "Urban Crisis at the Air Force Academy," by William Leavitt, in the June issue. I submit that the conferees' concern for the nation's ills and their solutions to them ultimately reduce to a dire need for responsibility at all levels of society and government. Responsibility means accountability for one's actions. Unfortunately, in this "liberated" age, responsibility for one's actions seems to be an old-fashioned and unpopular concept and practice, particularly with the vocal radical minority.

While I do not agree with some of the solutions advocated by the conferees, I believe they have taken the first step in responsible action, that is to identify the problem and resolve to remedy it within the present system.

However, the next step is the crucial one, and infinitely more difficult. This will be to maintain this responsible attitude and resolve despite the morass of apathy and irresponsibility that currently permeates our country. This will take all the initiative, determination, and zeal that these young people, and all Americans, can muster.

Time is late. But too much time already has been spent criticizing the country and pointing out its shortfalls. It is far easier to criticize and identify problems than to constructively solve them. What is needed now is responsible action at all levels of society and government to correct the defects that we have been identifying for so long.

CAPT. THOMAS E. LEE
Vienna, Va.

Service Separation

Gentlemen: A reduction in world tensions, combined with reduced American involvement in Southeast Asia, in Europe, and in Korea, brings an inevitable reduction in military strength. Personnel readjustment policies should be a major consideration when new force levels are imposed. A variety of policies, some presently within the power of the Defense Department, others needing congressional approval, should be considered now by the Air Force for DoD and congressional action. Forced retirement by those who anticipated a longer career deserves mention; however, present transition programs ease the impact upon this group, and retirement pay and fringe benefits relieve much financial burden.

The qualified enlisted man who is separated or denied reenlistment should receive separation pay on the same basis as an officer. Unfortunately, there is no way for these men to complete twenty active years for retirement. The forcibly separated officer receives separation pay, but the closer he is to the twenty active-year mark, the more difficult the financial problem. Should he enlist, a solution

(*Continued on page 17*)

How do you put a hot aircraft bang on target?

High-performance tactical aircraft require compact, precise weapons delivery systems—such as Automatic LORAN.

Automatic LORAN C/D makes the task easier for pilots of high-performance tactical aircraft. This computerized navigation system keeps track of aircraft course and position despite abrupt changes in attitude, altitude and speed. And leads the aircraft right to target, at tactical air speeds.

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And, we're bringing to next-generation system development the realistic know-how that got automatic LORAN off the ground in the first place.

ITT Avionics Division, a member of the Defense-Space Group, International Telephone and Telegraph Corporation, Nutley, New Jersey 07110.

AVIONICS DIVISION ITT

might be forgiveness of a portion of his separation pay, three-quarters of which is now required to be repaid before he receives retired pay.

For example, if $200 a month is "forgiven," the officer who enlists for a little over six years repays nothing (seventy-five months multiplied by $200 equals almost $15,000, maximum separation pay), while the officer who needs only about twenty-four months to complete twenty years is forgiven $4,800.

To minimize the number of forced separations, the forgiveness of active-duty commitments required by government-sponsored schooling, promotions, etc., would allow those desiring separation or retirement to do so sooner than programmed. The discontinuance of flight pay for those who are paid for "not flying" would lead many affected officers to retire; should they continue, money would be saved regardless. Demotion in lieu of separation would allow retention of experienced men, often less costly than recruiting and training a man who will separate after a minimum tour. One admitted difficulty is in determining who will remain after a first hitch or commitment. Regardless, many well-qualified officers and airmen would rather continue with reduced rank than be separated short of retirement.

These short-term remedies would assist those facing separation in the near future, but many long-range problems need consideration. The often-discussed classification of all active-duty officers as "regulars" should be implemented. Promotions and eliminations can then be based on quality control of the entire officer strength. One interim policy, awaiting the above, is the use of promotion boards as regular officer selection boards, with the most qualified Reservists promoted being offered regular commissions. Conversely, the regular officer who is "passed over" would revert to career Reserve status. The regular and Reserve officer corps would both have a stimulus to maintain personal performance.

A yearly board can then decide what regular officers would remain past twenty years' service, similar to the enlisted selection-in process.

The Air Force has no obligation to retain any officer or airman until twenty-year retirement or beyond, yet it seems inequitable to use criteria of past years for personnel reduction that will come in the next few years, especially when outstanding individuals are considered. Prudent use of present regulations and prompt legislative action can prevent these inequities. Dedicated people have kept our nation strong, and these people deserve consideration.

MAJ. RICHARD I. BRUBAKER
Det. 111 AFROTC (AU)
Trinity College
Hartford, Conn.

"Night Mission"

Gentlemen: This month's [August] "Night Mission on the Ho Chi Minh Trail" is without a doubt one of the most beautiful and sensuous personal statements about flying I have ever read. If Major Berent must ever give it up, let us hope that he chooses writing as a second career. An absolutely haunting article!

E. SCOTT CHRONISTER
Chicago, Ill.

Fighter Units Book

Gentlemen: I am under contract to a major publisher to do a book on the fighter units of the Fifth and Thirteenth Air Forces during World War II. I would very much like to hear from anyone who might be able to make available to me photos, unit histories, mission reports, encounter reports, etc. Any material loaned will receive the best of care and be returned as quickly as possible.

WILLIAM N. HESS
9322 Overlook Dr.
Shreveport, La. 71108

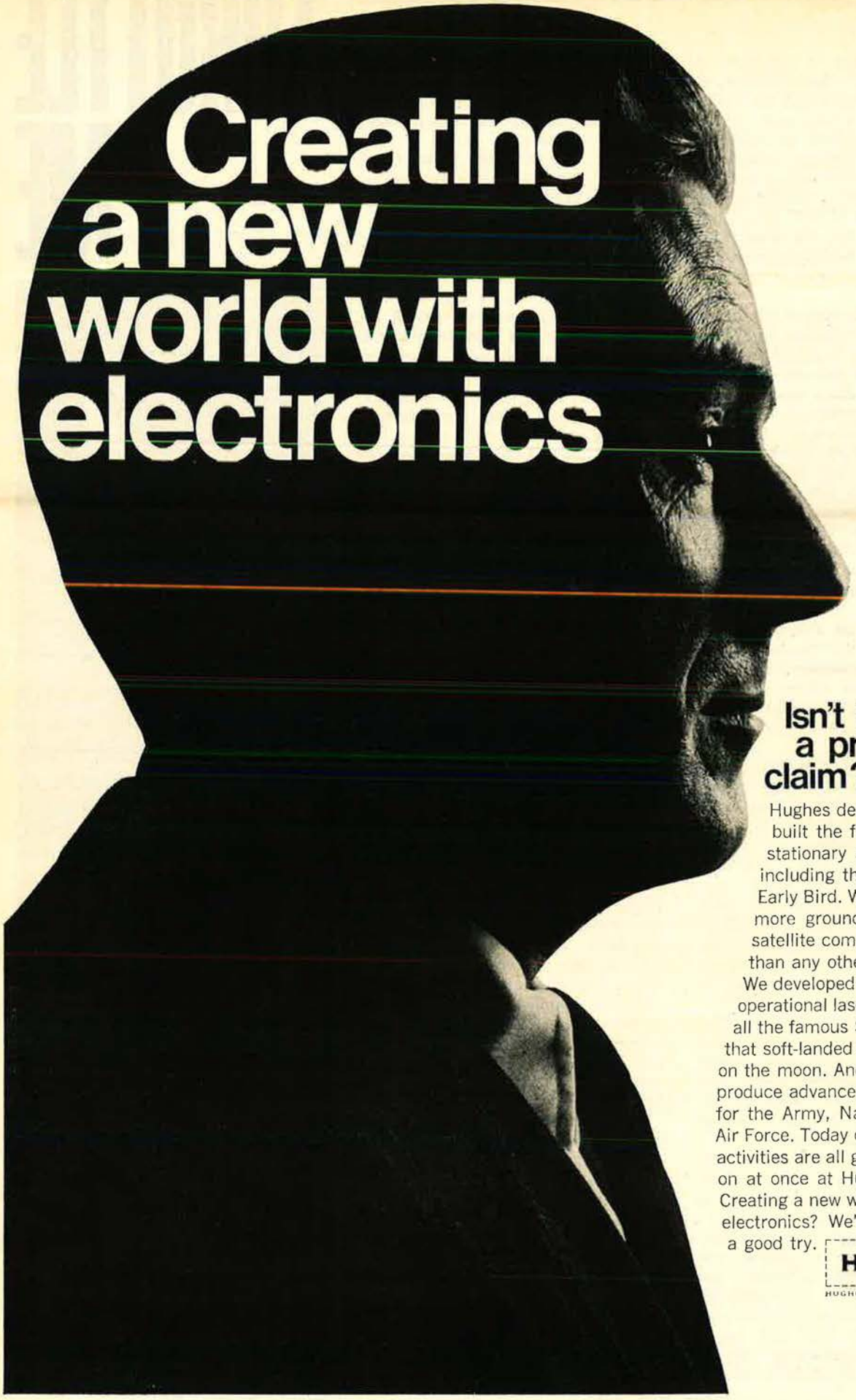
Other Side Heard From

Gentlemen: I have followed with interest several letters appearing in "Airmail" on technical managers, the plight of young men possessing graduate degrees in scientific and engineering fields, and their dastardly treatment by the tired old "military minds" who are given the privilege of supervising them while their talents languish in the service of their country.

Since I have had this supervisory privilege for many years, I feel compelled to try to even up the score a little.

In my experience, Air Force policy has been weighted heavily in favor of scientific and engineering officers, frequently offering them long, stabilized tours, more interesting jobs, and, in general, several privileges not accorded to their fellows. Had the disgruntled few paid more attention to the real world, they might realize that advanced academic degrees are merely a requirement for certain jobs, not a passport to the easy life. The most vociferous junior scientists are fre-

(*Continued on page 19*)



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Isn't that a pretty big claim?

Hughes designed and built the first successful stationary satellites, including the Syncoms and Early Bird. We've put up more ground stations for satellite communications than any other company. We developed the first operational laser. We built all the famous Surveyors that soft-landed successfully on the moon. And we produce advanced missiles for the Army, Navy and Air Force. Today over 550 activities are all going on at once at Hughes. Creating a new world with electronics? We're making a good try.

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quently those who have spent much of their time, during duty hours, working to complete their thesis or dissertation, concentrating on their pet projects while the job "goes hang," and in general asserting an intellectual arrogance which they do not merit.

Supervisors, even those who also hold advanced degrees, learn with age that there is no escape from such sordid "trivia" as where does the money come from?—what is it worth to the taxpayer?—and how will I fill those critical personnel assignments?

Fortunately, the vast majority of scientific and engineering officers are more modest and appreciate what special considerations they do get. Those that ultimately leave service often have obtained valuable practical experience in their field, are then a more valuable addition to the civilian community, and frequently take positions in companies who discovered their value only by virtue of their business relationships while still in the Air Force.

It is also interesting to note that, when employers query me about these young men, their first questions relate to the prospect's abilities to deal with people, common sense, work habits, and management potential. The privileges of doing research and attending scientific conferences are, in fact, rewards for demonstrated special talent and demonstrated capacity to do productive work. In the military we still try our best to provide justifiable consideration to *all* men who show promise and ability. We have a tough time with those who demand constant coddling in return for promises or old report cards.

The "military mind" is a mossy fiction. I'd pit Socrates (a professional soldier) against H. G. Wells any day.

COL. ARNOLD J. CELICK
Sacramento, Calif.

Poetry Project

Gentlemen: A project to gather poetry about the war in Southeast Asia, written by men and women of the armed forces, is under way at the English Department of the Air Force Academy. Project officers there are requesting manuscripts from anyone who has written poetry on any aspect of the war, particularly day-to-day life, individual reactions and emotions, the war from differing perspectives, the attitudes of Americans in a strange land, the feelings of families and friends at home, and descriptions of the countries and peoples of Southeast Asia.

Poems submitted for this project will also be considered for publication in the "Poet's Corner" of *Air Force Times* or another appropriate periodical.

Poems should be printed or typed, one to a page, and sent to

MAJ. WALTON F. DATER, JR.
DFENG
USAF Academy, Colo. 80840

The As and Bs

Gentlemen: In the July issue there is a handsome two-page ad by McDonnell Douglas.

Too long ago, when I was a cadet, I was taught that the United States Air Force's system of numbering and designating planes was permanent, reserved for each particular plane for all time.

Remembering this, perhaps wrongly, I have often wondered why our A-26 of World War II became the B-26 of Korea, especially since the B-26 of World War II had such an outstanding record—as witnessed by your article on page 74 of the same issue ["How Jim Vining Took on the Luftwaffe's Finest," by Jack Taylor].

Could you clear up this matter for me? How did the A-26 acquire the B-26's number?

RICHARD M. TOON
Des Moines, Iowa

• *The A/B-26 may be the most notable exception to that old "rule" about aircraft designations.*

The Martin B-26 Marauder first flew in 1940, and during the war went through various modifications that brought the program up through the B-26H (or, actually, XB-26H). The "B" prefix was, of course, for Bomber.

The Douglas A-26 ("A" for Attack) Invader first flew in 1942. Specifications for the aircraft called for a "multipurpose light bomber, capable of fast attack operations at low level, as well as precision bombing from medium altitudes, and carrying a powerful defensive armament." The A-26B became operational with the Ninth Air Force in Europe in 1944. Model designations ran up through the "D" but only one of those was built (the XA-26D, which had eight .50-caliber guns in the nose and six more in wing packages), and production was canceled after V-J Day.

Many hundreds of B and C models of the A-26 remained in front-line service after the end of WW II, and the aircraft became the primary offensive weapon of the new Tactical Air Command, created in 1946. In June 1948, the "Attack" category was

(*Continued on page 21*)

At AC Electronics...where tomorrow's history gets its start.

On May 23, 1969, an Air Force TITAN III-C launch vehicle streaked skyward on one in a

series of spectacular military space missions. On board an AC Electronics all-inertial guidance system successfully carried out all phases of the intricate maneuvers required to put two VELA nuclear detection and three Orbiting Vehicle (OV 5) satellites into two distinct orbits, circular for the VELAs and elliptical for the OV 5s.

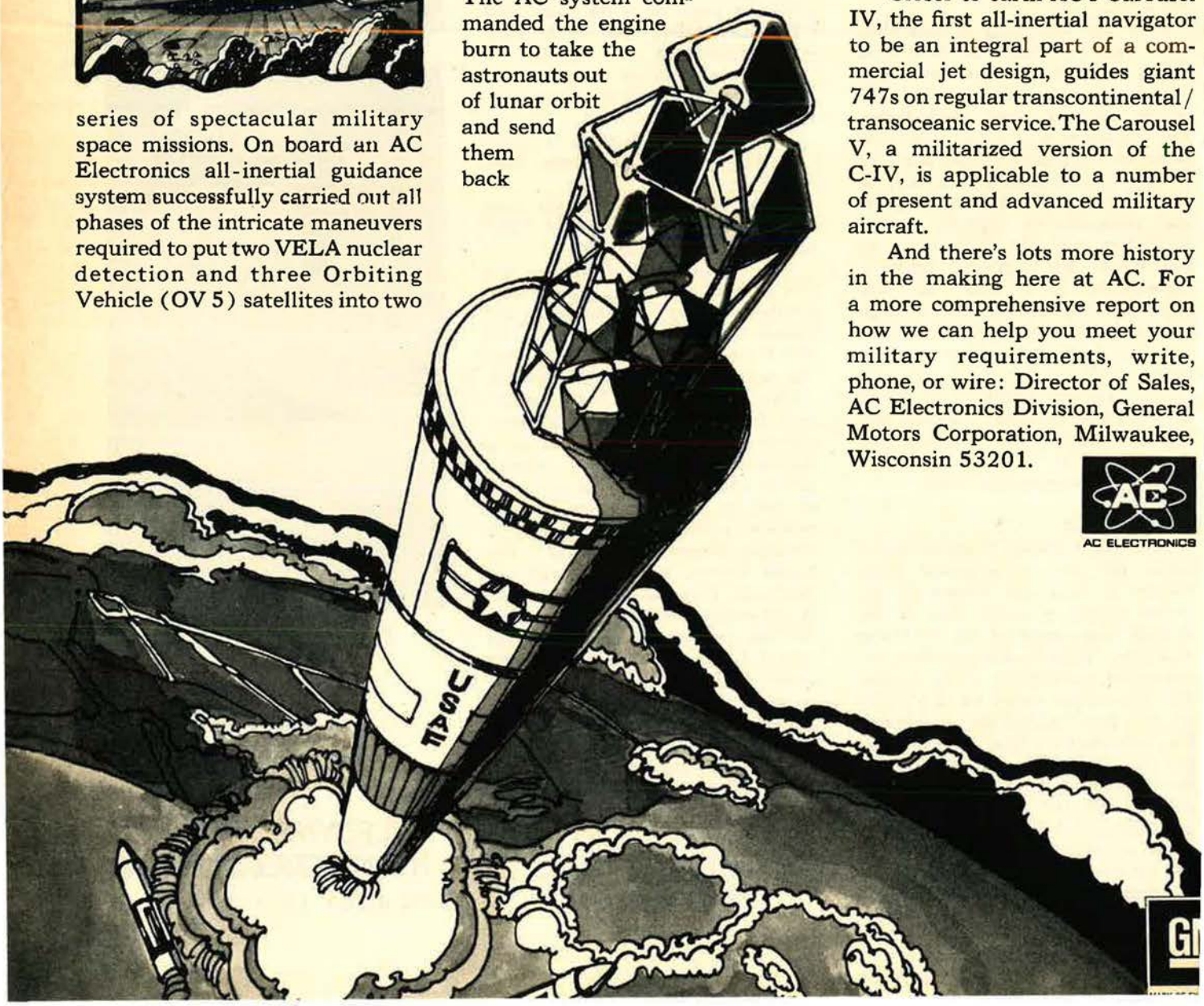
The addition of this successful TITAN III launch typifies AC's contributions to a number of other aerospace achievements of historic importance. It was an AC system that guided the first Americans to the moon and back. The inertial guidance system kept Apollo 11 on course to the moon, controlled the retro firing to put the spacecraft in lunar orbit, guided Eagle to a lunar landing . . . and back again for link-up with Columbia. The AC system commanded the engine burn to take the astronauts out of lunar orbit and send them back

toward earth, across a quarter-million miles of space.

Closer to earth AC's Carousel IV, the first all-inertial navigator to be an integral part of a commercial jet design, guides giant 747s on regular transcontinental/transoceanic service. The Carousel V, a militarized version of the C-IV, is applicable to a number of present and advanced military aircraft.

And there's lots more history in the making here at AC. For a more comprehensive report on how we can help you meet your military requirements, write, phone, or wire: Director of Sales, AC Electronics Division, General Motors Corporation, Milwaukee, Wisconsin 53201.

AC ELECTRONICS



officially abandoned (though it now is being used again, as in the A-1s in Vietnam and the forthcoming A-X), and the Invader's designation was changed to B-26B and B-26C, since by that time all of the Martin B-26s were obsolete and out of service—THE EDITORS

A Flyable Fortress, Anyone?

Gentlemen: The crew of the B-17 "Possible Straight," of the 550th Squadron, 385th Bomb Group, Eighth Air Force of World War II, recently held its twenty-fifth-year reunion. (We won the war this time, too!)

Plans were laid out for a thirtieth-year reunion in 1975, which call for flying ourselves back to England in a B-17 marked up with the red-checkered tail of the 385th.

Question: Can any readers help us come up with a flyable B-17?

W. W. VARNEDOE, JR. (Navigator)
Rt. 4, Box 1853
Huntsville, Ala. 35803

Book on MoH Winners

Gentlemen: The Office of Air Force History would like to hear from AFA members who have personal or first-hand information about any of the Air Force Medal of Honor recipients of all wars. Anecdotes and other details about their careers and combat experiences, as well as their character and other personal qualities are desired for a book on these airmen. Background information on their units and the operations in which these men were involved would also be valuable.

Although the book will emphasize the Medal of Honor recipients, it is also hoped that their exploits will serve to illustrate some of the highlights of Air Force history.

Personal records, including photographs, loaned for this project will be safely returned to contributors. Correspondence and other materials should be addressed to:

Hq. USAF (AFCHO)
Washington, D.C. 20330

Program for Leadership

Gentlemen: This letter is prompted by articles in AIR FORCE/SPACE DIGEST in recent editions, *i.e.*, "An All-Volunteer Force," by Louis R. Stockstill (April '70); "Some Thoughts on Leadership," by Gen. Bruce K. Holloway (July '70); and "The Responsibilities of Youth," by 2d Lt. Charles R. Reed (July '70). I am glad for these articles, but I sense that their contents are incomplete.

This letter is also prompted by my background as CCC camp educational adviser (US Civilian Conservation Corps, 1933-42-46) followed by service in the US Army Air Corps, both at home and overseas, in World War II.

In the 1950s, I lived at length in the national capital. Several times in the Pentagon, from the top down, I was informed that the CCC camps had given to the US armed forces the finest officers and noncoms that the US armed forces had ever received from any source at any time. This is a wonderful tribute. My own personal experience in the armed forces during World War II confirms this tribute. . . .

Yet, who in the national capital or elsewhere, since World War II, has dramatically made known the superiority of the US Civilian Conservation Corps as a training program for wartime leadership? Informed citizens know very well that the CCC Camps made marvelous contributions in peace and in war to the American people, to humanity, and posterity, that are unprecedented, unequaled, unapproached in human history. . . .

Let us have an examination and evaluation of the CCC camps for their social significance during the life of that Corps and since. . . .

CLARENCE C. CASE
Lansing, Mich.

UNIT REUNIONS

12th Tactical Fighter Wing
The officers of the 12th Tactical Fighter Wing will hold their third annual stag reunion September 18-19, 1970, at the Sheraton-Park Hotel in Washington, D.C. Hospitality suite will be open at 1600 hours. Contact

Lt. Col. Tommy I. Bell
Hq. USAF (AFRDPN)
Washington, D.C. 20330
Phone: (202) OXford 74434

20th Special Operations Sqdn.
The "Pony Express" helicopter pilots in SEA are planning a reunion in Washington, D.C., on October 23-24, 1970. Write or call

Maj. Bill McGuth
1st Helicopter Sqdn.
Andrews AFB, Md. 20331
Phone: (202) 981-5131
Autovon 858-5131

4258th Strategic Wing
The officers of the 4258th Strategic Wing, U-Tapao Airfield, Thailand, are holding a reunion at Carswell AFB, Tex., on September 25. All officers who served PCS or TDY with the unit are invited. Contact

Col. James Marr
Hq. SAC, DOCS
Omaha, Neb. 68113
Phone (402) 291-2100
ext. 2518/2537

A Special Report

USAF and the Medal of Honor

The eighth Air Force man to win the Medal of Honor is Col. William A. Jones, III, whose medal was awarded posthumously on August 6 in a ceremony at the White House.

The accompanying citation started out with these words: "For conspicuous gallantry and intrepidity in action at the risk of his life above and beyond the call of duty. . . ."

The late USAF Col. William A. Jones, III, is the eighth Air Force man to receive the Medal of Honor in the Vietnam War. He died in a light-plane crash last fall, after his return from Southeast Asia. President Nixon presented the Medal on August 6 to the family.

"For conspicuous gallantry and intrepidity in action at the risk of his life above and beyond the call of duty."

Those are the words that introduce the citation accompanying the Medal of Honor awarded posthumously, in White House ceremonies on August 6, to Col. William A. Jones, III, USAF. Colonel Jones's Medal of Honor was the eighth such award to an Air Force member for actions in the Vietnam War, and he was the fifty-fourth airman to receive the honor since the beginning of aerial combat in World War I.

The veteran flyer, a native of Norfolk, Va., was graduated from the University of Virginia in 1942, before entering the US Military Academy at West Point, from which he graduated in 1945. He won his wings in 1945, served in the Philippines, in SAC, in a troop carrier wing in Europe, attended the Air War College, and had flown ninety-eight combat sorties out of Thailand.

On September 1, 1968, the incident took place for which Colonel Jones was to receive the Medal of Honor. He was flying a propeller-driven A-1H Skyraider over North Vietnam, as commander of a rescue mission searching for a downed Air Force F-4 pilot. The weather was marginal, and the terrain near Dong Hoi was mountainous.

As Colonel Jones descended into the area, he got word from a forward air controller that 37-mm antiaircraft positions and other smaller automatic weapons were well within range of his slow-moving craft.

Just at that time, his Skyraider was hit, but Colonel Jones kept control, and as the smoke in his cockpit cleared he continued the search for the downed pilot. As he sighted the survivor, Colonel Jones spotted a multiple-barrel gun position firing at him from near the downed pilot's location. The enemy gunners hadn't

USAF MEDAL OF HONOR WINNERS IN VIETNAM

As the eighth Air Force member to receive the Medal of Honor for valor during the Vietnam War, Colonel Jones joins the following list of USAF Vietnam Medal winners: Maj. Bernard F. Fisher, for action at A Shau Valley, South Vietnam, on March 10, 1966; Capt. Hilliard A. Wilbanks, for action at Dalat, South Vietnam, on February 24, 1967; Maj. Merlyn H. Dethlefsen, for action in the Hanoi area, North Vietnam, on March 10, 1967; Capt. Gerald O. Young, for action in the Da Nang area, South Vietnam, on November 9, 1967; Lt. Col. Joe M. Jackson, for action in the Da Nang area, South Vietnam on May 12, 1968; 1st Lt. James P. Fleming, for action at Duc Co, South Vietnam, on November 26, 1968; and A1C John L. Levitow, for action at Long Binh, South Vietnam, on February 24, 1969. Of these seven, five are still on active duty, one has completed service, and one, Captain Wilbanks, was killed in action that earned him the Medal.

At a White House ceremony on August 6, President Nixon, left, presents the Medal of Honor to the widow of USAF Col. William A. Jones. Between them is Congressman William L. Scott (R-Va.), and the others, from left, include Mary Lee Jones, 9; Mrs. Elizabeth Kelley (behind Mary Lee), the mother of Colonel Jones; Elizabeth, 13; Anne Marie, 19 (partially hidden behind her sister, Elizabeth); Sen. Harry Byrd, Jr. (D-Va.); and Sen. William B. Spong, Jr. (D-Va.).

yet seen the F-4 pilot, who was only a few feet from them.

Colonel Jones went after the gun position with cannon and rocket fire. On his second pass the aircraft was hit again with several rounds from the automatic weapons. His cockpit burst into flames, and most of his windshield was blown away. He tried to eject, but the ejection-seat mechanism didn't work.

Though suffering severe burns, he somehow put the Skyraider into a climb. At the same time, he tried to radio the location of the survivor and enemy gun positions to friendly aircraft in the area. But his transmissions were blocked by repeated calls from other aircraft telling him to bail out. Shortly, his cockpit fire burned itself out, but by then all his transmitters were disabled and he could receive on only one channel.

Having miraculously reached altitude in his shattered aircraft, Colonel Jones signaled by hand to his wingman that he would fly his Skyraider back to base, some ninety miles away, instead of bailing out over the first secure area. It was the only way he could get the information on the downed pilot through. The wingman took over the lead, and Colonel Jones, flying in close formation through instrument conditions, followed the wingman and made a GCA landing.

As he was lifted, badly injured, from his aircraft, his first concern was to relay the vital information on the location of the downed F-4 pilot and the enemy gun positions so that the rescue could be made. The survivor was retrieved later that day, but only after the gun position Colonel Jones had sighted had been destroyed.

Colonel Jones was air-evaced back to the US for medical treatment. After recuperation from the burns he suffered during the mission, he returned to active duty and, early in 1969, was assigned as Commander of the 1st Flying Training Squadron, 1st Composite Wing, at Andrews AFB, Md.

On November 1, 1969, Colonel Jones was promoted to full colonel. He was still on assignment at Andrews AFB when he was killed, on November 15, 1969, in the crash of his private plane near Woodbridge, Va.

He is survived by his widow, Mrs. Lois Mc. Jones; the couple's three daughters—Anne Marie, 19; Elizabeth, 13; and Mary Lee, 9—and his mother, Mrs. Elizabeth H. Kelley, all of Charlottesville, Va.

There was a poignant moment after the formal presentation of the Medal during the White House ceremony. Mary Lee gave President Nixon a copy of *Maxims for Men-at-Arms*, by her late father. The new book is a collection of quotations by famous people about the military profession, gathered by Colonel Jones during his career in the Air Force. Each page bears an appropriate pen-and-ink illustration by Colonel Jones, who had received the first copy of the book himself only the day before his death.—END

We've
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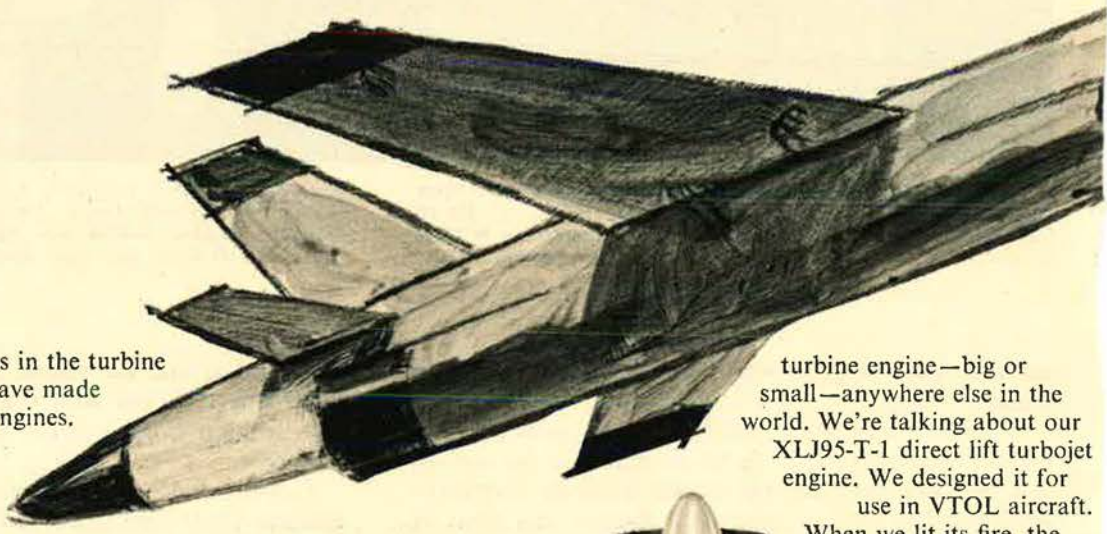


There are companies in the turbine engine business that have made it big by making big engines.

Then there's us. Teledyne CAE.

We've made it big by making small turbine engines.

Like our engines for target drones. We happen to be the world's leading manufacturer of turbojet drone engines. So far, Teledyne CAE engines in the BQM drone series alone have been successfully launched over 20,000 times. And nearly 10,000 of these launches have been in the air. Way up in the air.

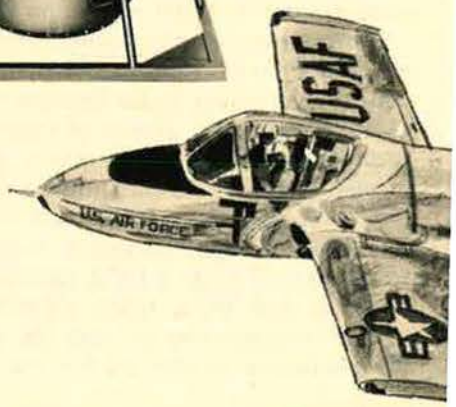
Just recently our 1920-pound thrust YJ69-T-406 engine completed its flight test program in the Navy BQM-34E drone. It reached Mach 1.1 at sea level and Mach 1.5 at 60,000 feet. This same engine is programmed for the Air Force BQM-34F, incidentally.

Another one of our drone engines, the Tri-Service J69-T-29 is famous, too. But for a slightly different reason. On a per pound of thrust basis, it's the lowest cost engine in the world today.

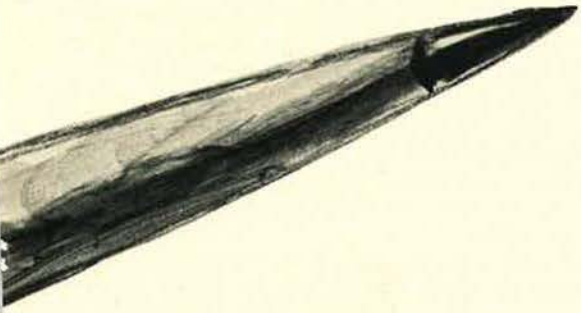
And, as you know, thrust per dollar is the name of the game.

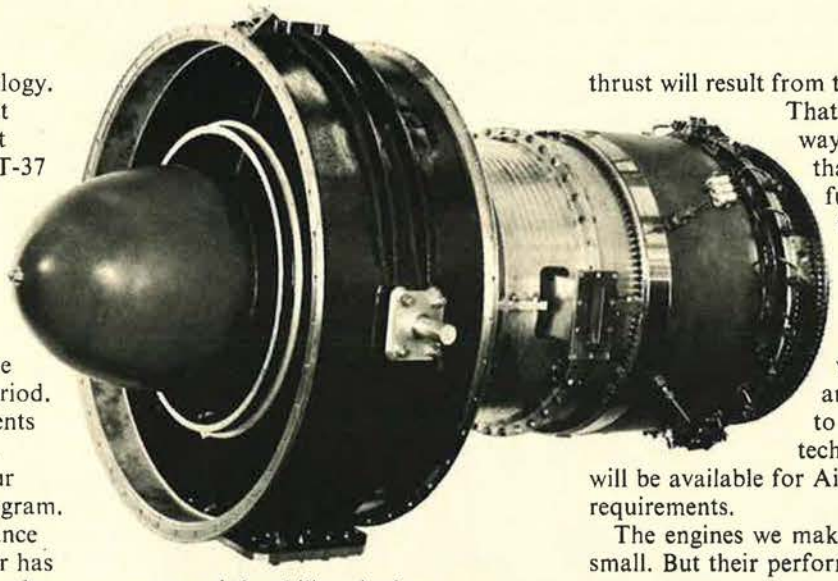
We own another record that also hasn't been duplicated in another turbine engine—big or small—anywhere else in the world. We're talking about our XLJ95-T-1 direct lift turbojet engine. We designed it for use in VTOL aircraft. When we lit its fire, the XLJ95-T-1 demonstrated a thrust-to-weight ratio in excess of 20:1.

You don't get that kind of a thrust-to-weight ratio unless you know all about the most advanced



made it big small way.





ncepts in gas turbine technology. We also build an engine that as been powering the T-37 jet rainer ever since there was a T-37 et trainer. From the beginning of the program until ow, the 3,900 engines we've upplied have logged over 000,000 flight hours. It also has the lowest aintenance cost of any engine the Air Force inventory. Period. One of our latest developments n't in the military inventory. ot yet, that is. It's part of our TEGG or "core" engine program. or some time now, our Advance urbine Engine Gas Generator has been demonstrating extremely high levels of performance and durability. And we expect that turbofan engines with a thrust to weight ratio of 10:1 and specific fuel consumption of less than 0.4 lbs/hour/lb. of thrust will result from this technology. That's a technical way of saying that, in the future, small turbofan engines in the 2,000-5,000 lb. thrust range with performance equivalent to large advance technology engines will be available for Air Force requirements.

The engines we make may be small. But their performance is big.

See you at the AFA Show
Booth 101-105

TELEDYNE CAE

1330 LASKEY ROAD · TOLEDO, OHIO 43601

AIRPOWER IN THE NEWS

By Claude Witze
SENIOR EDITOR, AIR FORCE MAGAZINE

A Package Tied in Blue Ribbon

WASHINGTON, D.C., AUGUST 11

An experienced congressional staff executive, who has spent many years monitoring military operations, remarked earlier this year that "every incoming defense administration believes itself duty-bound to show that it has a new approach, one that will be vastly superior to the old ways, more conducive to economy, efficiency, and responsibility."

He also delivered the opinion that reforms always fall short of expectations. The current example, of course, was the revolution introduced by Robert S. McNamara. After nearly a decade of Mr. McNamara's reforms, the situation in the Pentagon seemed to be worse than ever, this observer said. It was a judgment that stood in sharp contrast to the speech of a Democratic senator, who hailed Mr. McNamara as "one of the finest public servants ever produced by this country . . . the finest Secretary of Defense . . . a man for all seasons [who] leaves behind him a legacy of accomplishments in the defense complex which will stand for many years."

These men can't both be right, and their difference of opinion may account for the deep silence on Capitol Hill since the Nixon Administration's program for Pentagon reform was handed down on July 27 by the Blue Ribbon Defense Panel. This group, headed by Gilbert W. Fitzhugh, Chairman of the Board and Chief Executive Officer of the Metropolitan Life Insurance Co., has been working for a year—which probably was not long enough—to draft a list of 113 recommendations for changes in the organization and procedures of the Defense Department. The report itself is 237 pages long and is a worthwhile discussion of all aspects of Pentagon interest, including organization, command and control, procurement, research and development, intelligence, personnel policies and practices, and conflicts of interest. To get your own copy, send a check for $2.25, made out to the Superintendent of Documents, to the Government Printing Office, Washington, D.C. 20402. Ask for the "Report to the President and the Secretary of Defense on the Department of Defense by the Blue Ribbon Defense Panel, 1 July 1970."

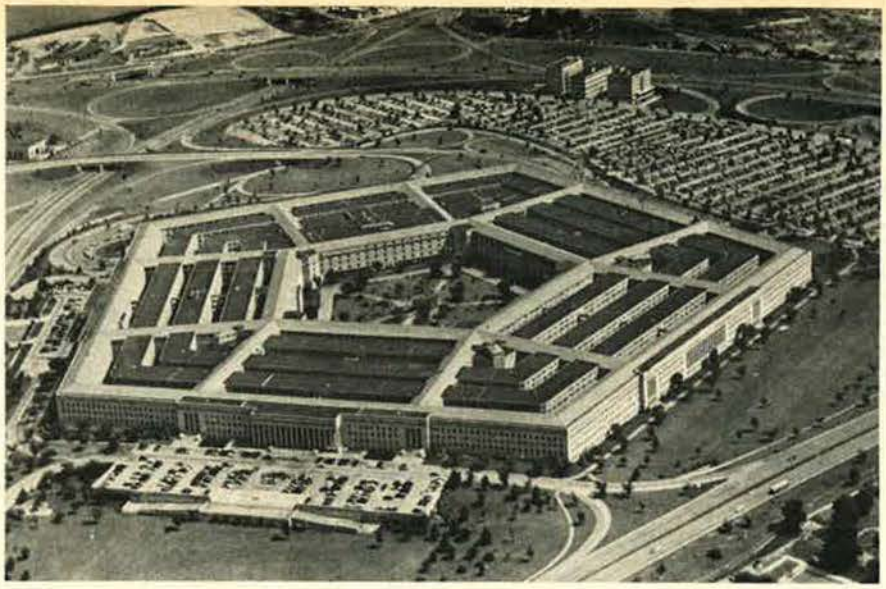
The silence that greeted the report in Congress may be more than matched by the reluctance of anyone in the Pentagon to offer comment. Defense Secretary Melvin R. Laird, who had the first copy, has said only that he assumes a majority of the recommendations will be adopted. While the document sits on his desk awaiting action, the men in uniform are under orders to hold their silence. It is an admonition that is somewhat meaningless, as the record shows.

In USAF circles, for example, there is some satisfaction garnered from an observation by Mr. Fitzhugh, who told a press conference that the basic difficulty in defense administration is a "diffusion of responsibility." He said, "there is nobody below the level of the Secretary and the Deputy Secretary that has the purview of the whole operation of the Department. The same people have an interest in everything, so they are all bogged down with too much detail work, too many responsibilities; there are too many man-killing jobs, and nobody really has the responsibility for anything."

He continued:

"Everybody is somewhat responsible for everything, and nobody is completely responsible for anything. So there's no way of assigning authority, responsibility, and accountability. You can't hold anybody accountable. There is nobody that you can point your finger to if anything goes

Report on Blue Ribbon Defense Panel recommendations was given to Pentagon press corps by Chairman Gilbert W. Fitzhugh (right) and Defense Secretary Melvin R. Laird (left). One of the major weaknesses in Defense Department organization, the chairman said, is the fact that all basic decisions come to the top, because nobody below has authority to make them.



The Pentagon, largest office building in the world, has too many people working in it, the Blue Ribbon Defense Panel says. The Office of the Secretary of Defense, with 3,500 persons now on the payroll, should be reduced to not more than 2,000. The Secretariats and military staffs, the report continues, should be slashed in a similar manner for more efficiency.

wrong, and there is nobody you can pin a medal on if it goes right, because everything is everybody's business and, as you know, what is everybody's business is nobody's business. . . . Nobody can do anything without checking with seven other people."

Well, the discovery of this fact, at the conclusion of the McNamara regime, came as no surprise in the Head Shed, where it was not necessary to ask for formal comment. The documentation is there. About a year ago, in his swan song to the Senate Appropriations Committee, Gen. John P. McConnell, retiring USAF Chief of Staff, bewailed high centralization and the burden of providing more and more information to upper-level decision-makers. He called for more management by responsible officials at lower levels.

Then the General made an observation that could have provided the text for Mr. Fitzhugh:

"In running flying outfits, I never had any trouble. When a squadron commander goofed, he was fired. In our procurement and development areas, I can't find anyone to fire. Too many people at too many levels have had too much to say about the program."

The text of the Blue Ribbon report itself provides several examples of situations, unearthed by the panel in its year of work, that have been the subject of military critiques for a long time. One is the discovery that public attitudes toward conduct of the war in Vietnam have an effect on defense operations and that these public attitudes sometimes have no basis in reality. Take the general blame for inefficiency in the conduct of the war. Much of the public holds the military services responsible. There are congressmen, cartoonists, and commentators who join in the chorus. Yet the Fitzhugh report says, "Many of the rules and restraints regarding how this war has been fought have not originated with the military, but with the civil authorities of government. Many operational tactics, believed by some to be more militarily efficient, have been precluded by the United States's self-imposed 'rules of engagement,' which reflect many factors in addition to military efficiency. Whether or not one agrees with the weight given the various factors in coming to such judgmental decisions, or with the actual decisions, the fact is that these decisions relating to the war in Southeast Asia were made by civilian, not military, officials—sometimes upon the advice of the military, and sometimes against such advice."

In another area, the panel found that the Office of the Assistant Secretary of Defense (Systems Analysis) "has proved to be a controversial organization." The reason, in large part, is that "it initiates, rather than reviews, force structures . . . and, in effect, has made, rather than advised on, decisions." This is an observation made long ago. Specifically, it was the source of an outburst by Gen. Thomas D. White, after he retired as USAF Chief of Staff in 1961, lamenting the advent of "Whiz Kids," who puffed on their pipes and told old hands in uniform what they really needed to know. The review of force structures and programs for the Secretary of Defense is an essential task, the panel declares, but it "requires the application of a broad range of disciplinary skills, maturity born of experience, and firm, responsible direction."

If we shift again, to the subject of military personnel, the report suspects that antimilitarism, on the campus and off, deters young men and women from serving in the armed forces. Positive steps are needed to restore respect for uniforms. Within the services, the panel is critical of rotation practices, arguing that both officers and enlisted men are rotated too frequently. The policy is wasteful and inefficient, and makes it difficult to fix responsibility. In a study of 174 new general officers, the staff found their average service was twenty-four years and that in this time these 174 men had been given a total of 3,695 assignments—an average of twenty-one per man. The average duration per assignment was fourteen months. The panel recommends that specialist careers be established in professional fields and that the duration of assignments be increased.

There is something here, too, for the maligned military-industrial complex. With a bow to Dwight D. Eisenhower, the panel says he often is quoted out of context on the subject, and says that industrial capability is essential to national defense. The report is confident that Pentagon civilian officials can and will control the military-industrial complex, for the simple reason that the critical decisions are made by civil authorities in the executive and legislative branches of the government. The men in uniform and the contractors do as they are told.

Next to this lies the subject of profits and the current concerns that "defense contractors make large profits, and that the desire for profits leads them to press for ever larger defense budgets." Not so, says the panel. It can find no grounds for a charge that in recent years there have been excessive profits, and points to the requirement

(Continued on page 29)

LOG COORDINATE CONVERTER

DATA TRANSMIT UNITS

DUAL VERTICAL SCALE INDICATOR (tachometer)

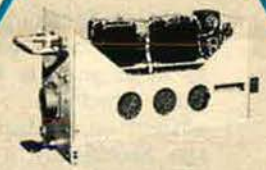
AL VERTICAL SCALE INDICATOR (temperature)

AIR DATA INDICATORS

VERTICAL SCALE ATOR (elevation)

INS TIME-TO-GO INDICATOR

ARINC DUAL DME INDICATOR



DUAL CHANNEL SYNCHRO AMPLIFIER

DECI-LINE

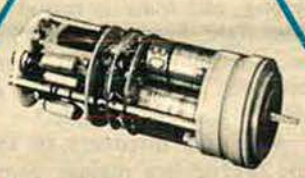
DUAL VERTICAL SCALE INDICATOR (fuel flow)

SOLID STATE SERVO REPEATER

AREA NAV. SYMBOLIC PICTORIAL INDICATOR

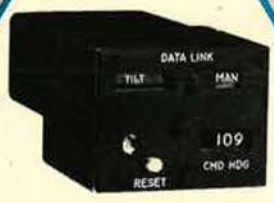
LORAN "C" RECEIVER

ARINC DME INDICATOR



SERVO REPEATER

LAT/LONG INDICATOR



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for renegotiation as a protection against abuses. Further, the report calls for a recognition that incentives are required to attract industry into competition for defense business. It notes that while a great number of dollars are spent for research and development and procurement, they represent only part of the defense budget, and that profit accounts for less than ten percent of the money spent in this area. "Too much attention to profits," the panel concludes, "can divert attention from the much larger elements of costs, quality, and performance."

The continuing congressional interest in the conflict-of-interest issue, and the employment of retired officers by defense contractors, also gets a review, and the critics, for the most part, are rebutted. The concern over the possibility of a retired general or colonel exercising influence on behalf of a contractor is not viewed as a menace. And it is more than offset, the report indicates, by that of the former Defense Department civilian employee who has joined the defense business. A study of the statistics indicates, the report continues, "that retired military personnel (a) leave the service at an early age, (b) normally seek a second career, (c) frequently have difficulty in translating military skills into comparable civilian skills, and (d) do not tend to cluster around military-related industries."

The panel says "it is difficult to envision a retired officer who would have sufficient personal influence within the Department to manipulate the whole [procurement] process." It concludes that the emphasis of the statutes and regulations "should be directed toward prohibition of and punishment for specified undesired acts, rather than toward prior restraints." It is critical of the existing statutes and says they should be reevaluated in the interests of fairness and consistency.

When the Fitzhugh report was made public in late July, the initial reaction reflected in headlines and the press commentaries was that the real news involved procurement policy and a change in the role of the Chiefs of Staff. One of the reasons for the profound silence from Capitol Hill and the Pentagon corridors probably is that these flash reactions to the Fitzhugh panel report were incorrect. The chairman said, frankly, that ninety percent of the recommendations can be carried out without legislation, which means that Mr. Laird, exercising the same powers that Robert McNamara used, can select the ideas he likes and use them. It is more than a year ago, for example, since Mr. Laird and his deputy, David Packard, turned away from the McNamara total package procurement concept that proved so unworkable and embarrassing in the case of the Lockheed C-5A program. Thus, the fact that the Blue Ribbon Panel also rejects it and calls for a "fly-before-you-buy" policy hardly rates as surprising news. In all of this, there was little attention paid to what Chairman Fitzhugh had to say on the subject. He is worth quoting:

"We don't think there should be a $3 billion contract that can get a defense contractor into a problem of solvency. We think it's too much to expect anybody, any defense contractor, to put in a bid today as to how much it's going to cost him to build a weapon or a plane or a tank that neither he nor anybody else has ever built before, or knows whether it is possible to build.

"He has to guess at all the so-called unknown unknowns, the technical uncertainties, and he has to guess what costs are going to be over the next eight years. It is no wonder that they don't come up with the right answer, that [systems] cost more and take longer."

His realism continued:

"Right now, to put in a proposal for one of these major weapons, it takes more than one ton of paper. Each bidder puts in a proposal with more than a ton of paper. Who can analyze that? Who can really know which is the better proposition? It's just too big." His panel proposal is that the system be divided "into smaller pieces" with "more prototypes . . . and less reliance on paper studies."

In order to do this, the panel's proposed new table of organization includes a Deputy Secretary for Management and Resources, who would be in charge of research and development and procurement. There would be two more Deputy Secretaries—one for Evaluation and one for Operations. The present chair of Deputy, the one occupied by Mr. Packard, would be abolished.

Mr. Fitzhugh explains his idea of splitting the old office of Director of Defense Research and Engineering, now occupied by Dr. John Foster, as part of the effort to break the department into "manageable pieces." The user would be separated from the provider by independent DoD test and evaluation. And, "We think that research and development should not be together, that, by putting that all under one Director [Dr. Foster], he can move things back and forth from research to development." The result: "The Secretary does not have the visibility he ought to have of what's going on, Congress does not have visibility of what's going on, and it's too much of a job anyway."

It is at the level of changes in the table of organization, of course, that controversy will emerge. This also is the level at which Congress is empowered to take a hand. Congress would have to approve the changes, as well as future political appointees to the three new Deputy Secretariats. It is not difficult to imagine the storm that would arise if a new executive branch sought approval to one of these slots of an Adam Yarmolinsky or Alain Enthoven or today's Herbert F. York or Jerome Wiesner.

This is why one of the key issues is the panel's proposal to shake up the machinery that would fight a war, if we got into one. In addition to the one mentioned above, suggested changes include the creation of a military operations staff for the Secretary of Defense that is separate from the Joint Staff of the Joint Chiefs of Staff. The Chiefs now work in three roles. They are commanders of their services, military advisers to the President, and serve as a link between the Secretary and forces in the field. As a matter of fact, this last job was thrust upon them by Secretarial decree and is not required by the law.

Under the new operations staff, reporting to the new Deputy Secretary (Operations), would fall three new military commands: Strategic, Tactical, and Logistics. The Strategic Command, of course, would include USAF's SAC, the Navy's nuclear-submarine fleet, and the Continental Air Defense Command (CONAD) as well as the Joint Strategic Target Planning Staff. The Tactical Command would include all general-purpose forces in all services. The Logistics Command would be responsible for support activities of all services.

The reason for this program is spelled out. The panel finds the present arrangement "awkward and unresponsive" and says it provides "a forum for interservice conflicts" and "inhibits the flow of information."

Whether or not all these things are true will depend on the experience and wisdom of the observer. That the conclusions in this regard will be contested, there is no doubt.

The one certain thing is that the Blue Ribbon Defense Panel has dealt a blow to many of the military's loudest critics. A government that can bring about so many changes, if it wants to, is not in the grip of a military monster.—END

AEROSPACE WORLD

News, Views & Comments

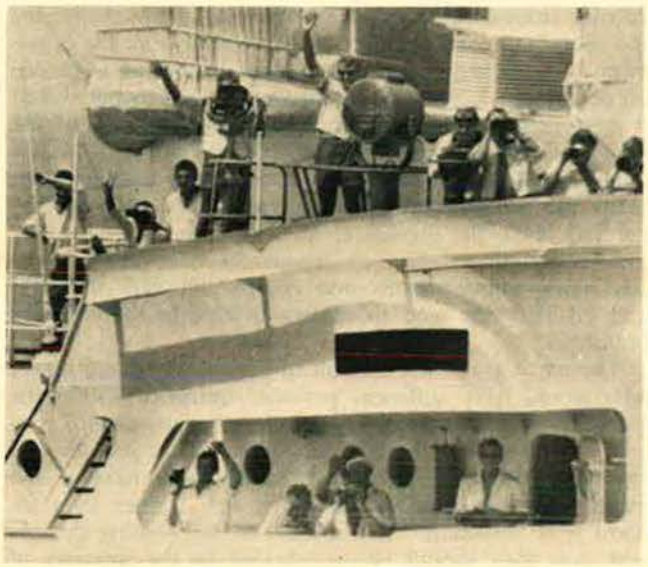
By William P. Schlitz
NEWS EDITOR, AIR FORCE MAGAZINE

WASHINGTON, D.C., AUGUST 17

A run-in on August 3 with a Soviet snooper ship almost stole the spotlight from an event of great significance: the first underwater firing of the Poseidon missile.

The Russian ship—the *Laptev*—came so dangerously close to the USS *Observation Island* on two occasions that the US skipper had to sound the international danger signal; once, the US vessel went into full reverse to avoid a collision. The Soviet ship also made an unsuccessful dash to retrieve some of the debris left on the ocean surface following the Poseidon shot, which took place from a US nuclear submarine about thirty miles off the Florida coast.

Russian ferret ships have observed other ocean tests of US missilery, but



Crewmen of the Soviet spy ship Laptev *wave and snap photographs as the vessel approaches to within eighty yards of a Navy support ship on August 3. The approach was made after the US sub* James Madison *successfully launched a Poseidon missile for the first time from underwater.*

—Wide World Photos

The McDonnell Douglas Corp.'s DC-10, a new, wide-bodied trijet, was rolled out on July 23 and later began a flight-test program. Capable of transporting 270 passengers and their baggage over distances up to 6,100 miles, the 182-foot-long aircraft is powered by GE CF6 engines derived from the advanced-technology, high-bypass engines of the C-5. Fourteen US and foreign airlines hold options and orders for 237 DC-10s.

Lockheed Corp.'s L-1011 TriStar, which is to begin test flights in November of this year, can carry up to 345 passengers over distances of more than 3,500 miles when configured for transcontinental operations, or up to 6,300 miles in its proposed Dash 8 intercontinental model. It is fitted with Rolls-Royce turbofan engines. Thus far, 173 TriStars have been ordered by the airlines.

never before at such close quarters or with such aggressiveness.

Poseidon is scheduled to replace the US's arsenal of Polaris missiles in this decade, and, with its MIRV (multiple independently targeted reentry vehicle) warhead carrying up to twelve nuclear weapons, will complement Air Force missiles and bombers in supplying the potential punch to deter the Soviet Union from any surprise attack.

The first submarine set for installation of operational Poseidon missiles is the *James Madison,* the craft that conducted the underwater test shot. In all, thirty subs will carry the new missile.

How the Poseidon deployment will affect the Strategic Arms Limitation Talks, currently under way with the Soviet Union, cannot be determined. Thus far, the talks seem to be making headway toward limiting the quantity of strategic weapons by both parties; applying curbs to such weapons as Poseidon remains a future prospect.

☆

The Air Force reached another milestone in development of its F-15 air-superiority fighter when, in July, it initiated the "fly-off" stage of two advanced radar systems competing for the F-15 contract.

The radars are mounted in B-66 jet bombers, and, following the "fly-before-you-buy" test series, prime contractor McDonnell Douglas will select the winner from the two competing companies—Hughes Aircraft Co. and Westinghouse Electric Corp.

The radar for the fighter, scheduled for first flight in 1972, will assist pilots in air-to-air combat situations. McDonnell Douglas already has picked IBM to produce the fighter's centralized computer, which will conduct all computation and memory functions for the high-maneuverability aircraft. Other subsystem contractors are currently under consideration.

In the "fly-before-you-buy" concept established by Defense Secretary Melvin Laird, specific development goals must be reached before the contractor begins production. With the exception of long-lead-time components, major subsystems must be flight-tested to reduce possible future problems of cost, performance, and schedules, before production is initiated.

Officials view this method as the answer to the kind of problems that plagued development of the F-111 and C-5 under "total package procurement" contracting procedures.

In another matter, Boeing Co., prime contractor for development of the Air Force's Airborne Warning

(Continued on following page)

JAPAN STEPS UP CIVILIAN VTOL USE

Japan's high-density urban areas, long a hindrance to rapid airport commuting, are one major factor in the strong drive for introduction of VTOL and helicopter air-taxi services.

Large corporations are particularly interested in helicopters to keep their top executives out of time-consuming road traffic. The choppers would operate from heliports atop downtown offices to branches and plants located around such major cities as Tokyo and Osaka.

Road travel is currently so slow that many businessmen prefer to use the subway instead of a company car. The crowded vehicle conditions also are responsible for the nonprofitable operation of the monorail that links Tokyo and the present Tokyo International Airport.

Since its opening in 1964 until recently, the monorail has been consistently in the red, mainly because it did not operate all the way to the downtown area. As a result, travelers preferred taxis to and from the airport. However, vehicle traffic on the airport roadnet is now so heavy that passengers often face long delays and frequently miss flights.

(Ironically, the monorail's hope of future prosperity may be short-lived because of new government planning. A new airport is being built at Narita to handle all of Tokyo's international flights. The present Tokyo International Airport at Haneda will be used mainly for domestic flights.)

The Transport Ministry is planning a rapid-transit system to link the New Tokyo International Airport at Narita to the downtown area and the present Tokyo International Airport at Haneda. VTOL aircraft, a monorail, and a bullet train similar to the New Tokaido Line will provide high-speed transportation to and from the airport within a few years.

VTOL aircraft are scheduled to be in service by 1975, and will make the thirty-seven-mile flight from the new airport to the heart of Tokyo in just twenty minutes. The VTOLs will have a seating capacity of 150, and will also link the old and new airports.

The bullet-like train will run from the airport to the centrally located Tokyo Station, also in twenty minutes. The monorail, however, will involve a change to the subway, and that trip will total fifty minutes. These facilities are not expected to be operational when the new airport opens next April, but plans call for completion prior to 1975.

A sidelight to introduction of VTOL aircraft on a large scale in Japan is that the Aeronautical and Space Technological Research Institute of the Science and Technology Agency is well into testing to develop a domestic VTOL. The experimental aircraft is powered by two JR 100F lift-jet engines, each with a thrust of 1.37 tons. It is conceivable that by 1975 at least some VTOLs in Japan will be domestically designed and built.

As mentioned above, private business is the prime mover behind the growing use of helicopter transportation in and around large Japanese cities. Until recently, helicopters were used exclusively by the military, news agencies, and for agricultural spraying.

Transportation Ministry figures show the number of registered civilian helicopters rose from only thirty-one in 1955 to 270 last year. The first Japanese company to purchase a helicopter to improve management efficiency was the giant Japan Miniature-Bearing Co., in 1967. A company spokesman said the helicopter has already paid for itself. Other companies now using helicopters include Sony Corp., Tohoku Electric Power Co., and Daini Seikosha.

One problem standing in the way of air-taxi services is the difficulty involved in locating heliports in built-up city areas. Seibu Department Store and the forty-story World Trade Center Building were refused permission to construct heliports on their roofs, mainly because of the noise.

However, to ease ground-transportation congestion, the Japanese Transport Ministry is being forced into a more permissive stand on VTOL/helicopter use over high-density urban areas, as evidenced by its own plan to introduce VTOL service to downtown Tokyo by 1975.

Commercial helicopter chartering firms, however, face other problems besides restrictions on heliport construction. The several major air-taxi firms in Japan have to contend with high operating costs. Presently there are about eighteen helicopter chartering companies in Japan.

As the use of helicopters for urban transportation increases in Japan, experts predict the number of chartering firms will decrease due to mergers forced by competition and high operating costs. —RONALD C. GOLDEN

and Control System (AWACS), has awarded contracts to both Hughes and Westinghouse for creation of AWACS' overland surveillance radar.

Flight tests of the two competing radar systems, which are to be designed to "look" down and separate moving targets from the ground clutter, are scheduled to begin early in 1972. Boeing plans to outfit two 707-320 Intercontinental aircraft as testbeds for the program.

☆

In a surprise move late in July, Dr. Thomas O. Paine resigned as Administrator of the National Aeronautics and Space Administration.

The forty-eight-year-old Dr. Paine, who headed the team responsible for man's first landing on the moon, said that he would return to private life and a "challenging opportunity" with General Electric Co., where he had been employed for nineteen years prior to his move to NASA early in 1968.

There was immediate speculation that Dr. Paine's resignation was the result of the series of cuts in NASA's budget. This he emphatically denied: "Now is the appropriate time for a change in command at NASA," he told President Nixon in his letter of resignation, "and this coincides with my wish to return to private life."

Knowledgeable observers of NASA affairs suggest that the front runner among those mentioned as possible candidates for the top NASA job is the current Deputy Administrator, George M. Low, who has served at Houston's Manned Spacecraft Center in prime posts before coming to Washington.

Dr. Thomas O. Paine recently resigned as Administrator of NASA, where he headed up the team that put the first man on the moon. Dr. Paine announced that he will accept a position with GE, his employer before his NASA work.

Maj. Henry M. Dyches, Jr., admires the Koren Kolligian, Jr., Trophy, given each year to an Air Force crew member for outstanding performance during an in-flight emergency. Major Dyches won for such an action at Yokota AB.

NASA, already beset by its funding difficulties, has a number of other question marks in its future. Among them: whether or not to continue its original schedule of moon landings; how best to develop the reusable space shuttle; and how to balance its manned and unmanned space efforts.

☆

Following a lapse of five years, USAF once more plans to conduct its "William Tell" fighter-interceptor competition. The event, October 26–31, will be under the auspices of the Aerospace Defense Command and will be held at Tyndall AFB, Fla.

Top ADC and defense-assigned Air Guard fighter-interceptors will compete. Canadian forces also have been invited to participate.

The event was begun in 1954 as the air-to-air rocketry part of USAF's third annual Fighter Gunnery and Weapons Meet held in Arizona. It moved to Tyndall in 1958 and became the USAF Worldwide Fighter-Interceptor Weapons Meet. Not held in recent years because of Vietnam combat needs, it has been made possible this year because of funds already available for training purposes, the Air Force said.

The competition's aim is to evaluate crew ability to maintain, handle, and load defense weapons under sim-

(*Continued on page 34*)

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The burned-out hulk of a C-130 aircraft lies on the airfield at El Toro Marine Corps Air Station, Calif., after it crashed and exploded. Its pilot was killed and four-man crew severely injured. In the background, President Nixon's Boeing 707 —Air Force One—performs a practice takeoff near the wreckage.

—Wide World Photos

ulated combat conditions, and to demonstrate the interceptor weapons' capabilities. A best team is named in each aircraft type participating.

Competing will be F-106 Delta Darts, F-102 Delta Daggers, and F-101 Voodoos. Firing is to take place on the Air Force test range over the Gulf of Mexico.

Late in July, Panavia Aircraft GmbH, Munich, received a go-ahead to begin the first development phase of Europe's multirole combat aircraft (MRCA).

The prototype planned by Panavia is to be a twin-engine, two-seat aircraft with variable-geometry wings; a major characteristic is to be its very short takeoff and landing capability. Panavia is an international consortium established by Britain, Germany, and Italy to manage production of the aircraft. Prototypes are to be built in all three countries, and operational aircraft are scheduled to enter the three air forces by 1975.

The green light to Panavia came following the signing of a Memorandum of Understanding by Great Britain and Germany. Italy has yet to sign the memorandum.

The British Aircraft Corp., Fiat of Italy, and Germany's Messerschmitt-Bölkow-Blohm are Panavia's parent companies.

Despite initiation of prototype manufacture, the long-term outlook for the MRCA project is shrouded in doubt because of financial and other major question marks. (*For additional details on the MRCA, see April AF/SD, page 22.*)

☆

The Departments of Defense and Transportation have teamed up to test helicopter capability in a logical but heretofore largely overlooked role: providing evacuation and medical assistance to civilian automobile-accident victims and others needing emergency care.

The test program began in the San Antonio, Tex., area in July and will continue through the end of December. Participating Army helicopters and medical corpsmen are to apply techniques developed during the Korean and Vietnam Wars. Rapid helicopter evacuation is one reason that the death rate of wounded soldiers was cut from 4.5 per 1,000 in World War II to 2.3 per 1,000 in Vietnam.

Theoretically, the same trend should apply to critically ill civilians, especially in remote rural areas, or

to those injured on the nation's highways.

In the test, a UH-1 Huey helicopter and crew from the Army's 507th Air Ambulance Company, Fort Sam Houston, are on constant alert to respond to emergency calls. A Huey can carry three stretcher and four sitting passengers along with its flight crew and medical personnel.

Two military and sixteen civilian hospitals in the ten-county area of the test program are also involved.

Besides saving lives, the program should help to determine communication and coordination effectiveness, civilian and military training requirements, and other related factors. The program already is to be expanded to other areas.

☆

The Coast Guard is also experimenting with helicopters to help prevent massive oil spills from stricken oil tankers. It hopes that the technique can eventually be put to use as far as 300 miles offshore.

The system relies on removing the cargo from a distressed tanker before the oil spreads on the ocean surface and becomes unmanageable. Theoretically, a helicopter would deposit pumping equipment and a salvage crew aboard a troubled tanker. Oil in the holds would be pumped into giant, floating rubber containers, each capable of holding hundreds of thousands of gallons of oil.

Sikorsky HH-52A and HH-3F helicopters have already participated in a series of tests to prove the system, using a US Navy water barge as a simulated tanker.

(*Continued on page 37*)

—Wide World Photos

On August 4, this British-built Harrier V/STOL aircraft flew demonstration missions at the Marine Corps base at Quantico, Va. The Marines are buying twelve of the aircraft to help in close support, at a cost of $57.6 million. Deliveries are set to begin next January.

Uncle Sam's trying to save money.

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You can bank on our help.

AEROSPACE WORLD — CONTINUED

If the system works in actual cases, the plan calls for the rubber containers to be towed to shore to recover the oil. The containers are reusable.

☆

Personnel who served with British Commonwealth forces prior to US entry into World War II have been invited to attend a reunion of Commonwealth aircrews.

The reunion, dubbed a "nostalgic happening" by the sponsoring Winnipeg Wartime Pilots and Observers Association, is scheduled for September 24–27.

Planners of the reunion expect attendance by some 2,000 flyers from Britain, Australia, Canada, New Zealand, India, South Africa, the US, Norway, Denmark, and other wartime allied countries. Invited are wartime flyers of any war, regardless of rank or aircraft specialty.

For additional information, write Commonwealth Air Reunion, P.O. Box 1702, Winnipeg, Canada.

☆

Talk about supergadgets! USAF recently unveiled a rotating-arm test apparatus designed for speeds up to Mach 3 (2,280 mph). That is more than twice the velocity of the free world's only other supersonic rotating arms at Wright-Patterson AFB, Ohio, and Dornier Systems GmbH, Germany. Those will do Mach 1.4.

Actually, the supersonic rotating-arm test apparatus has a very practical purpose: studying the effect of particles hitting solid surfaces at high speed. Major damage to even the highest-strength materials takes place when they are bombarded with water, ice, or sand particles. Naturally, this phenomenon is of considerable interest to military and commercial aerospace communities alike.

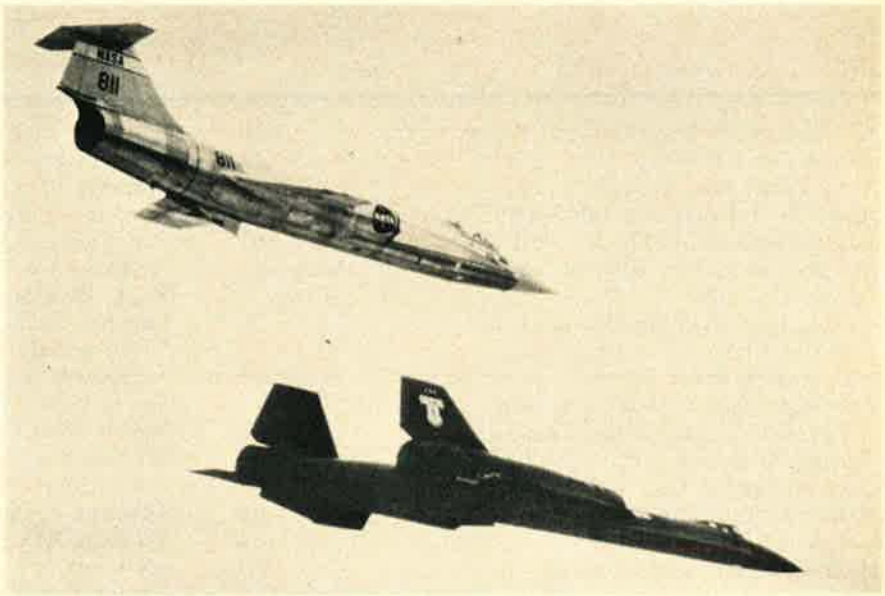
USAF experience testifies that rain and ice particles have severely damaged missiles and aircraft noses, canopies, radomes, and wing and tail leading edges. In some cases, damage was done in only thirty seconds while flying through heavy rain at 680 mph.

The test apparatus, at Textron's Bell Aerospace Division in Buffalo, N.Y., will be used in a program to determine the erosion characteristics of about 600 materials at sustained speeds ranging from Mach 0.66 to Mach 3 and at simulated altitudes up to 60,000 feet.

Among the specimens Bell will test for the Air Force are polymers, elastomers, ceramics, nucleated glasses, composites, and a variety of steel, aluminum, and titanium superalloys. The purpose is to develop materials that will withstand particle erosion.

The rotating device is housed in a concrete-encased twenty-six-foot-diameter vacuum chamber. Specimens are mounted on a tapered blade that extends nine feet in radius. At Mach 3, the blade hits 3,500 revolutions per minute and develops load factors of 35,000 Gs. An environmental control system introduces sand and water particles, and a closed-circuit television

(Continued on following page)



High in the skies over Southern California, a "blackbird" YF-12A research aircraft—the world's fastest interceptor—is shadowed closely by a "chase" Starfighter. The planes, both built by Lockheed-California Co., work for NASA in training astronauts and observing the performance of high-speed aircraft undergoing tests at Edwards AFB.

The Air Force, too, has its changing fashion scene. Above is how the WAF uniform looked back in the 1950s. Skirts had that floppy look and came all the way to mid-calf with no length options.

A1C Pat Rowe (left) and Sgt. Paulette Stugart model 1970 WAF uniforms to show maximum and minimum permitted skirt lengths. Just what effect fall's anticipated fashions will have is unclear.

On the masculine side, Col. John R. Hansen of the C-5 Systems Program Office, Wright-Patterson AFB, Ohio, wears an experimental two-tone summer uniform that may replace the tan one.

system is part of the monitoring equipment.

☆

About a month had elapsed between the disastrous Peruvian earthquake (*see AF/SD, July, page 22; August, page 26*) and the arrival of massive Soviet aid to the stricken area.

Huge Soviet AN-22s (until the US Air Force's C-5, the record-holder in lifting air cargo) and smaller AN-12s brought in medical personnel and supplies, including a complete hospital unit, prefab housing, food, clothing, and helicopters.

The transports came from northern Russia via Iceland, where they refueled at Keflavik Airfield.

One of the giant AN-22s disappeared from US radarscopes monitoring the Soviet flights, presumably having crashed in the North Atlantic off Greenland. Although an immediate search was undertaken, nothing of the aircraft and its twenty-five passengers and crew was found.

☆

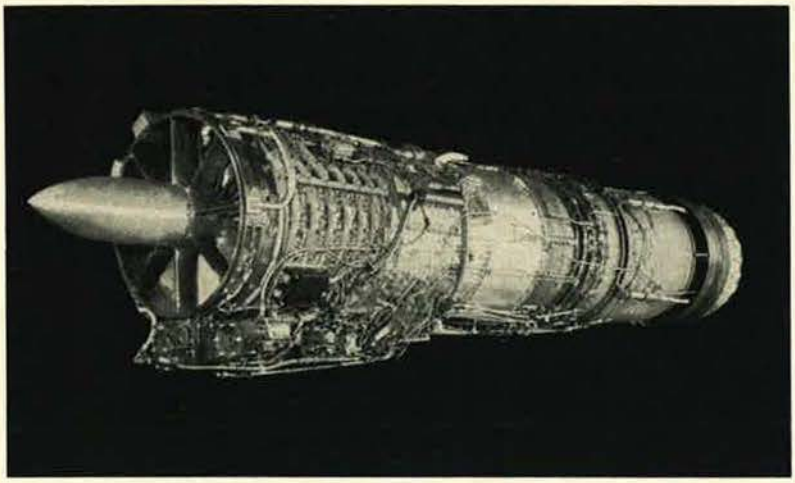
NEWS NOTES—**Dulles International Airport,** near the nation's capital, has

(*Continued on page 41*)

INDEX TO ADVERTISERS

jet set

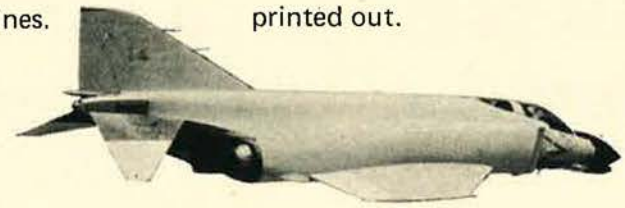
How to economically test jet engine fuel controllers — Testing fuel controllers on the J79 engine used to be a large scale, expensive, manual operation. RCA has developed something better — called the Automated Test System/Jet Engine Accessories — ATS/JEA.



One Computerized System —
This RCA system tests fuel controllers automatically, precisely, and at far less cost. One time-shared process controller monitors all test stands.

How does it work? —
Four test stands (thirty-six more can be added to the system). Each stand is a self-contained unit complete with hydraulic system and reservoir, transducers, actuators, control panels, digital display, and teletype-writer. Using printed or visual instructions, an operator merely hooks up and makes mechanical adjustments. The process controller does the rest. Any adjustment or malfunction is identified and printed out.

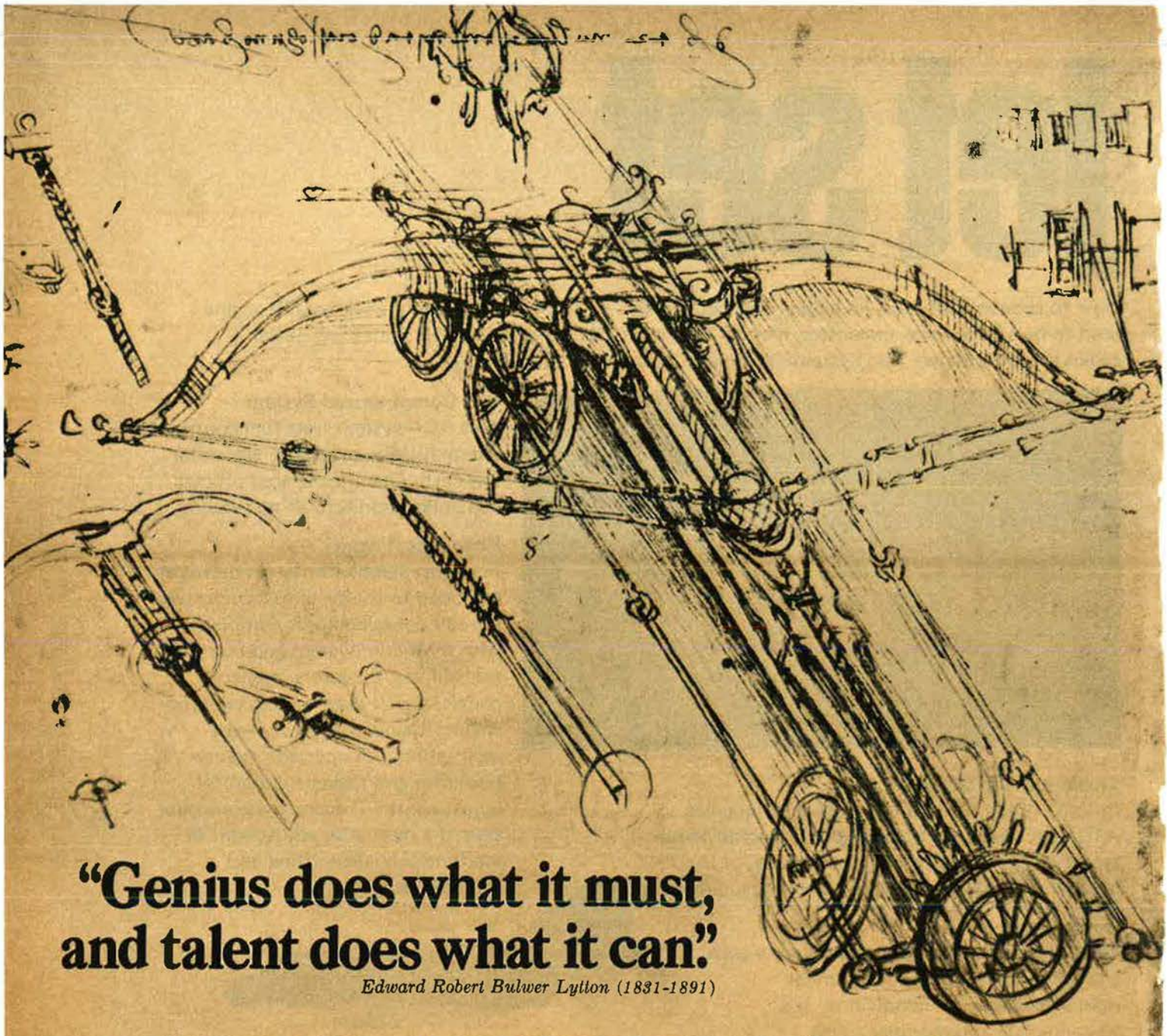
This is just the beginning —
Initially it will be used for overhauled engines. ATS/JEA has broad applications in engine manufacturing plants for production testing, or in maintenance hangars serving commercial airlines.



How reliable is it? —
The system uses standard components with a proven record of reliability under rigid environmental conditions. It's all solid state and modular. This makes it easy to maintain while simplifying future expansion.

If you want more information about the ATS/JEA System, contact:
RCA Defense Electronics Products,
Aerospace Systems Division,
Burlington, Mass. 01801.

RCA Defense Electronic Products



"Genius does what it must, and talent does what it can."

Edward Robert Bulwer Lytton (1831-1891)

. . . Lytton, a contemporary of Robert Browning and the other great Victorian writers, wanted nothing more than to be a great poet. But wanting wasn't enough. Nor was he deluded by the praise he did receive. Toward the end of his life, he realized that greatness took genius, and that the only thing worse than failing in a life's prime purpose was to be content with a little success. Genius is never content. "Genius is master of man," he said. "Genius does what it must, and talent does what it can . . ."

Talent alone is never good enough. Especially today. The demands are too great. The needs too critical. The results of failure too devastating.

We must somehow stay a step ahead of technology, and not settle for "little successes."

Our approach has always been to conceive and design communications equipment that others either haven't thought of, or just can't seem to produce.

Especially when it comes to converting theoretical electronic ideas into practical, functional products.

Our computerized tactical field telephone switching system is smaller, faster, and more reliable than any other. And it automatically tells you if there's anything wrong and how to fix it.

Our pocket-size two-way rescue radio lets downed fliers tell air and sea rescue units where they are and how to get them home.

Our Standard Lightweight Avionics Equipment (SLAE) was the first to be specially designed and built for small helicopters.

And there are dozens of other things our people are working on that we can't talk about.

We don't develop these things because we can. We do it because we must.

Sylvania Electronic Systems, Sylvan Rd., Waltham, Mass. 02154.

SYLVANIA
GENERAL TELEPHONE & ELECTRONICS

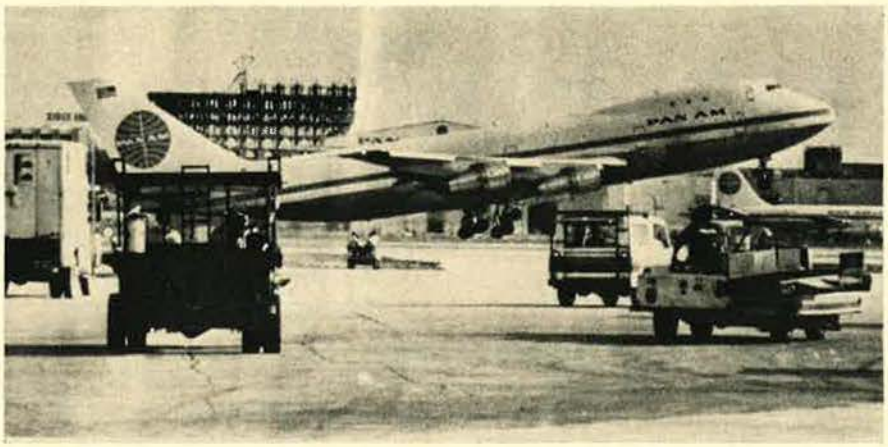
Air Force Academy third-class cadets (from left) Grant W. Meadows, Jr., William P. Beck, and Richard W. Harris quench their thirst with snow during a rest break at Saylor Park, Pike National Forest. The three received training in Survival, Evasion, Resistance, and Escape, a course designed to teach them how to live off the country under combat conditions and while so doing evade capture by an enemy's forces.

been picked as the site of the first **US International Aeronautical Exposition** now scheduled for June 1972. It is predicted that the event will draw more than 500 exhibits on aeronautical matters and advanced transportation methods and more than a million visitors.

On July 31, **USAF** was presented with the **Award of Honor,** the **National Safety Council's** highest award for safety-active industries and government agencies. The Air Force achieved a 17.7 percent reduction in worldwide ground accidents involving motor vehicles. It is the eighteenth time USAF has won the award.

The keel laying of the **Navy's** new nuclear-powered **attack carrier** USS *Dwight D. Eisenhower,* took place on August 15 at Newport News Shipbuilding and Dry Dock Co., Newport News, Va.

The Air Force's **C-5 transport** has begun regular flights to **Europe.** The giant aircraft's cargo-airlift role is scheduled at an initial one flight a week, but this will increase as more of the aircraft enter the inventory and demand rises.—END



—Wide World Photos

Finally on its way to San Juan, Puerto Rico, is this Pan American Airways 747 jet, the first of its kind to be hijacked. The aircraft, with 360 passengers aboard, was on a New York to San Juan flight when it was forced to fly to Havana, Cuba. Here it is shown taking off from Miami International Airport, where it had returned from its trip to Havana. Aircraft hijackings have become one of the airlines' major concerns.

AIRMAN'S BOOKSHELF

The U-2 Pilot—Hero or Bum?

Operation Overflight: The U-2 Spy Pilot Tells His Story for the First Time, by Francis Gary Powers, with Curt Gentry. Holt, Rinehart and Winston, New York, 1970. 375 pages. $6.95.

On May 1, 1960, a near-miss by a Soviet surface-to-air missile crippled Francis Gary Powers' U-2 spy plane near Sverdlovsk, about midway along his planned course between Peshawar, Pakistan, and Bodö, Norway. In the wake of the incident came twenty-one months of imprisonment for Powers, the end of the US program of manned overflights of the Soviet Union, the abrupt cancellation of the Eisenhower-Khrushchev Summit meeting in Paris, and some fundamental moral questions about the conduct of intelligence operations by a democratic society.

Now, ten years later, the U-2 pilot tells his story. It is a story that for some years after his repatriation (in 1962, in exchange for Russian "master spy" Col. Rudolf Abel) Powers was "discouraged" from telling, by the CIA, his employer.

The book adds invaluably to the public record of the U-2 affair and in turn raises a number of questions for which answers may never be forthcoming.

Mr. Powers tells his story in straightforward fashion, from his Depression boyhood in the coal-mining hills of Appalachia, through his joining the Air Force in 1950, his flight training, recruitment by the CIA in 1955, his learning to fly "Kelly" Johnson's remarkable new plane—the U-2—and descriptions of the U-2's use in operations, both high-altitude research and reconnaissance.

Certainly the most graphic part of Powers' book is his account of the May 1 overflight, his struggle to escape from the crippled plane, his capture and interrogation, and his own thoughts while the Soviets were playing cat-and-mouse with the US government, which found itself uncomfortably hoist on its own inept cover story.

Powers gives his version of the trial, describes in detail his experiences in Lubyanka and Vladimir Prisons, and tells how the exchange (initiated by his father and Colonel Abel's American attorney, James Donovan) of Abel for Powers came about.

The most telling part of the book is the final section, describing Powers' return to the US, where the public was unable to decide whether he was, in the words of one newspaper headline, "HERO OR BUM?"

The suppression, until now, of Powers' memoirs left largely unanswered such questions as why Powers didn't blow up his plane, why he didn't use the "poison needle" the Soviets made such an exhibit of, why he didn't report by radio when he knew his plane was going down, and why, at his show trial, he was so cooperative with his Soviet captors, even to the point of "apologizing."

Powers' book furnishes credible answers to all these questions, and to others. But it goes further. It raises some questions of its own. For instance, did President Eisenhower *want* the Russians to know about the May 1 overflight, to give him bargaining strength at the coming Summit for his "Open Skies" program? Was the U-2 flight betrayed by Martin and Mitchell, the two National Security Agency cryptologists who, after giving the Russians secret information since 1958, defected to the Soviet Union two months after Powers crashed? And, perhaps most intriguing of all, was there any connection between Powers' capture and the defection to Russia, six months earlier, of a former Marine Corps radar operator who had been based at Atsugi, Japan, one of the U-2 bases? The Marine's name: Lee Harvey Oswald.

Operation Overflight is in many ways a defensive book, even an angry book. The author may have justification. One can make the case that the U-2 pilot was treated more shabbily by his own government than by that of the Soviet Union. After his return to the US, Powers found himself in a gray area. He was cleared by the CIA, but the CIA's statement seemed designed primarily to get the Agency off the hook. In Vladimir Prison, at least, Powers knew where he stood.

Powers worked briefly for the CIA after his repatriation, but did not find the work "meaningful" and yearned to return to flying. The Air Force would have taken him back, but reneged on its earlier promises that Powers would suffer no loss of time in grade or credit toward retirement for his service with the CIA. Until recently, Powers worked for "Kelly" Johnson at Lockheed, test-flying U-2s.

On some of the larger issues, there can be no doubt that the U-2 program was highly productive. In his memoirs (*The Craft of Intelligence,* Harper and Row, 1963), published after his retirement as Director of the CIA, Allen Dulles said that the U-2 "could collect information with more speed, accuracy, and dependability than could any agent on the ground. In a sense, its feats could be equaled only by the acquisition of technical documents directly from Soviet offices and laboratories. The U-2 marked a new high, in more ways than one, in the scientific collection of intelligence."

The "in more ways than one" phrase refers, of course, to the extraordinary altitude capabilities of the U-2, an area in which Powers is still reticent. He told the Russians he was flying at 68,000 feet when his U-2 was crippled. In his book, he says this was two lies: that this was not the altitude he was flying on that mission, and that the U-2's maximum is higher than 68,000 feet.

It was Powers' own decision to withhold vital technical and operational details from the Russians. His entire CIA guideline on what to do if captured consisted of: "You may as well tell them everything, because they're going to get it out of you anyway."

"They" didn't get it all out of him. Powers talked—"confessed," if you prefer—but told the Russians only what he felt they already knew.

History should record that Francis Powers—a product of his times, when "gentlemen" still do, and must, read "other people's mail," and when technical accomplishment sometimes outruns human considerations—was a man who behaved honorably, even heroically, under terribly difficult circumstances.

—Reviewed by Richard M. Skinner. Mr. Skinner is Managing Editor of this magazine.

More Melman Mania

Pentagon Capitalism: The Political Economy of War, by Seymour Melman. McGraw-Hill, New York, 1970. 290 pages. $8.50.

Pentagon Capitalism is professed to be a concerned view of a fundamental institutional change in the American economy. Surprisingly, we learn from a critic of the

defense establishment that the military-industrial complex is dead, having been replaced under Secretary of Defense Robert S. McNamara's regime by a system of State Capitalism. But we are warned to take no comfort from this, for the new system faces a task described as impossible, and it is motivated by a sort of Parkinson's Law to strive only for expansion of its own authority.

The charge that management of the defense establishment has fundamentally altered the US economic system sounds novel but, in fact, there is little new-Melman in this latest work by one of the foremost critics of the defense effort. Seymour Melman probably is best known to readers of AF/SD as the principal proponent of the "overkill" thesis. In *Pentagon Capitalism,* overkill is adopted as a basic premise, and the author also draws heavily upon his 1965 book, *Our Depleted Society.*

The author reasons that additions to or improvements in the strategic forces have no military value since we already can overkill any enemy. Furthermore, Melman considers defense against an attack to be infeasible in light of advanced weaponry. He dismisses deterrence as no more than a speculative experiment in applied psychology. Thus, he claims to have disposed of the presumed objectives of the Defense Department managers. Instead, every activity and every policy of the "state managers" is interpreted as a move to extend the influence and authority of the Department of Defense.

The main points of the book are summarized in the first chapter, where the Office of the Secretary of Defense is characterized as a super-management that is so intimately concerned with the operational details of defense contracts as to make government become business, and contractors become mere submanagements. Subsequent chapters document the thoroughness of state control by descriptions of the activities of the Defense Supply Agency and by lengthy quotations from the Armed Services Procurement Regulations (ASPR).

The reader is sure to be impressed by the degree of control exercised by the Pentagon but, if he is concerned by the very difficult problems of choice inherent in the procurement of major weapon systems, it is likely to be a positive impression. It is only because all procurement is irrational in the view of the author that these controls are seen as mere means for the extension of Pentagon power.

Melman regards a penchant for increased authority as a natural propensity of management. In successive chapters, he deplores "Extension of Control over Means of Production" and "Extension of Control over the Universities and Research." In a chapter entitled "The Vietnam War Program," he characterizes both the SEA conflict and preparedness to face insurgency elsewhere in the world as mere excuses for the state management to enlarge its powers.

This wide-ranging censure of every defense activity loses credibility because of its manifest bias and inconsistencies. Melman decries the utilization of civilian universities and researchers for fear that they become subverted by defense interests. (This has a hollow ring today, after so much campus criticism of Pentagon-sponsored research.) He ignores any possibility that civilian institutions and individuals might constructively influence government. He charges that any conceivable benefits of military service are foreclosed to those who need improvement because of the high rejection rates of young men with physical or educational shortcomings. But he also criticizes "Project 100,000" as an incursion into basic education. He discounts the collateral benefits of military R&D, but criticizes DoD interest in furthering technology in housing and hospitals.

A curious bit of irrelevance appears in his criticism of cost-benefit analysis, which he deems ineffective in aiding systems selection. He offers as evidence a list of sixty-five contracts that were canceled only after the expenditure of substantial sums of money. But, of those sixty-five contracts, only two were started after 1960 and only twenty-three were canceled after 1960. Thus, most of his data predate the emphasis upon systems analysis associated with Secretary McNamara. So his "evidence" could as well be used to *justify* cost-benefit analysis.

Melman's accounting of the real costs of the defense effort is drawn almost entirely from his earlier *Our Depleted Society.* It is remarkable for attributing virtually every social and economic problem of the nation to the activities of the Pentagon. The state managers are blamed for high infant-mortality rates, aged capital equipment, high interest rates, and dislocations in the world gold market, among many others. In general, Melman considers defense expenditures "parasitic," as contrasted with "productive" expenditures that add to current or future consumable goods and services. This, again, is based upon his assumption that defense is unattainable. Such a distinction recalls the long-abandoned controversy among nineteenth century economists between productive and nonproductive labor.

Pentagon Capitalism will no doubt serve as a useful compendium of arguments for critics of the defense establishment. But it is neither a well-reasoned analysis of political economy nor a constructive critique of defense decision-making.

—Reviewed by Maj. Edward L. Claiborn. Major Claiborn is an Associate Professor of Economics, at the Air Force Academy.

NEW BOOKS IN BRIEF

Americans to the Moon, by Gene Gurney. A considerably shorter and more enthusiastic account of Project Apollo than *Journey to Tranquility* (*see below*). Well illustrated, easy reading. Random House, New York, 1970. 147 pages with index. $3.95.

Fighters Over the Desert, by Christopher Shores and Hans Ring. The air campaigns in North Africa between 1940 and 1942, written by English and German coauthors. Includes hundreds of photographs. Arco Publishing Co., New York, 1970. 250 pages with appendices. $8.50.

Flight to the Stars, by James Strong. Contains much interesting data and some fascinating speculation on interstellar flight. Hart Publishing Co., New York, 1965. 178 pages with index. $4.95 hardback; $1.95 paperback.

Journey to Tranquility, by Hugo Young, Bryan Silcock, and Peter Dunn. Three British writers record the history of the US space program to the first moon landing. Impressed by US technical and managerial genius, they see little of value in what they believe to have been a largely unsuccessful bid for world prestige. Doubleday & Co., New York, 1970. 302 pages with index. $7.95.

The Royal Australian Air Force and Royal New Zealand Air Force in the Pacific, by Rene J. Francillon. This is the third in a series of Aero Pictorial histories, and the only such work on the RAAF and the RNZAF. Contains more than 200 pictures and much additional data on all aircraft flown in the Pacific by both Air Forces. Aero Publishers, Fallbrook, Calif. 98 pages. $3.95.

They Flew Alone, by George Sullivan. The author writes knowledgeably and with a good sense of drama about a number of notable flights, from Wilbur Wright through Chuck Yeager's breaking the sound barrier. Frederick Warne & Co., New York, 1969. 164 pages. $3.95.

POW ACTION REPORT MIA

Rescue Line

On May 1, 1970, newspaper advertisements in Bangkok, Stockholm, and New Delhi appealed for humane treatment of American POWs in Southeast Asia. The appeals, addressed to North Vietnam, were paid for by an organization called "Rescue Line."

The ads represented a modest beginning for what Rescue Line's founder, Mrs. James Lindberg Hughes, hopes will become a major newspaper campaign wherever the North Vietnamese have embassies.

Mrs. Hughes, wife of an Air Force lieutenant colonel who is being held prisoner by North Vietnam, is a determined and resourceful woman. She began her appeals for POWs through paid ads in foreign newspapers in August 1969. And she has even traveled to Laos to meet her husbands' captors face to face.

Her husband was shot down over North Vietnam in May 1967. The Hughes family received three letters from him in the next two months, and then the letters stopped. In August 1969, Mrs. Hughes began an advertising campaign with an appeal in a Hong Kong newspaper, for information about him and other American POWs. She followed with several ads in the Bangkok *Post*, paying for these ads herself.

In December 1969, Mrs. Hughes, along with Mrs. Louis F. Jones, wife of an Air Force lieutenant colonel shot down over Laos, journeyed to Vientiane, Laos. They were the first MIA/POW relatives to be granted interviews in Laos by Pathet Lao and North Vietnamese officials. Mrs. Hughes was told by a North Vietnamese representative that her husband was alive and well. Mrs. Jones, who now lives in Fairfax, Va., was unable to get any information about her husband.

After returning home, Mrs. Hughes continued to place ads in foreign newspapers. She became convinced of the value of her campaign after the ad in the Bangkok *Post* appeared to have persuaded the Communists to broadcast a message from her husband over Hanoi radio. This small success led to the establishment of Rescue Line.

Last spring, Mrs. Hughes began publicizing her program and seeking funds. Early support came from friends in New Mexico, and from other POW families. Now other groups, including Air Force wives' clubs across the country, have joined in the effort.

Mrs. James Lindberg Hughes has started an ad campaign to aid POWs in Vietnam.

In May, Mrs. Hughes wrote to additional foreign newspapers for advertising rates. Many said they would not accept the ads because they were "too political." There was more than enough response, however, to expand the campaign as money became available. In the meantime, the Rescue Line campaign continues with an ad each week in the Bangkok *Post*, at a cost of about $500 a month.

Mrs. Hughes asked a former USAF information officer, retired Col. Harold Woodruff, for help in securing new ad layouts. Colonel Woodruff now is Director of Programs for Santa Fe (N.M.) College. He suggested that the inmates of the Penitentiary of New Mexico might help, since many of the prisoners were enrolled in art courses through the college. In early June, Mrs. Hughes met with Warden Felix Rodriguez, other officials, and an inmate, to talk about prisoners helping prisoners. Out of this meeting came POWER DRIVE.

POWER DRIVE

The Penitentiary of New Mexico inmates, with the support of New Mexico prison authorities, formed a committee to organize a concentrated campaign in behalf of American prisoners in Southeast Asia.

POWER drive
(PRISONERS OF WAR EFFECTIVE RELEASE)

This emblem was designed by inmates of the New Mexico State Penitentiary to symbolize their campaign of prisoners helping prisoners through support of "Rescue Line."

The name "POWER DRIVE" was coined—for Prisoners Of War Effective Release Drive.

Special artwork was done, posters were prepared, and publicity and advertising ideas were worked out. Service clubs and other inmate groups were contacted, and money started to come in—from convicts.

Contributions ranging from $1 to $10 were received. And, through the combined cooperation of the prison administration and officials of the blood-plasma program, arrangements were made whereby inmates could give blood and have $5 deposited to the account of Rescue Line.

By early July, Mrs. Hughes had received twenty-eight starkly dramatic, black-and-white posters and a

check for $269 from inmates. To date, more than sixty-five percent of the New Mexico prisoners have contributed to POWER DRIVE.

The prisoners now are spreading the campaign from the Penitentiary of New Mexico to other penal institutions.

The address for Rescue Line is Box 2392, Santa Fe, N. M. 87501. For additional information on POWER DRIVE, write to the Penitentiary of New Mexico, Santa Fe, N. M. 87501.

Eglin, Fla.

The Citizens Assistance Program of Ft. Walton Beach, Fla., spearheaded by the Eglin AFA Chapter, reports that it has been "snowed under" by requests from individuals and groups wanting to know how they can help MIA/POWs.

By mid-July, they had distributed more than 35,000 copies of their twenty-four-page brochure, "Lest We Forget," to all parts of the country and overseas. More than 1,000 mailings were made as a result of an editorial appearing in Hearst newspapers across the country in mid-June, which gave the Eglin Chapter's address as a source of information.

By mid-July, the program had also distributed some 36,000 bumper stickers and 10,000 ministickers, measuring 1¼ x 4 inches. An additional 10,000 bumper stickers were procured by Dr. Dan Callahan, president of AFA's Middle Georgia Chapter, which purchased them to support its campaign in behalf of MIA/POWs.

The Eglin-area group has been working with many organizations, including the National League of Families; United We Stand, of Dallas, Tex.; I Care, Inc., of Atlanta, Ga.; and The Forgotten Americans Committee, of Omaha, Neb.

The Eglin AFA Chapter recently presented AFA membership to thirteen MIA/POW wives so that each would receive a personal, monthly copy of AIR FORCE/SPACE DIGEST.

The Eglin campaign has been an area-wide project, with volunteer help and money coming from many organizations. Two of the volunteers most responsible—both retired USAF officers, Col. Harry Howton, Area Coordinator, and Lt. Col. David J. Andersen, his assistant — have been working up to sixteen hours a day to keep up with the mail and their many, varied programs.

Time Is Money

Americans who own "Spiro Agnew" wristwatches have indirectly contributed some $10,000 to the National League of Families to help the League's efforts on behalf of POWs. Mr. Agnew collected $20,000 from two manufacturers of the novelty watches and specified that American Indian children and the League share the money equally. In addition, Varsity House Inc., of Columbus, Ohio, which makes Spiro Agnew sweatshirts, made an advance payment of $5,000 and will give two percent of its royalties to the Agnew-designated recipients.

POW/MIA Seminar

A major meeting to report on efforts on behalf of MIA/POWs, and to explore new approaches, is scheduled for AFA's Annual Convention. The seminar will be held at the Sheraton-Park Hotel on Wednesday morning, September 23. Three presentations are planned by the Department of Defense, Department of State, and the Red Cross—to be followed by comments from a discussion panel that will include a former POW released by Hanoi.

—BY MAURICE LIEN

This is a sample of the twenty-eight posters done for "Rescue Line" by inmates of the New Mexico State Penitentiary. This example is accompanied by a quote from Ho Chi Minh: "Four inhuman months in the depths of this jail. More than ten years aging has ravaged my body."

Volunteers assist in a recent mailing of Ft. Walton Beach, Fla., brochure on helping POWs. They are, from the left, Mrs. Carl B. Crumpler, wife of a POW; area coordinator Col. (Ret.) Harry Howton; Postmaster; Col. (Ret.) Bud West, Vice President of the Florida AFA; and Chuck Widaman, Eglin Chapter President.

Arnold Air Society and Angel Flight assistance in the MIA/POW issue was discussed recently at AFA Headquarters by, from left, Mrs. Kevin J. McManus (Capt.-POW); Mrs. Bobby G. Vinson (Col.-MIA); and U. of Md.'s Barbara Arata and Mary McCarthy, Angel Flight National Secretary and Commander.

DOD is the world's largest user of EDP, and EDC too.

EDC is electronic data communications. The largest and most sophisticated EDC system in the world designed, installed and maintained by Western Union is used by the Department of Defense.

The system, called Autodin, provides communications for virtually every aspect of DOD's operations on a global scale. About 2 700 points can communicate efficiently, flexibly and rapidly.

Since Autodin went on line in 1963, Western Union has been upgrading its performance. Here are typical figures showing current speed of service.

Precedence	Objective	Average Performance
Z—emergency	10 minutes	3.45 minutes
O—operation	1 hour	5.04 minutes
P—priority	6 hours	12.21 minutes
R—routine	18 hours	17.39 minutes

This is typical of Western Union's approach to the needs of civilian and military communications Our services go beyond installing systems. We continually maintain and upgrade performance. And that's because our goal is to make electronic data communications as useful and practical as electronic data processing.

Western Union, the EDC company

western union

USAF—The Momentous Quarter Century

THE essence of editing is selection, choosing from the reams of copy available, from the mounds of photos, from the endless vault of ideas, that which is most important and informative. To highlight in words and pictures the twenty-five momentous Air Force years from 1945 to 1970 is a formidable assignment. So much history has been made so fast.

Yet there are major themes in the Air Force story since 1945, and we have tried to illuminate them in this issue. Senior Editor John Frisbee tells, as one who was there on active duty, what it was like to live through the vast changes that have transformed the Air Force in the past quarter century. Air Force historian Thomas Sturm relates how the Air Force organization evolved in response to the challenges it has faced. Associate Editor Edgar Ulsamer recounts how from the beginning the Air Force has immersed itself in technology as the key to air and, later, aerospace supremacy.

Aerospace Industries Association president, Karl Harr, Jr., chronicles industry's response to the challenging demands of aerospace superiority. Senior Editor William Leavitt traces how airpower became aerospace power and tells of the vital role the Air Force played in crossing the space frontier. Senior Editor Claude Witze analyzes the politics of airpower since 1945. And Robert C. Moot, Assistant Secretary of Defense (Comptroller), speaks of money as it has to do with defense *and* with pressing domestic needs. Capt. Aaron Thrush, of the Air Force Academy's Department of Political Science, explores the nature of the Soviet challenge then and now, and Maj. David MacIsaac, an Associate Professor of History at the Air Force Academy, analyzes the significance of that most important and so often misunderstood aspect of airpower—strategic bombing.

For this issue, we have assembled an array of specially commissioned drawings, gracing each section of our chronicles, from the bold hand of Cliff Prine, whose illustrations have appeared in many previous issues of AIR FORCE Magazine. The poem on page 70, by Lt. Col. Don Clelland, was specially written for this issue to accompany a spread of striking paintings from the Air Force Art Collection.

All of this we dedicate to those of the United States Air Force who have gone before, to those who man it now, and to those who will man it in times to come.

—THE EDITORS

The Panorama Unfolds

BY JOHN L. FRISBEE

Senior Editor, Plans and Policy

TWENTY-FIVE years ago this month, two great wars—one in Europe and North Africa, and one in the Pacific—had just ended. The United States already had begun to dismantle the most powerful military force in history. Perhaps "dismantle" is not the right word. It implies some orderliness of process. Our victorious forces were smashed with a wrecking ball. Shortly before V-J Day, the Army Air Forces had commanded the equivalent of 243 operational wings. Only a few months later, Gen. Carl "Tooey" Spaatz warned that he could not muster a single, fully effective squadron.

The story of how the Air Force rose from the ashes of victory to again become the most powerful fighting force in the world has to be told in several parts. It is a story of technology, of response to an external threat, of organizational arrangements, and of public acceptance. Those parts are discussed elsewhere in this issue of AIR FORCE Magazine.

It also is a story of ideas: how the Air Force looked at itself, at its military responsibilities, at its people, and at its place in American society. Some of that story is told here with acknowledged subjectivity. Perhaps no one whose life has been touched by a great organization, as all of ours have by the Air Force, can pretend to talk about that organization with complete objectivity. So this is not a capsule history of Air Force life, but rather some impressions of a tumultuous quarter century, told in the knowledge that each of us gained from his Air Force experience something of value—a satisfaction that perhaps is found only in a corporate endeavor whose goals transcend personal gain. And also in the belief that the sum of our individual efforts was of value to the United States and to much of the rest of the world.

For most of us there are trivial things—often far in the past—flashbacks that stake out the parameters of a situation. Sometimes they do it in a positive way, sometimes in the negative. There are four such personal trivia that often pop up when I think about my own nearly twenty-five years in the postwar Air Force.

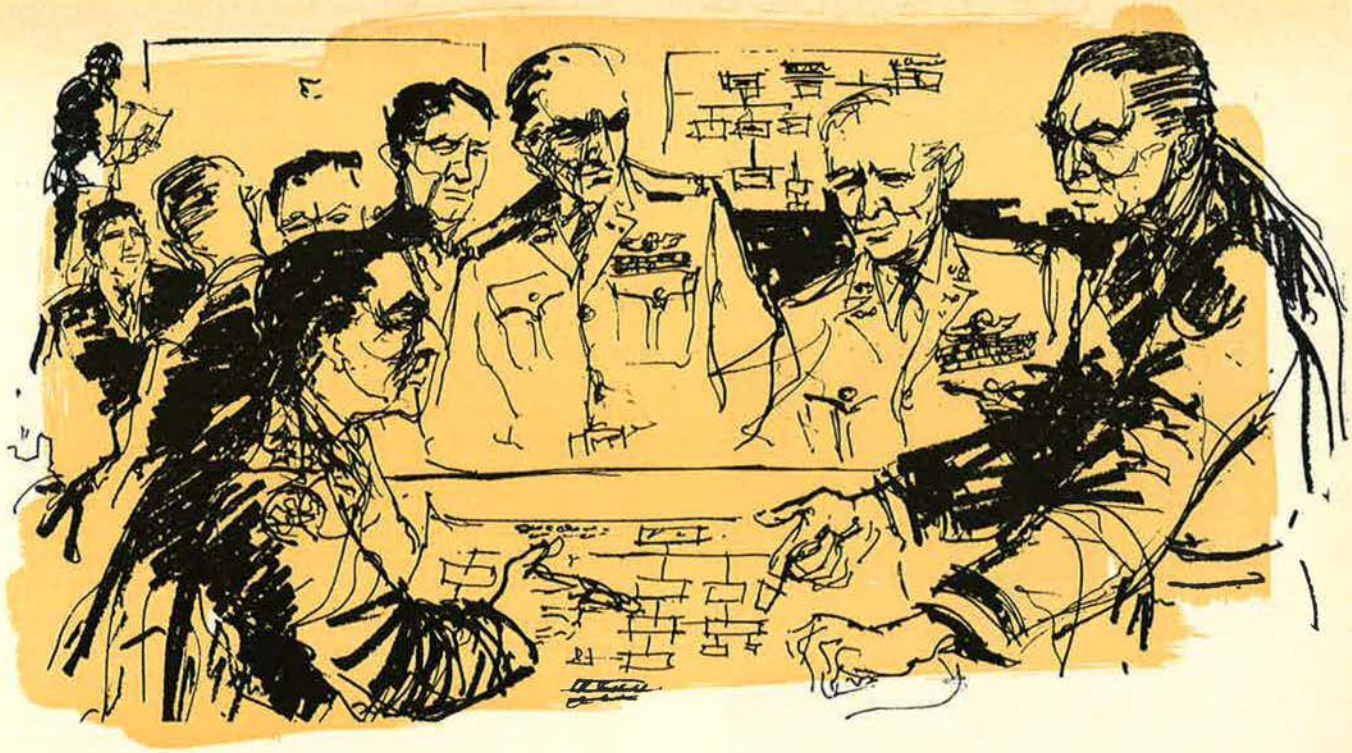
One occurred around V-E Day, while I was assigned to the Air Staff of Supreme Headquarters, Allied Forces, Europe. There was a Reserve colonel in the headquarters, who had gone through flight training in the 1930s, served a few years' active duty, then returned to civilian life and a successful law career. He asked me what I planned to do after the war. I told him I was thinking about applying for a Regular commission.

"Don't do it," he said. "You'd die of boredom in the peacetime air force. Your work—such as it is—is done by noon. It's a nice life, but no challenge. That's the way it was in the '30s and that's what it will be again."

A Poor Prophet

The Soviets made a very bad prophet of the colonel. It's easy to say he should have known better. Even then, in the closing weeks of the war, we couldn't get a bomb line from the Russians. Soviet liaison officers in the headquarters had as little to do with the other Allies as possible. The Soviet command gave us a very bad time whenever we tried to clear a supply flight to the US mission in Moscow. For their part, if they wanted to send a plane to London, they did it and informed us after it had landed. A few months later, in the fall of 1945, Soviet fighters shot down at least one unarmed American transport that strayed out of the poorly defined air corridor from West Germany to Berlin. What they were doing to Eastern Europe, as Russian troops pushed toward Berlin prior to V-E Day, was well enough known.

The colonel should have known better than to think that conflict would stop when the shooting did. But so should a lot of others who were in on much more than he was. Anyway, the Air Force never went back to the tranquil garrison life of prewar days.



Another trivial incident happened when I got back to the States late in 1945 and told friends, who weren't exactly military-oriented, that I intended to stay in the Air Force. That was the first time I heard the old cliché: "The military spends all its time getting ready to fight the next war with the weapons and tactics of the last." The atomic bomb, jet aircraft, electronics, computers, and missiles made poor prophets of my friends, too. The next twenty-five years were to see an upheaval in weapons, doctrine, strategy, tactics, and management like nothing that had happened previously—and maybe like nothing that will happen again. Prophets tend to be more cautious these days.

The last two trivia relate to the other side of the Air Force's hardware/people equation. In January 1942, I was a preflight cadet at Maxwell Field, living in newly built concrete barracks set in a sea of mud. We used to talk about what would happen to those rows and rows of barracks after the war. All they would be good for, it seemed, was low-cost public housing.

A little more than a year later, I was back at Maxwell as a second lieutenant, aide to a general and copilot on his Lodestar. It was obvious that the more senior officers who lived in permanent quarters enjoyed certain perquisites that weren't available to cadets at the other end of the field. For one thing, the commissary shopping list was left in a box by the door, picked up each day by someone, and groceries delivered by noon. Someone else came around from time to time to cut the grass. Clearly, the phrase "officer and gentleman" related to more than a code of military ethics.

Some three years later, I was back at Maxwell once more, this time as a major with a wife and two small children. We were living in those same concrete barracks of cadet days, hastily converted to family housing. Our air-conditioning during Alabama summers consisted of a block of ice with an electric fan behind it in the middle of the living room floor. Still, we were a lot better off than officers and airmen living off base or on the many temporary bases that had been built during the war. For several months the groceries were even delivered from the commissary and someone cut the grass. Then, the commissary stopped delivering, and then each barracks got its own lawnmower.

All this is by way of defining a postwar environmental background that was dictated more by events than by Air Force choice. In the continuous competition for scarce resources between the urgency of combat readiness in a nuclear world and the crying need for more and better housing, better pay, more stability—in short, a better life for the people who kept the show going—readiness usually had to be given the nod. Much of the graciousness of the old, established military life disappeared. It was replaced by hard work and long hours, but also by the excitement of helping to build a new Air Force in a period of rapid change, and by the satisfaction of knowing that freedom—with all its practiced imperfections—had a better chance of survival and growth because of American airpower. For Air Force people those twenty-five years haven't been all sweat, tears, and earnest striving by any means. There were plenty of good times with good friends. But more than 4,000 Air Force men have given their lives since V-J Day in the belief that what they were doing was worthwhile.

Instant Demobilization

We sometimes forget how Herculean was the task that faced the AAF in the years immediately following World War II. First there was the instant problem of demobilization. At its wartime peak, the AAF had more than 2,000,000 people in uniform, operating and supporting 68,400 airplanes. By mid-1947, there were only 303,000 people and 25,000 planes left.

Along with the other services, the AAF had occupation responsibilities in Europe and Japan. Our war-

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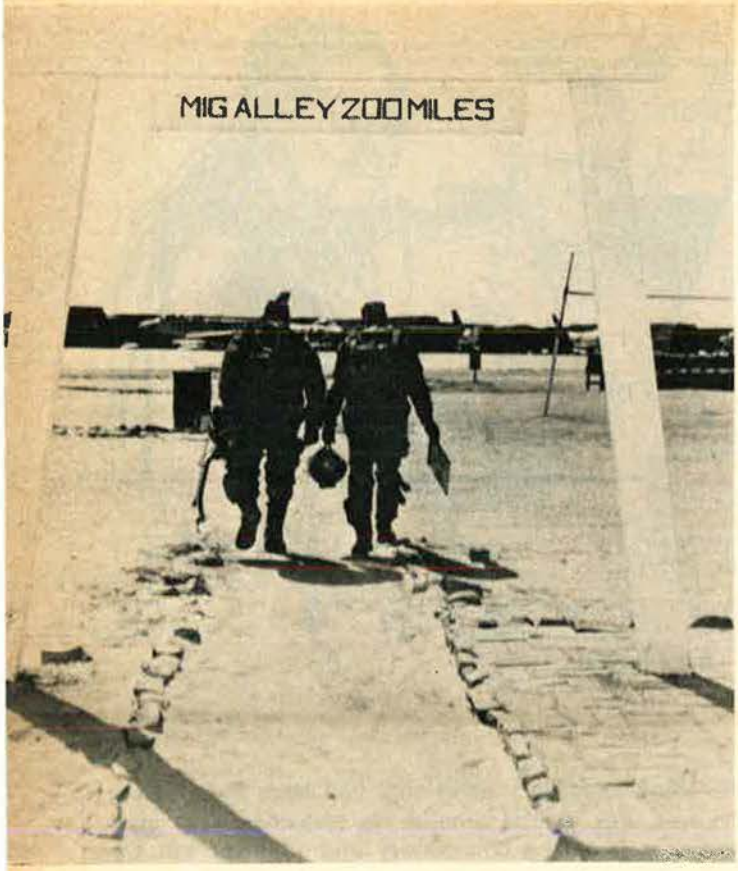

Korea saw the first aerial battles between jet fighters. In MIG Alley, far to the north of USAF bases, World War II-seasoned F-86 pilots ran up a 10-to-1 score over the enemy.

time Allies were physically and economically exhausted while the USSR—badly damaged, too—already showed signs of increasing truculence in Greece and Iran. Some operational air capability had to be restored as soon as possible. In March 1946, SAC had only one bomb group capable of sustained operations.

An independent status for the air arm was in the wind. While the fighting was still going on, the War Department, in Field Manual 100-20, had acknowledged that "land power and airpower are coequal and interdependent; neither is an auxiliary to the other." Almost everyone in the AAF believed that a separate air force was imminent. That created some rather large problems of preparing to take over administrative, support, and housekeeping functions that had been provided by the Army.

There were bound to be interservice disputes over roles and missions, and these would be complicated by nuclear weapons and by the growth of missilery, which didn't fit neatly into the traditional pattern of land, sea, and air forces. These issues had to be studied and the lessons of the war evaluated against a backdrop of technological change and a drastically altered international power balance.

All these were tasks that demanded the skill and knowledge of broadly experienced professionals. The emerging USAF didn't have enough of them. Before World War II, the Air Corps had numbered about 50,000 officers and airmen. From 1946 to 1950, Air Force personnel strength fluctuated between 300,000 and 400,000. Even taking into account the older, experienced Reserves who stayed on active duty and the more senior officers who transferred from the Army to the Air Force, probably eighty percent of the postwar Air Force was made up of people who had come in during the war. By and large, they were well-trained and experienced technicians who knew a specialty—operations, maintenance, training, supply—but who had not had the time or the opportunity to broaden their professional competence. Only about a quarter of the officers were college graduates, and many had gone into the AAF directly from high school.

In the closing months of the war and immediately after, AAF leaders made several decisions that helped fix the pattern of Air Force development for the next twenty-five years. Their outlook was global, although the country had not yet decided to assume worldwide commitments through the series of alliances and bilateral treaties that were entered into during the late 1940s and early '50s. As a result, it was decided that postwar airpower was to be built around the strategic air arm as a deterrent to future large-scale war (many airmen then thought to *all* war) and as the predominant element in combat if deterrence failed.

The Air Force was organized along simple, functional lines with each combat and support command having a clear-cut mission, coordinated with the missions of the other commands. With some modification and temporary departures, that organizational scheme has remained.

Preeminence in Research

Before his retirement, Gen. Henry H. "Hap" Arnold, the AAF's wartime commander, recognized that ". . . the first essential of the airpower necessary for our national security is preeminence in research." General Arnold recognized, too, that the Air Force would have to look to the civilian world for advice and assistance in both technical and nontechnical areas. He appointed that von Kármán Committee, which laid out a remarkably accurate forecast of the technology that would be needed and might be available to the Air Force. The RAND Corporation, first of the defense-oriented think tanks, was General Arnold's brainchild. Very early, there began a continuing close relationship between USAF and the civilian intellectual world.

Perhaps the decision that had the greatest long-term influence on the Air Force was the plan to develop a body of professionals as the nucleus of the postwar Air Force. Nuclear weapons and long-range bombers made forces in being, rather than in reserve, an essential of national security. Professional education was separated from training and established under the Air University, which opened its doors in 1946. The curricula of Air University schools and colleges were broadly oriented to develop men who not only knew their profession but were concerned with the political, ethical, and moral aspects of the use of military power. Since that time more than 47,000 USAF officers have attended Air University schools and colleges.

The new Air Force became the most education conscious of all the services. Along with professional competence, education became an important determinant of career advancement. Over the years, thousands of of-

ficers have been sent to civilian colleges and universities to complete educations that had been interrupted by the war, or to study a wide range of disciplines needed in a service that had become the nation's first line of global defense.

The Air Force Institute of Technology (AFIT) was established at Wright-Patterson AFB, Ohio, to provide both undergraduate and graduate education in engineering and management, and to administer the civilian institutions program of the Air Force. Air Force ROTC expanded to nearly 200 campuses at its peak.

The Air Training Command (ATC), charged with responsibility for teaching specific skills to both officers and airmen, was faced with a whole range of new problems as the Air Force moved to jets, nuclear weapons, advanced electronics, computer technology, new management techniques, and a host of other innovations. Its job was further and constantly complicated by wildly fluctuating force levels and budgets, by personnel retention rates that varied with shifts in the domestic economy and international tensions. Between 1945 and 1953, for example, the Air Force had five different force programs ranging up and down from forty-eight groups to 143. Military and civilian educational specialists helped reduce the size of the training problem by developing training aids and techniques, many of which have been accepted gradually by civilian educational systems.

Finally, the long-dreamed-of Air Force Academy became a reality in 1954 and rapidly assumed the leadership among service academies in modernizing the undergraduate education and training of future Regular officers.

In a sense, these early developments set a tone and style that, in broad outline, has continued to this day. It was based on an all-volunteer force, operational readiness to be attained if necessary at the cost of creature comforts, simplicity of organization, heavy reliance on technology, across-the-board professionalism, and an approach to management that laid the groundwork for systems analysis and automated management techniques that have spread to the other services, government agencies, and to industry.

Operators and Missionaries

That all sounds pretty sterile, but it wasn't. There were real people doing these things in the various headquarters and in the operational units that were fighting back to some semblance of combat readiness. The young Air Force had its operators like Curtis LeMay, O. P. Weyland, and Bill Tunner. It also had its missionaries, just as airpower had had during the Billy Mitchell days. Gen. Orvil Anderson, the first Commandant of the Air War College, was among the most

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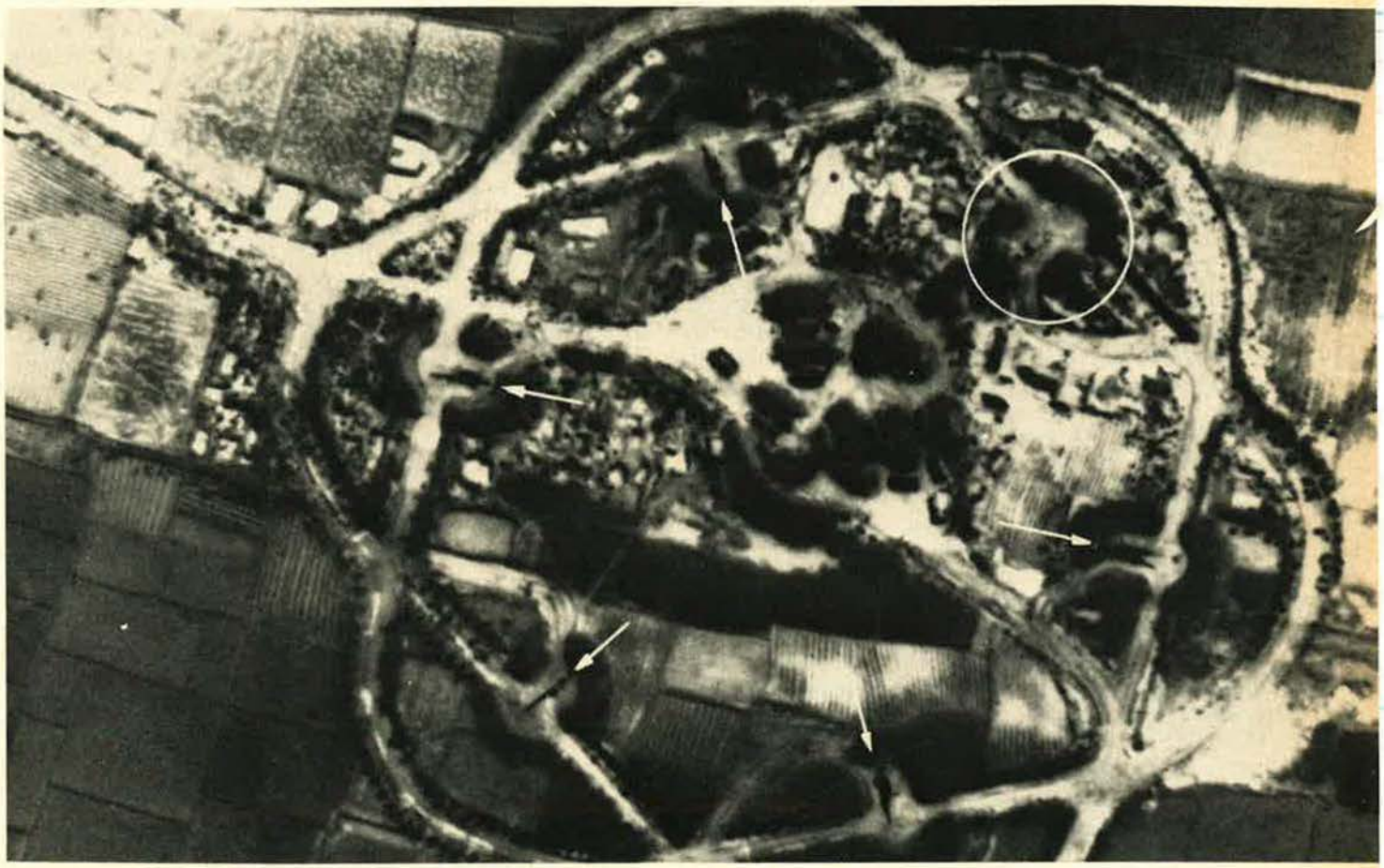

USAF aircrews gained their first combat experience against enemy surface-to-air missiles (SAMs) in North Vietnam. Tactics had to be modified constantly to successfully counter the formidable threat of Soviet-built SAMs in sites like these.

Unit rotation to overseas bases became a way of life for SAC people. These B-47s are preparing to take off from Thule AB.

vocal and persuasive. I remember entering the barber shop at Austin Hall, where the AWC was housed in its early days, and seeing a nervous, bewildered barber pinned in the corner by the General, who was giving him the word on strategic doctrine. Wherever one or more gathered, there was General Anderson's pulpit.

There was no fully developed nuclear doctrine in those early days. It was more an application of very limited nuclear experience to the strategic ideas of World War II, but the basis for elaborate formulations of Counterforce, Minimum Deterrence, and Finite Deterrence began to emerge. Many Air Force people who were to be influential in the great debates over nuclear strategy that occurred in the 1950s and '60s began to think systematically about strategy at the Air University. The early faculty and the first two classes at AWC and the Air Command and Staff College probably aggregated the greatest array of talent and experience that any air arm had ever assembled up to that time.

It wasn't an ivory-tower atmosphere, however. There was a lot of red blood circulating around the place. No one who was at Maxwell in those days will ever forget Big Foot Brown, the Marine Corps's gift (or rather, loan) to the Air Force. Or the Saturday night at the Officers' Club when, in a dazzling display of judo, the hundred-pound wife of an RAF exchange officer floored two of the Air Force's most colorful 220-pound colonels whose argument about tactics was about to pass over to physical violence.

And I'll never forget flying back to Maxwell from Stewart AFB, N.Y., in a B-25 with an equally colorful former fighter group commander. We were IFR over Washington with everything going sour—intermittent radio contact, traffic control noting us and another aircraft over the same reporting point at the same altitude at the same time, and so on. "To hell with it," he said. "Tell them we're now VFR and cancel the IFR flight plan." With that, he pulled back the throttles, pointed the nose down, and we broke out at 1,200 feet. The greatest miracle of all—we were never charged with a violation.

Triumphs and Disappointments

Very early in the game, the Air Force reached some of its most cherished goals. In September 1947, it gained independent status under the National Security Act that had been passed earlier that year. Six months later, at Secretary of Defense Forrestal's Key West Conference, the Air Force was given sole responsibility for strategic air operations and primary responsibility for air defense of the continental United States. Subsequent decisions in 1955 confirmed the Air Force assignment of tactical airlift, tactical reconnaissance, interdiction, and close support. These arrangements have been reinforced and expanded by interservice agreements since that time.

In June 1948, the wartime Air Transport Command and the Naval Air Transport Service were merged to form the Military Air Transport Service (MATS), a major Air Force command and an agency of the Department of Defense. This decision set the pattern for later consolidation of similar DoD-wide functions under one command or agency. A month after MATS was formed, it was plunged into the Berlin Airlift. That operation was significant for more than the great humanitarian work performed. The Airlift fed a starving city, warmed a freezing city, and earned the admiration of the non-Communist world—and probably, secretly, of a good many people on the other side of the Iron Curtain. The Berlin Airlift also demonstrated the use of airpower as an instrument of national policy in cold war—a function that MATS (now MAC) was to perform many times in later years, along with its support of military forces and operations.

But some Air Force objectives—particularly operational objectives—could not be reached between 1945 and 1950. That was a period of superausterity. Because

of its inability to reach even minimum essential force levels, the Air Force put heavy reliance on the Air Force Reserve and Air National Guard, though it never was able to provide them first-line equipment.

In Fiscal Year 1950, Congress appropriated $4.7 billion for the Air Force (in 1970, the budget of Air Force Systems Command alone was nearly $7.5 billion) and that same year the aircraft inventory dropped to a postwar low of fewer than 21,000 planes. This despite the fact that the Soviets had exploded a nuclear device in 1949, and the previous year had seized control of the Czech government and blockaded Berlin. At the time of the Czech coup, the Air Force had only one radar station operating in our continental air defense system.

Those were the days when interservice competition for roles and missions—and a slice of the budget that went with them—reached a crescendo. The carrier/B-36 controversy between the Navy and Air Force was a wide-open fight with no holds barred—a fight the likes of which couldn't possibly happen in today's more tightly controlled defense regime. A Navy captain publicly offered to demonstrate how safe a carrier would be in nuclear war by standing at one end of the runway at Anacostia Naval Air Station while the Air Force dropped an atomic bomb on the other end.

Korea—The Turning Point

Korea was a turning point. It found the Air Force, like the other services, ill-prepared and ill-equipped as a result of five successive starvation budgets. As Gen. Hoyt S. Vandenberg said, it was a shoestring Air Force that went to war in Korea. Much experience and talent came back via the Reserves and Air National Guard during the Korean buildup. The Air Force budget for Fiscal 1951 rose to $15.9 billion and the next year to $22.3 billion.

Not all of it went to the Korean War. NATO, established in 1949, placed additional demands on US airpower. The growing military power of the USSR, and its thermonuclear breakthrough of 1953, gave SAC real meaning in the eyes of most Americans. During the late 1950s, it was hardly possible to pick up a newspaper or magazine without seeing a story about SAC. It was one of those rare occasions when military men were heroes in peacetime.

Korea not only saved the United Nations from a probably fatal decline; it confirmed the tactical air warfare lessons of World War II and demonstrated that strategic airpower could confine hostilities to Korea at a time when NATO defenses were too weak to have withstood a Soviet attack.

For the first time in aerial warfare, jet fighters locked in combat. MIG Alley became a household word, and the USAF's 10-to-1 margin of victory over enemy fighters a legend. It's a legend that came back to haunt the Air Force when "Whiz Kids" used it to justify cutting the size of tactical air forces or turning down a new air-superiority fighter.

Korea was our first experience with a completely unprincipled enemy who resorted to brainwashing, torture, and forced confessions of "war crimes." After the war, a lot of nonsense was spoken and written about men who allegedly signed these confessions. Most of the nonsense came from people whose only experience with torture was having a thoroughly numbed molar filled by an expensive dentist.

Korea was limited war fought for limited objectives under close political control, but it did convince a majority of Americans that our security depended on military strength in being, and that conviction has lasted, at least until now.

Korea to Vietnam

Defense budgets declined after Korea, but less at the expense of the Air Force than of the Army and Navy. The "New Look" of Eisenhower years placed heavy reliance on airpower as the principal deterrent in a strategy of Massive Retaliation. The expansion and modernization of SAC continued at a steady pace to a peak strength of about 1,900 bombers, reducing in number during the 1960s as the ICBM force built up to its present strength of 1,054 missiles.

Concurrently, strategic defenses received a badly needed transfusion as the Soviet bomber force grew in size, range, and nuclear ordnance. New interceptors were brought into the inventory—the F-102 in 1956, and the F-101, F-104, and F-106 between 1958 and 1960. Radar coverage was vastly expanded with the Pinetree and Mid-Canada Lines, and the DEW Line, completed in 1957, the same year that NORAD, the joint US-Canadian defense command, was established.

Radar coverage was extended offshore by Texas Towers, picket ships, and airborne early-warning aircraft. Then came the Air Force surface-to-air missile, Bomarc, and finally the SAGE system of communication to tie the whole strategic defense array together. Very little air defense modernization has taken place since the early 1960s. The size of our strategic defense forces, in fact, has been cut drastically, but the Soviet bomber threat continues undiminished.

The years after Korea did not see an abatement of crises. There were the Suez and Hungarian affairs in 1956, Sputnik in October 1957, and Lebanon and Taiwan in 1958. These latter two tested the Air Force's limited-war capabilities and found deficiencies in mobility, airlift, and bare-base operating ability. But the reorientation of priorities from strategic forces to general-purpose and airlift forces was not to begin until 1961, when our strategic nuclear superiority seemed assured, and the Kennedy-McNamara team began a shift from its brief endorsement of a counterforce strategy to Assured Destruction—a strategy that came to imply effective, if not numerical, nuclear parity. Somewhat ironically, it was nuclear superiority, whose value Secretary McNamara later discounted, that settled the Cuban missile crisis of October 1962.

The War in Southeast Asia

The story from 1962 onward revolves principally around Vietnam, where by mid-1965 the United States was deeply committed to a war in which the most effective use of airpower was constrained by a strategy of "controlled escalation," or gradualism.

How can Vietnam be characterized? It has been a war of contrasts, contradictions, and paradoxes. Despite

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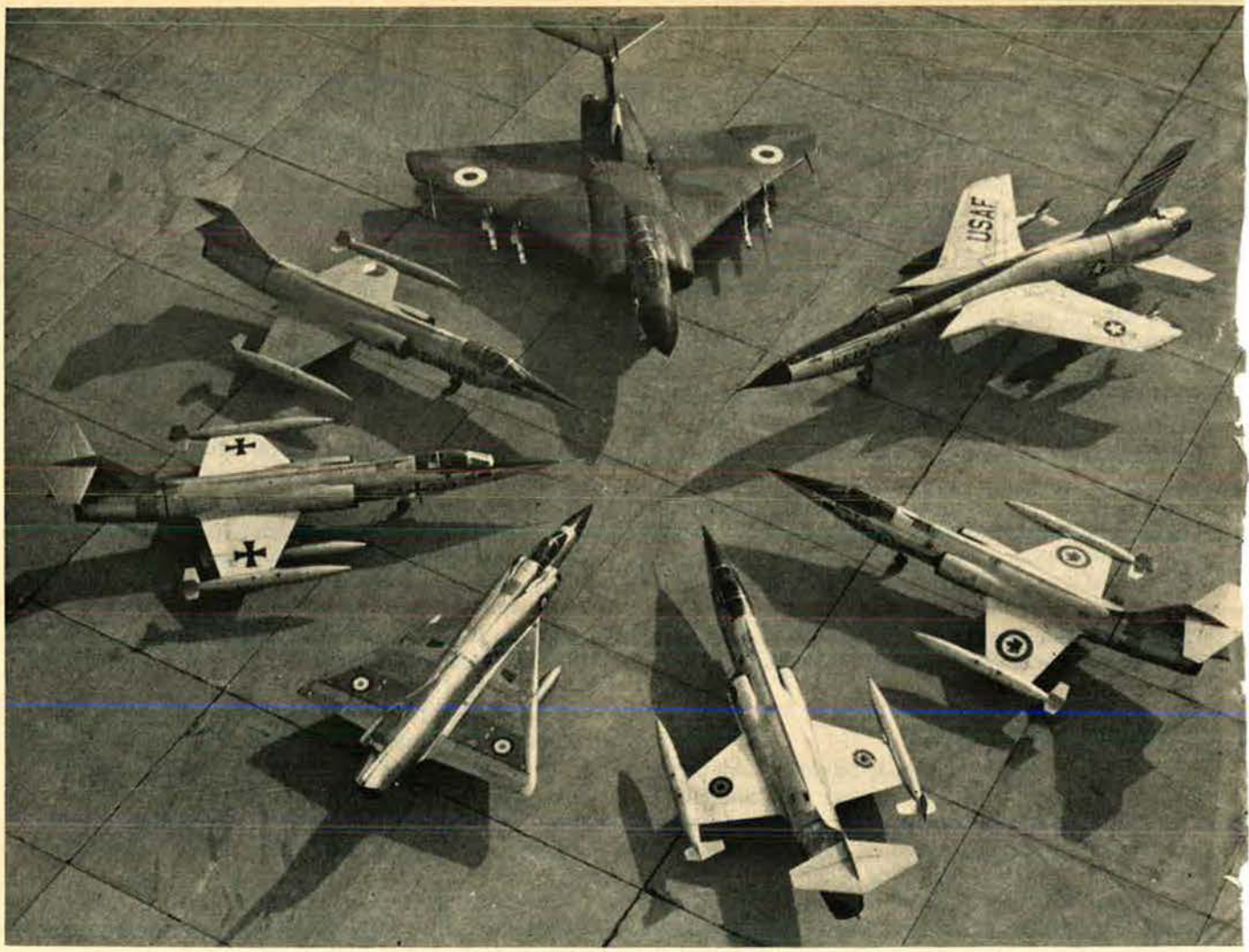

USAF people became accustomed to working with allied airmen from many nations. Seven members of NATO, our largest and best-equipped alliance, contributed these aircraft to NATO's Central European Air Force, known as AIRCENT.

indifferent public support at home, morale among Air Force people in the combat zone has never been higher. With improved equipment, tactics, and techniques, interdiction and close support have been performed better (terrain taken into account) and given less recognition than ever before. An innovation of the war—sustained use of strategic bombers in tactical air warfare—has been denounced by journalists, moralists, and armchair strategists as either wasteful or infamous, but the B-52 has been praised by ground commanders as the most effective weapon of the war. Another paradox: Prior to the cessation of the bombing of North Vietnam, what strategic bombing was undertaken was done by tactical fighters, while the strategic bombers carried out tactical missions in the South.

Vietnam—A War of Contrasts

Vietnam has been a war of contrast in ages, too—the very young and (relatively, but only relatively) the very old. In World War II, it was commonly believed that few men could fly fighters in combat successfully past the age of thirty. A couple of years ago, I checked out the fighter wing commanders in SEA. They averaged twenty-six years of experience and forty-seven years of age, and there wasn't a chairborne commander among them. I asked a prematurely gray (that's anyone under sixty) fifty-year-old deputy wing commander at Cam Ranh Bay if he had any trouble keeping up with the young bucks in F-4s. "Well, not in the F-4," he said. "I've been flying fighters all my life. But these kids think they have to take me on at the bar, too, and that does get a little wearing after a while."

In SEA, strategic and tactical airlift reached unsurpassed levels of sustained efficiency. After 1961, MAC was no longer primarily a scheduled, airline-type operation with heavy commitments to passenger-carrying operations. It became a military airlift command in the true sense of the word, with most of the passenger lift contracted to civilian airlines.

Special Air Warfare forces—now called Special Operations Forces—were created for low-intensity fighting. They had their baptism of fire in Vietnam, helped train the airmen of other countries in nation-building, and have become a permanent part of the Air Force.

As the war grew in intensity, logistic miracles were performed to support a war halfway round the world. Research and development produced more innovations

and refinements in the conventional warfare field than in the previous twenty years. Aerospace Rescue and Recovery teams day after day displayed a heroism that used to be front-page news. So did the aircrews who flew against targets in the Red River Valley—the most heavily defended real estate in the history of air warfare. The most-shot-at aircrews of the war in the South —the C-123 crews who flew defoliation missions— are probably the most anonymous of all the anonymous heroes of a war that has had no Ernie Pyle or Bill Mauldin.

Vietnam has put a high gloss of professionalism on everyone in the Air Force—aircrews, support people, staffers, everyone. No one I know in the Air Force would want to fight a war for that reason, but that has been one result of this strange war. It's a result that could stand the country in good stead in the years to come when Air Force people may have to do more, but with fewer hands and less hardware, than most of us would consider desirable.

Drastic Change

Facts and decisions of the last twenty-five years have changed life in the Air Force so drastically that it bears little resemblance to life in the Air Corps of pre-World War II. Customs of the service became less formal, in part because of the sheer size of Air Force bases. A colonel, now retired, used to tell about his days as a bachelor officer at Randolph Field, when social calls were part of the drill. All officers were expected to remain in uniform to receive callers until 2100 hours. About that hour one evening, he and several friends, properly uniformed, heard a knock on the door. Thinking it was too late for a caller, he shouted (approximately), "Butter your butt and slide under the door." Naturally it was the base commander.

Social calls were a postwar casualty, although they still were part of Army life when I served a very pleasant tour at West Point in the early 1950s. In those days, Army people seemed to take themselves less seriously, but customs of the service more seriously, than we did in the Air Force.

The lack of on-base housing, especially in the early postwar years, tended to separate Air Force families from military life. Often the husband became a commuter and his wife and children visited the base only on occasional trips to the commissary, hospital, or club. They knew less about the husband's work, about military customs and traditions, and military life than in earlier days when nearly everyone lived on base in a small, close-knit community. To generalize broadly, the corporate spirit of the Air Force became a professional/social mix, where once military corporateness had been more a social/professional amalgam.

The lack of on-base housing also worked another change. Military people became part of the local community, joining the PTA, churches, clubs, and other community activities. They were not aliens in a civilian society. Today, antimilitary feeling is far less prevalent around an Air Force base than it is in areas where the civilian population has little contact with the military. It can be added that with the return of several thousand Air Force, Navy, and Army pilots to civilian life and with the expansion of commercial and private aviation, the Air Force has lost some of the exotic character that also fostered exclusiveness in earlier days.

In another quite different way, Air Force life in operational units—first SAC, then TAC, MAC, and to some extent ADC—came to resemble military life on a frontier post in the last century. Aircrews and support people were on either constant or frequent alert—an especially heavy burden on SAC people. It's doubtful that anyone (I include myself, since I never served in SAC) can appreciate the prolonged tension of those years of alert duty, never knowing, when the klaxon went off, whether it was for real or not. SAC also be-

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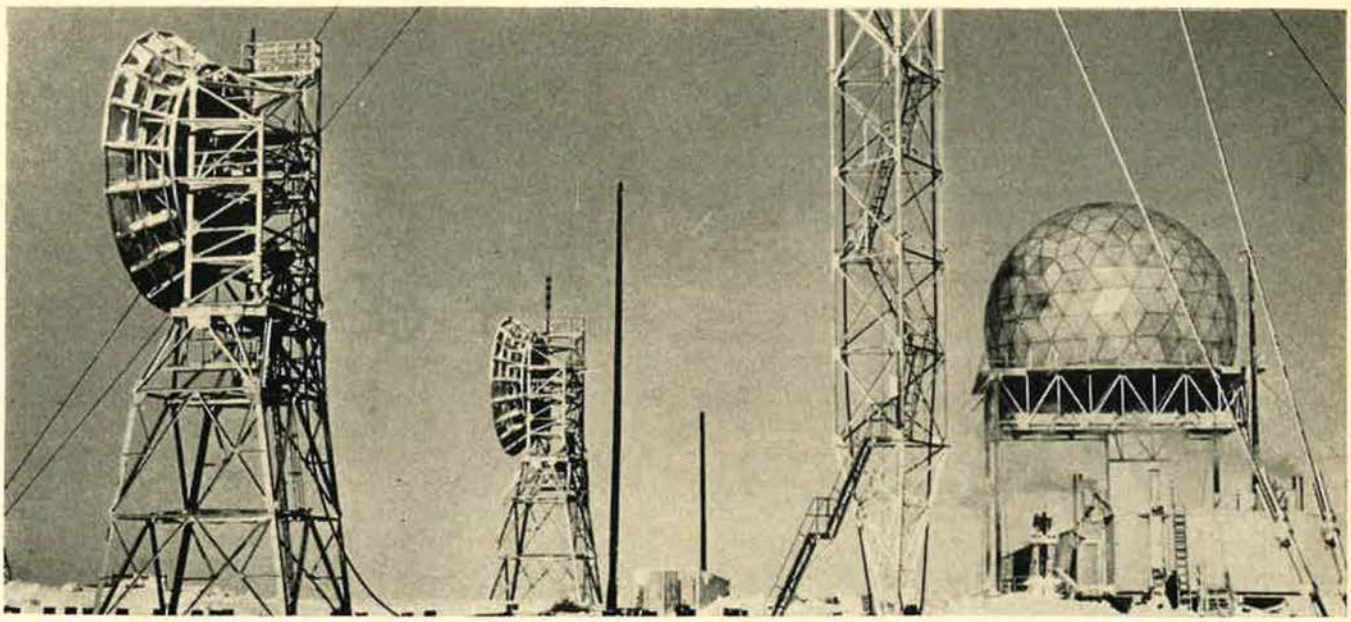
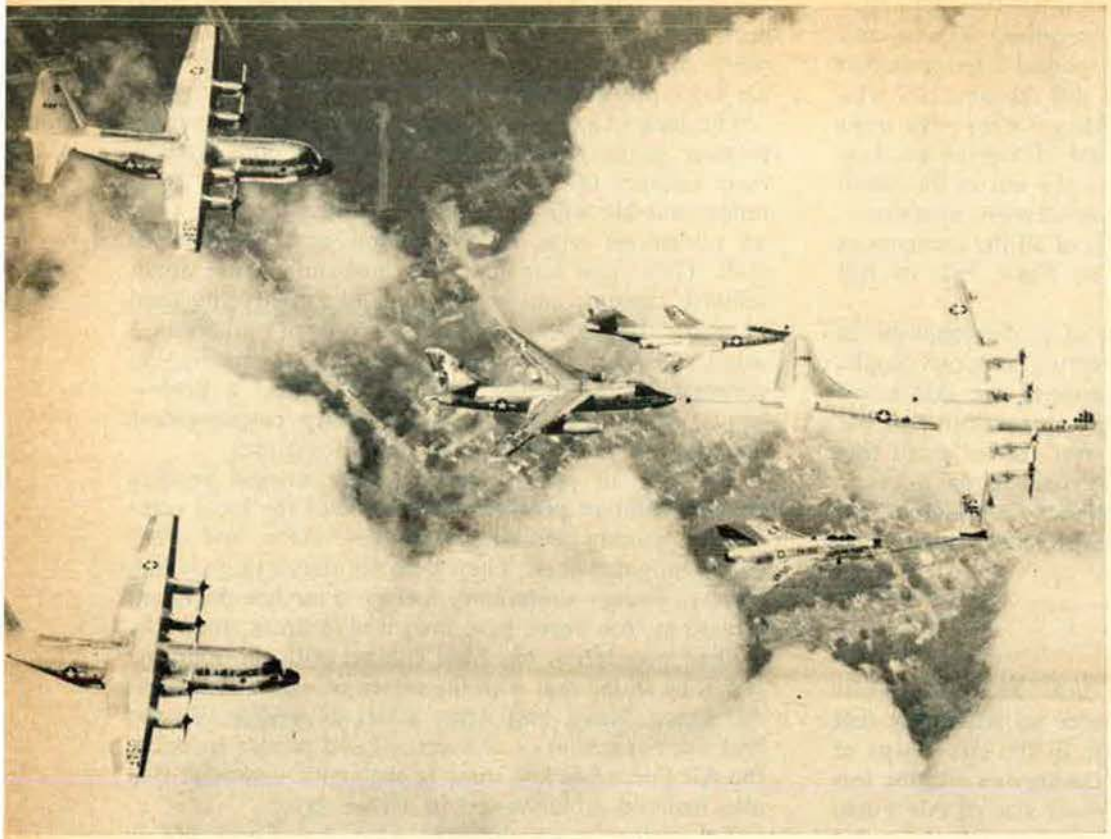


Operations in the northern areas of Alaska and Canada became routine for USAF aircrews and support people, and for the men who operated these remote warning sites of the DEW Line, some of them even north of the Arctic Circle.



To meet limited-war challenges, TAC developed Composite Air Strike Forces (CASFs), which could be tailored to suit any small-war threat. This typical force of the late 1950s is made up of F-100, F-101, B-66, and C-130 aircraft, with KB-50 tanker support.

gan to rotate units overseas as early as 1947 and continued this practice until the range of its bombers made unit rotation no longer necessary. Constant TDY disrupted family life and, combined with often substandard housing, the hazards of military flying, and relatively low pay, drove many people out of the service despite the Air Force's best efforts to improve conditions for both the men and their families.

SAC, with its requirement for instant readiness, set the pattern for the other combat commands in both training and management. Its training became the most realistic and demanding in military history. Practice missions were as close to the real thing as they could be made in peacetime. Probably for the first time in history, the combination of alert duty, overseas rotation, exercises, operational readiness inspections, transition to new aircraft and tactics, the drive for spot promotions, and competition among SAC units resulted in cases of combat fatigue in peacetime.

Necessary, Accepted, Honored

Despite the hardships of life in the operational units, people did stay on year after year, and there was public recognition of the sacrifices made by our airmen. They were a necessary, accepted, and honored part of American society during the hottest days of the cold war.

Those also were the days of military construction projects that staggered the imagination: the SAC bases in Morocco, the DEW Line radar sites in the far north, and construction of the ICBM sites—the greatest earth-moving project of all time.

The need for instant combat readiness, efficient management of very expensive equipment, and the responsibility that goes with vastly destructive nuclear weapons, brought about far-reaching changes in organizational and command arrangements. Support functions were consolidated rather than decentralized at squadron level as they had once been. Standardization was a watchword, and the position of squadron commander in most units became principally that of a scheduler of aircraft and crews. The number of command assignments, in the traditional sense of the word, decreased proportionately, and the potential for seasoning a young officer by rotation through duties in squadron supply, maintenance, mess, and so on, largely disappeared. It became an age of specialization. Broadening experience was gained to a great extent vicariously through professional schools, though Tactical Air Command's return to the self-contained squadron may make this less true for some Air Force people.

The requirement for operational efficiency also tended to keep many Air Force people in the same command year after year. To some indeterminable degree this "professionalism within a profession" encouraged compartmentalized thinking about the uses of aerospace power, though that never appeared to create a serious problem. In any event, the buildup of TAC and MAC forces after 1961, and the concurrent reduction of ADC squadron and SAC bomber units as missile forces grew in size, has resulted in a rather thorough shuffling of Air Force people among the operational commands.

As both total capital investment and unit value grew (the cost of a bomber has increased by at least 800 percent since the end of World War II) the old management practices would no longer do. The Air Force became a pioneer in the use of computers to manage everything from supplies to maintenance schedules. It

In the early '60s, pessimists thought USAF would become the "silent silo-sitters," but manned aircraft remain essential.

innovated, borrowed from business and industry, and in turn contributed much to civilian management practices. The comptroller became as indispensable to a commander as was his director of operations. The Air Force grew more businesslike and in a sense more like business. But it has not made the mistake of looking at itself as a business rather than as a unique profession, an instrument of both national defense and international diplomacy.

A Cosmopolitan Character

With the growth of American commitments since 1949, Air Force life took on a cosmopolitan character that it had not known before. Prior to World War II, "overseas" meant the Philippines, Hawaii, Panama, or Alaska. Later it came to mean any of nearly 100 countries where Air Force people were stationed. There is hardly an Air Force family that has not had at least one tour of duty in Europe or the Far East.

Finally, the overcentralization of decision-making and the downgrading of military advice that were characteristic of the McNamara era appear to have ended. Secretary of Defense Melvin Laird has strongly supported decentralization of management. By allowing the military a voice in determining where painfully deep cuts will be taken, Mr. Laird has achieved the not inconsiderable feat of retaining the willing support of the military while reducing the defense budget to a level that most military men believe to be risky, at best.

With the passage of time, the Air Force as a whole has attained the maturity of outlook, the responsible professionalism shown by its early leaders—a professionalism that befits the principal custodians of the nation's greatest aggregate of military power. Gone is some of the fire and early, unbridled enthusiasm that were important ingredients in creating the world's most powerful military force out of the shambles that followed World War II. Gone are some of the amenities that made military life peculiarly attractive. Gone is the exclusiveness of the long-ago airmen who fired the imagination of an earlier generation. But who would say that the judgment, experience, and staying power of the professional is a lesser asset to the country than the faith and visions of the pioneer?

In September 1970, the Air Force, along with other military services, faces another period of uncertainty. While the US has been preoccupied by Vietnam, the wide margin of strategic nuclear superiority we held in the mid-1960s has been allowed to slip away. As the value of the US strategic deterrent in any situation except a direct attack on the United States has shrunk, the USSR becomes increasingly aggressive in the Middle East, the Mediterranean, and North Africa.

Concurrently, domestic problems of crisis proportion have diverted public attention from the growing Soviet and Red Chinese threats, and resources from the defense area. This situation has grown more serious, since heavy Soviet investment in research and development threatens to give USSR technological superiority within the next few years. The whole of this is exacerbated by antimilitary sentiment that springs largely from the frustrations of the long and unpopular war in Vietnam.

Unanswered Questions

Several questions that bear on the future of the Air Force cannot be answered now. What will be the impact of the Fitzhugh Committee report on organization of the Department of Defense, and on Air Force relationship to the other services? Will the Strategic Arms Limitation Talks bring about a neutralization of the strategic nuclear forces of both sides? If so, will that serve as a further stimulus to Soviet expansion, backed by conventional forces, or prosecuted by Communist proxies? How much further will US defense budgets be cut? Will there be enough military resources available to fulfill our international commitments? If not, must we look forward to a gradual decline of US influence and to abrogation of our position as a superpower, with all that implies for the economic, political, and cultural future of this nation?

And finally, what is to be the position of the Air Force in the American political/social structure? Will it be regarded as a necessary evil—or as an essential good? This question is much in the minds of American airmen who have held an honored position in a society that believed its secure and prosperous condition was largely attributable to the power and readiness of its aerospace forces and to the dedication of its military men and women.

One thing, at least, is certain. The Air Force of 1970 stands at a level of professional competence unequaled in its history. The members of this Association, who have supported the Air Force through good times and bad for nearly a quarter of a century, can look back with pride and satisfaction on their part in building the aerospace power of the United States Air Force.—END

Organizational Evolution

BY THOMAS A. STURM

Chief, General History Branch, Office of Air Force History

IT IS commonly recorded that a group of young Army Air Forces staff officers, in the waning months of World War II, conceived a brilliant postwar AAF reorganization plan which, when implemented a short time after the war's end, established the structural base from which today's thrice-larger and incomparably more lethal United States Air Force still operates.

Though it did not happen exactly that way, the legend is essentially true. What began as the "interim" postwar air force organization proved sturdy enough to weather twenty-five years of constant storm with scarcely a tremor. It happened this way because the founders grafted the feeble trimmings off the mighty wartime force to a deeply rooted doctrinal stock.

Thus, it would seem, the organizational introduction (which this essay is to serve) to this twenty-five-year examination of Air Force challenges and deeds can be compressed into one sentence: The Air Force restructured after the war, the new form survived every crisis, and the Air Force, despite its vast growth in size and power and awesomely more complex duties, shows much the same face to the world as it did a quarter century ago.

In other words, SAC remains SAC, as do TAC, ADC, USAFE, and PACAF. If the only alternative at this point to allay misconceptions that can spring from such oversimplification (*viz.*, Air Force organizational planners are omniscient) were to recite the hundreds of organizational readjustments and name changes that have taken place within the Air Force during these years, this indeed would be a good place to stop and get on with more interesting things. But that is not necessary. The postwar Air Force combat organization came into the world nearly full-grown, and matured in less than five years. How this happened can be related, hopefully, without wading too deeply into a quagmire of organizational bookkeeping.

The Seventy-Group Program

Air Staff consideration of the postwar Air Force began in 1943. A War Department estimate in July of that year set the "interim forces" required immediately after the war at twenty-eight Army divisions and 105 air groups. Using this latter figure, the Air Staff produced the IPWAF (Initial Postwar Air Force: Preliminary Study) Plan in February 1944. Eighty-seven of the groups were bomber and fighter escort, eleven troop carrier, and three reconnaissance. The remaining four were tactical fighter or interceptor. The distribution left no question as to where that staff proposed to concentrate postwar airpower.

Anticipating the possibility of the creation of an international air force within three years after the war, and assuming that the American air force would join it, staff planners next prepared PWAF No. 2 in July 1944. This recommended seventy-five groups, with missions unspecified. The plan was strictly a fallback position paper, designed for a situation that few believed would come to pass. The 105-group program remained the primary objective.

In the fall of 1944, with the end of war in Europe in sight, Gen. George C. Marshall gave his personal attention to postwar reorganization. He promptly decreed that the nation could not afford the cost of forces thus far proposed. Accordingly, Air Staff planners in May 1945 trimmed the 105-group IPWAF down to a seventy-eight-group "Interim Air Force Plan." Postwar air would build to seventy-eight groups and operate at this level until an international force came into existence, and then reduce to the seventy-five groups called for in PWAF No. 2. If the international force failed to materialize, the permanent Air Force would remain at seventy-eight groups. Manning proposals were 638,286 for the seventy-eight groups, 485,000 for the seventy-five.

At Japan's surrender in August 1945, the Air Staff, showing the beginning of political wisdom, had begun to merge its two plans into a single, more easily comprehended one. The result, still mysterious in precise origin, was the famous seventy-group, 400,000-man program adopted on August 29, 1945. Though never

attained, and finally rendered academic by the war in Korea in 1950, it remained a solid goal for the nation's airmen for five lean years.

The March 1946 Reorganization

The seventy-group program specified that the postwar Air Force would consist of twenty-one very heavy and five light bomber groups, twenty-two fighter, three all-weather interceptor, ten troop carrier, and nine reconnaissance and weather groups. The Air Staff now had to devise an organization that ensured the most efficient and effective command of these forces.

In December 1945, an *ad hoc* committee was formed to consider all earlier proposals on the subject and make final recommendations. Gen. Carl "Tooey" Spaatz (soon to take Air Force command from Gen. H. H. Arnold) accepted the committee's report on January 2, 1946. The AAF would consolidate its forces into four corps —one strategic, one tactical, and two geographic air defense—under a Headquarters Combat Command.

Odd as it appears in retrospect, the January 1946 plan was well suited to the times. The seventy-group force was a promise, nothing more. Meanwhile, the wrecking job that passed as demobilization had already cut the Air Force from two and a quarter million men to 700,000, and half of these would leave in the next year. Until the Air Force rebuilt, why not consolidate all combat forces in one command? Then, at least, if new trouble arose, the commander responsible would possess all combat aircraft available to confront it.

However, again for reasons not documented, the Air Force at the last moment chose a different course. Some say that simply because Gen. Dwight D. Eisenhower (who had replaced General Marshall as War Department Chief of Staff) urged it, the Air Force agreed to establish a Tactical Air Command as a separate major organization.

One thing is certain: If Eisenhower wanted it that way, the Air Force would have been loathe to oppose him. His advocacy of a separate Air Force and belief that all postwar War Department planning should lead easily to separation assured him a friendly Air Force reception on whatever wishes he may have had.

In any event, by the end of January 1946, a new Air Force organization plan had been written, which called for three combat commands instead of one. The reorganization, placed in effect on March 21, created the Strategic, Tactical, and Air Defense Commands. SAC got most of the forces—fighter as well as bomber—and TAC got the rest. ADC received the promise of forces under the seventy-group buildup. There was no threat of air attack on the United States as yet, so why worry?

A Time of Achievement

Looking back on the period of late 1945 to early 1946 some twenty years later, Air Force Gen. Earle E. Partridge remembered it as a "period of transition that was extremely difficult." With manning at a low point, the location and condition of many resources still unknown, communications disrupted, and the Air Staff small and inexperienced, it was very hard, he said, to "identify the problems inherent in getting the air arm back on a sound footing and in solving them." He felt at the time, and still did, that it was "a period of great accomplishment for all concerned."

And indeed it was. Air Staff planners failed to achieve both their original force and organization proposals. Instead of a 105-group objective, they emerged with seventy; and, instead of one combat command, they got three. In the process, however, the Air Force kept its cause for equality alive and fostered at a crucial time. With presidential approval in principle of the

(Continued on following page)

seventy-group force in Air Force hands, the War Department could not have considered reversing the policy of Generals Marshall and Eisenhower that Air Staff and General Staff would remain equals in practice until they became so by law. Unification would have come to pass eventually, there is no doubt, but the irritant presence of an illegal separate service certainly hastened the process.

As for the 1946 reorganization, it reflected by designation and mission assignment the Air Force's prewar and war-proved doctrine on the proper employment of airpower. In the war, one type of aircraft oftentimes performed missions for which it was not designed, when the proper ones either were not available or in too small numbers to handle the task alone. Since much the same condition existed in the postwar force—too many big jobs for the aircraft on hand—the Air Staff decision to recommend a single combat command was the right one. The creation of three, on the other hand, violated only logic, not basic principle.

Never flown in combat, but the mainstay of the Air Force's deterrent during the early 1950s, was the Convair B-36. The pusher-prop, nuclear-armed bomber helped keep the peace during an era when the Air Force was establishing itself as the nation's first line of defense against aggression by a truculent Soviet Union.

Despite its outlandish apportionment of forces, the March 1946 reorganization, as all good organizations should, focused attention where it belonged—on the missions.

Pooling the Forces

It was clear by the spring of 1947 that the seventy-group program was in trouble. The Air Force had identified and activated the units that would comprise the force, but fifteen remained paper outfits. Of the remaining fifty-five, only thirty-six could claim any degree of readiness. None operated at wartime standards. This situation generally prevailed until December 1948, when the 1950 budget decreed that the goal would no longer be seventy groups, but forty-eight.

Meanwhile, the absurdity of assigning commanders a mission without the forces to carry it out had become clear. The Air Defense Command, created under Lt. Gen. George E. Stratemeyer, with headquarters at Mitchel AFB, N.Y., was formed initially from the wartime First and Fourth Air Forces. Later, in 1946, it received four more such units, which were staffed as men became available. Unlike their counterparts in SAC, TAC, and ADC, the six ADC air forces were organized along geographical lines. That is, each encompassed a quota of states within which the commander was responsible not only for air defense but Air Reserve and a host of other lesser, but important, Air Force housekeeping tasks. From their histories, one gets the impression that commanding them was a miserable assignment, the sort of character-building experience that prepared one to handle anything thereafter.

Air Force Headquarters' problem with ADC was that General Stratemeyer and his particularly capable operations and plans officers refused to sit quietly on their air defense mission. They remembered Pearl Harbor and what happened to the careers of the officers entrusted with Hawaii's defense. They also took seriously the public warnings by General Arnold and other top civilian and military leaders that America was wide open at the top (via Alaska and northeast Canada) to air attack. They believed that, if these avenues for air strike were not closed by radar, interceptor aircraft, and antiaircraft artillery, America—along with SAC's long-range nuclear bomber force—might be destroyed before it could mount a counteroffensive.

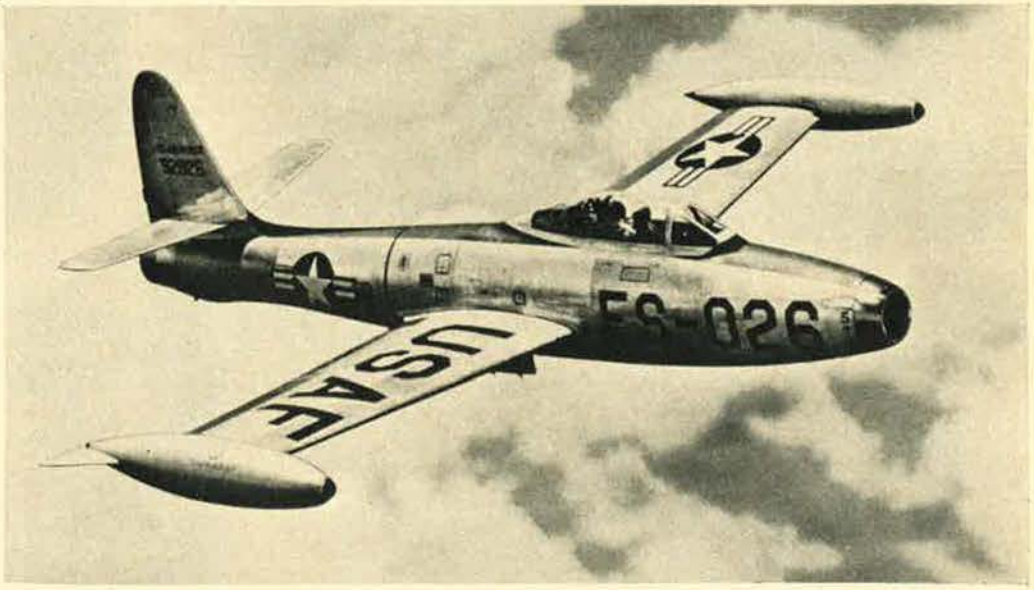
Throughout the years 1946 and 1947, the ADC staff inundated their Washington brethren with designs for air defense systems that sometimes exceeded the entire capacity of the worldwide Air Force as it then existed. On one occasion in 1947, General Spaatz practically ordered Stratemeyer to desist, at least until after unification when the exhausted Air Staff might muster energy to probe what ADC obviously regarded as a problem.

But it did no good. Within a week or so the Mitchel Field staff suggested that, since the Air Staff could not see a way to assign the ADC air force commanders forces of their own, it at least empower them, dur-

ing threat of air attack, to seize command of all other forces in their areas, regardless of other command or service objections. So it went. ADC prodded, the Air Staff tried to duck, but ADC refused to play the fall guy.

Perhaps it was a tempest in a teapot. As long as America held sole possession of atom bombs, the Soviet Union, now identified as the enemy, would not dare to attack. So why, with resources already dear, should TAC, SAC, and the overseas commands be robbed of fighters, and radar stations built and manned, to create a system which, by the time it was needed, would be obsolete?

ADC, and some on the Air Staff, had an answer to that argument, too. An air defense system, as the Battle of Britain and America's own limited overseas experience proved, takes time to install and perfect. And men do not learn the art of radar-controlled intercept overnight. To guard the nation against surprise air attack would require hundreds of radar stations, netted together by a gradually ascending series of combat control centers culminating in the Pentagon, perhaps even in the basement of the White House. Russia, with its copy of the B-29, was building a heavy bomber force. We also knew the Soviets were attempting to split the atom. While it would be 1952, perhaps even 1954, before they translated these activities into a long-range nuclear bomber force, it would take the Air Force that long to install even the beginnings of a radar aircraft warning and control net and provide it with the weapons for blunting an attack.



The Republic F-84 Thunderjet, first production-line jet fighter equipped for midair refueling and first USAF fighter designed for nuclear weapons, was a workhorse during the Korean War. That conflict reversed the defense funding policies, which had made it nearly impossible during the early post-World War II years to organize an Air Force at all.

Easing ADC's Predicament

True to his promise, General Spaatz, with unification an accomplished fact, directed the Air Staff to do what it could to ease the ADC predicament. First result was a proposal to Secretary of Defense James Forrestal for a national radar warning and control net. In late 1947, the Air Staff considered the creation of a new major command to handle the Air Reserves, freeing ADC headquarters and air forces for air defense. But the radar net proposal bogged down in the Bureau of the Budget, and the 1950 budget reductions killed all hope of acquiring all-weather fighter groups promised ADC under the seventy-group program. It was time to reexamine the 1946 established force priorities to see if they remained valid.

Gen. William M. Momyer, then a colonel and plans chief of TAC, started the ball rolling with the observation that TAC would not fight in an atomic war under war plans of that day except as a last-ditch measure when all else failed. Therefore, it appeared superfluous to continue to reserve TAC fighter squadrons solely for battle that might never come, especially since the nation so badly needed fighter-interceptors. He proposed that TAC fighters be cross-trained for both tactical and air defense missions. He also wondered about SAC's fighter-escort groups. It did not seem they could keep up on intercontinental missions. Maj. Gen. Gordon P. Saville, generally regarded as the Air Force's most experienced air defense expert and then heading the Air Staff's air defense division, agreed: Cross-train TAC fighters and steal three fighter groups from SAC for retraining in air defense.

In October 1948, President Harry Truman, in what proved a valiant but futile effort to substitute Reserve bulk for active-force muscle, directed the services to place greater emphasis on organizing and training the Reserves. This triggered the Air Force December 1, 1948, reorganization, which created Continental Air Command. Air Defense and Tactical Air Commands became "operational headquarters" in the new alignment, with General Saville commanding ADC and Maj. Gen. Robert M. Lee in charge of TAC. On line with the area air forces, they reported directly to General Stratemeyer, who moved up to take command of ConAC.

Fighter forces (including those transferred from SAC

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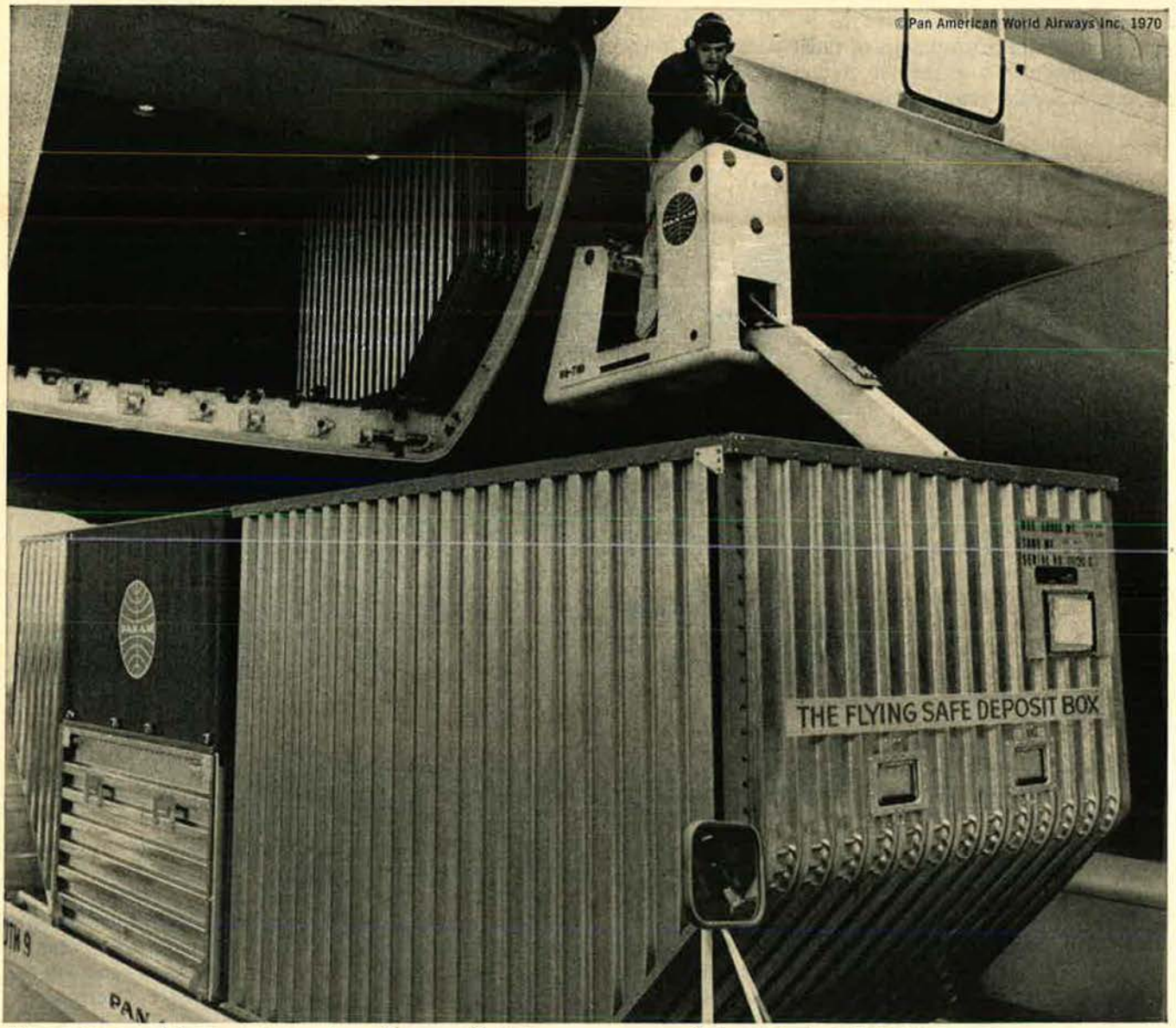

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Although air defense—along with tactical air—has taken a back seat to strategic offensive forces during most of the past quarter century, there has been a series of weapon systems in the inventory designed for the interceptor mission. The Lockheed F-94C Starfire, packing twenty-four rockets, was among the first all-weather jet interceptors.

to ConAC in accordance with Momyer's and Saville's recommendations) remained assigned to the area air forces, with ADC and TAC in charge of their combat training and employment in emergencies. Some fighter groups trained solely in air defense, the rest cross-trained in both missions. Publicly, the Air Force announced the change as one that freed area air forces to give more time to strengthening the Air Reserves, in compliance with the President's wishes. Gen. Hoyt S. Vandenberg, now Air Force Chief of Staff, wrote his major commanders that the reorganization became necessary because of reduction in strength and the economy program—that it enabled the Air Force to do more with fewer men and planes.

Actually, the December 1948 reorganization was a return to the idea of the Air Staff in its early 1946 proposal—to make multiuse of air forces as long as they remained in too short supply. It has been said that the ConAC reorganization reduced tactical and interceptor military aviation in stature—dropped them from major to subordinate command level. It indeed deprived TAC of some fighter forces, but for reasons which TAC officers like Momyer not only agreed with but implanted. For ADC, it was a great step forward. In order of priority, strategic air remained first, and air defense now moved up to second place.

An Air Force in Trouble

The ConAC organization had a flaw that General Stratemeyer and the Air Staff perceived from the start, but planned to overcome through good leadership. This was the assignment of combat forces to one commander (area air force) and the investment of operational control of them in another (ADC and TAC). Stratemeyer hoped to conduct his ConAC headquarters as a "balance wheel between training and combat operation requirements," thereby serving as a sort of psychiatrist to his slightly schizophrenic organization. All hands gave it the best try possible, but there was no time to see if it would work.

In April 1949 Gen. Ennis C. Whitehead, Far East Air Forces commander, swapped jobs with Stratemeyer and took an immediate distrust of the ConAC structure. The changes he initiated eventually resulted in the elimination of ADC headquarters. This did not entail much reshuffling. Whereas the TAC headquarters at Langley AFB, Va., had retained an adequate staff, which operated with relative independence, the ADC staff—collocated at Mitchel with ConAC's—never had a chance to fully form. Whitehead felt that the structure divided command, and his wartime experience had been that you could not win wars that way. With this change, he negated the rationale of the December 1948 reorganization, making further revision of air defense organization inevitable.

By late 1949, two Air Defense Force "operational" headquarters had formed, and, under them, air divisions. They, not the area air forces, assumed the air defense mission. Eventually, they took full command of the forces. In other words, General Whitehead had not turned the clock back completely on air defense organization. He simply left himself more major missions than one man could handle. He soon submitted a proposal to solve that.

The December 1948 reorganization brought a savings of only 2,000 men. To acquire the 15,000 additional men that SAC required in 1949 to man its gradually rebuilding bomber force, the Air Force in that year greatly reduced Far East Air Forces. As events soon proved, it was the wrong time. However, the forty-eight-group restriction still prevailed in the fall of 1949, and it appeared from the budget discussions that the Air Force would be lucky to keep that number.

On September 23, 1949, President Truman publicly confirmed that the Soviet Union had exploded an atomic device in late August. The enemy had the bomb. As would happen again eight years later when the Russians put the first man-made earth satellite in orbit, the government cautioned against undue alarm. One bomb does not a long-range nuclear bomber force make. The Pentagon dutifully complied, but worried task forces began working round the clock. On September 30, the top officers of the Air Staff agreed that planning timetables had to be advanced one to three years, and they directed that the entire Air Force program be updated for resubmission to the Joint Chiefs. Our actions shall be based on sound and calm judgments, Secretary of the Air Force Stuart Symington promised, adding, "But we shall not mistake inaction for calmness." There was no doubt in anyone's mind; the United States Air Force was under the gun.

(Continued on following page)

Brought into the operational inventory during the 1950s, the North American F-100 Supersabre has played an important role in the Tactical Air Command. It has been extensively used in Southeast Asia where, despite its age, it has acquitted itself well as a close-support aircraft.

The government, in the nine months following the Russian A-test, followed its own advice, "calmly" reducing the Air Force by another 7,000 men. Warning publicly that time had run out, and that the nation had to rebuild its defenses, not continue to pull them down, top Air Force leaders took every action possible to accelerate preparations for nuclear war. Gen. Muir S. Fairchild, the Air Force's No. 2 officer, directed the Air Staff to advance priority for men and weapons for air defense to one coequal (within practical limits) with that of the atomic retaliatory force. General Vandenberg, meanwhile, set the Air Force Scientific Advisory Board and the Air University to work on devising a means whereby the Air Force might more quickly translate ideas on new weapons into operational systems. Their recommendations corrected the one serious defect in Air Force organization, in January 1950, when the overloaded Air Materiel Command turned this responsibility over to a new Air Force Research and Development Command. (Today, of course, AMC has become the Air Force Logistics Command, while ARDC now is the Air Force Systems Command.)

One Mission, One Command

Reassured by the events of September 1949–June 1950 that the decision he made, upon taking ConAC command, that air defense was his first concern and that he should personally command it, General Whitehead proposed to Washington that he keep tactical air as well but be relieved of the Air Reserve mission. In late 1949 General Fairchild agreed and instructed the Air Staff to again consider the establishment of an Air Reserve Command. Before anything real came of it, the North Koreans attacked and the Air Force plunged into three years of tactical air warfare.

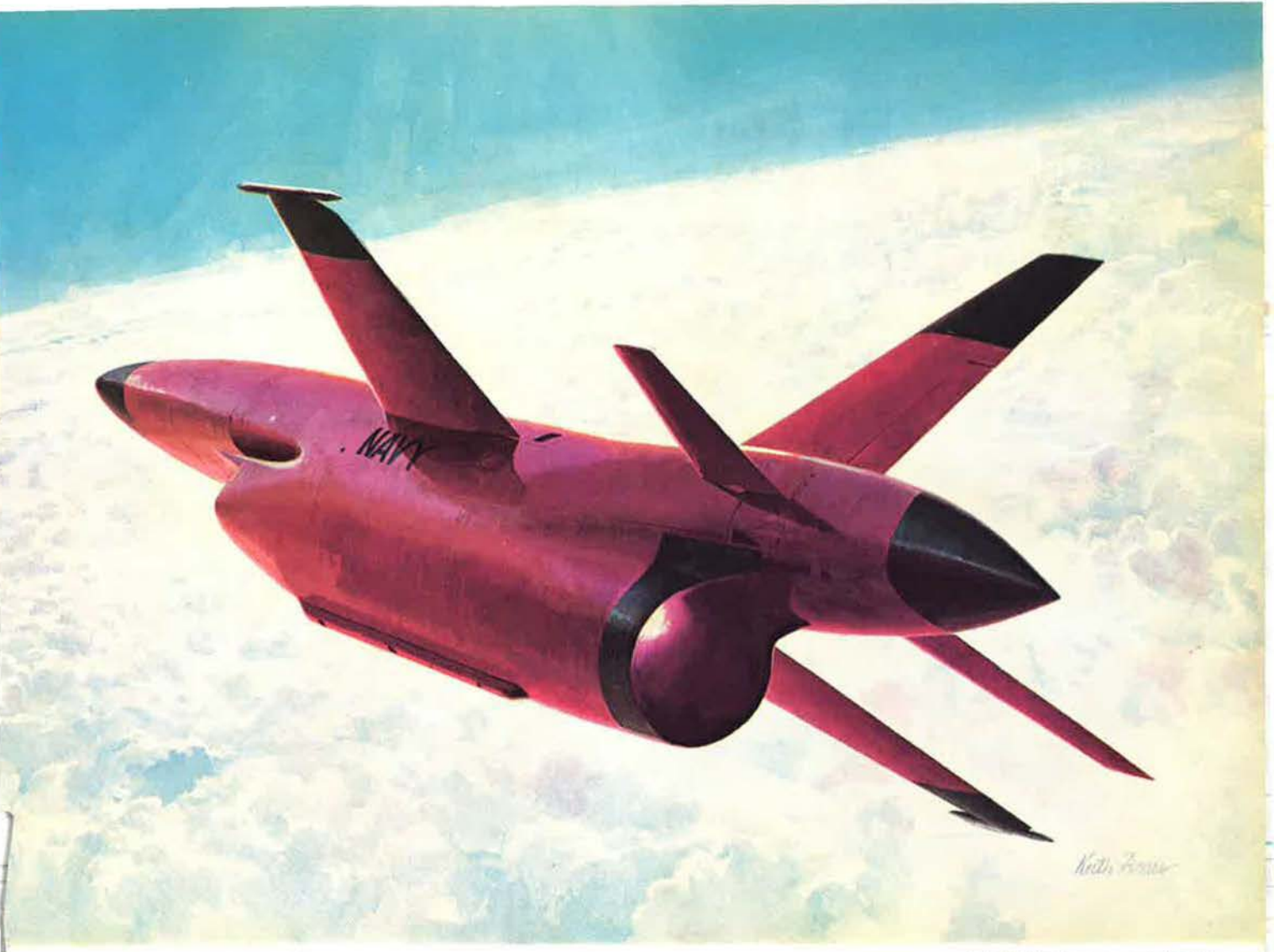
The Air Force now knew that its initially proposed postwar plans were correct, that, as in World War II, it still had three missions of equal priority, and that each required the best in men and equipment and the most effective organization possible. The organizational accommodations the Air Force made to the Army and the budget had been necessary but wrong. Men cannot perform missions without forces, or prepare for one kind of war and fight another—not without mortal danger to themselves and their country.

Before the Korean War force buildup reached any great size, the Air Force acted to sweep the cobwebs from its air defense and tactical air organizational mechanisms. On September 20, 1950, TAC reassumed command of the forces assigned that mission, from ConAC's area air forces. On December 1, 1950, it broke free of ConAC entirely to report directly once again to the Commanding General, United States Air Force. There was no need to move TAC headquarters from Langley. That had always been the right place—next door to the Army forces with whom it went into battle.

General Whitehead moved himself and most of his Mitchel staff to Ent AFB, Colo., and on January 1, 1951, reactivated ADC as a major command. This time it had but one mission: air defense. The Air Reserve and geographical jobs stayed back at Mitchel with ConAC, which later moved to Robins AFB, Ga., and took the new name Air Force Reserve.

And that, for all real purposes, is the Air Force organization story of these past twenty-five years. ADC relinquished direct command of forces during air attack to the Continental Air Defense Command (CONAD) in 1954, then to the North American Air Defense Command (NORAD) in 1957. Command of TAC forces, under certain circumstances, passed to Strike Command in 1961. However, the creation of the joint commands did not alter the organization of the tactical air or air defense forces, as set in late 1950 and early 1951. It merely confirmed the flexibility and solidarity of the basic Air Force structure.—END

Thomas A. Sturm holds B.A. and M.A. degrees in history from the University of Puget Sound, and has done further graduate work at Michigan State University. From 1951–57, he was Director of Command History at Air Defense Command and at Continental Air Defense Command Headquarters. After a five-year stint in the academic world, Mr. Sturm again joined the Air Force History Program, and is now Chief of the General History Branch, Office of Air Force History, at Hq. USAF.



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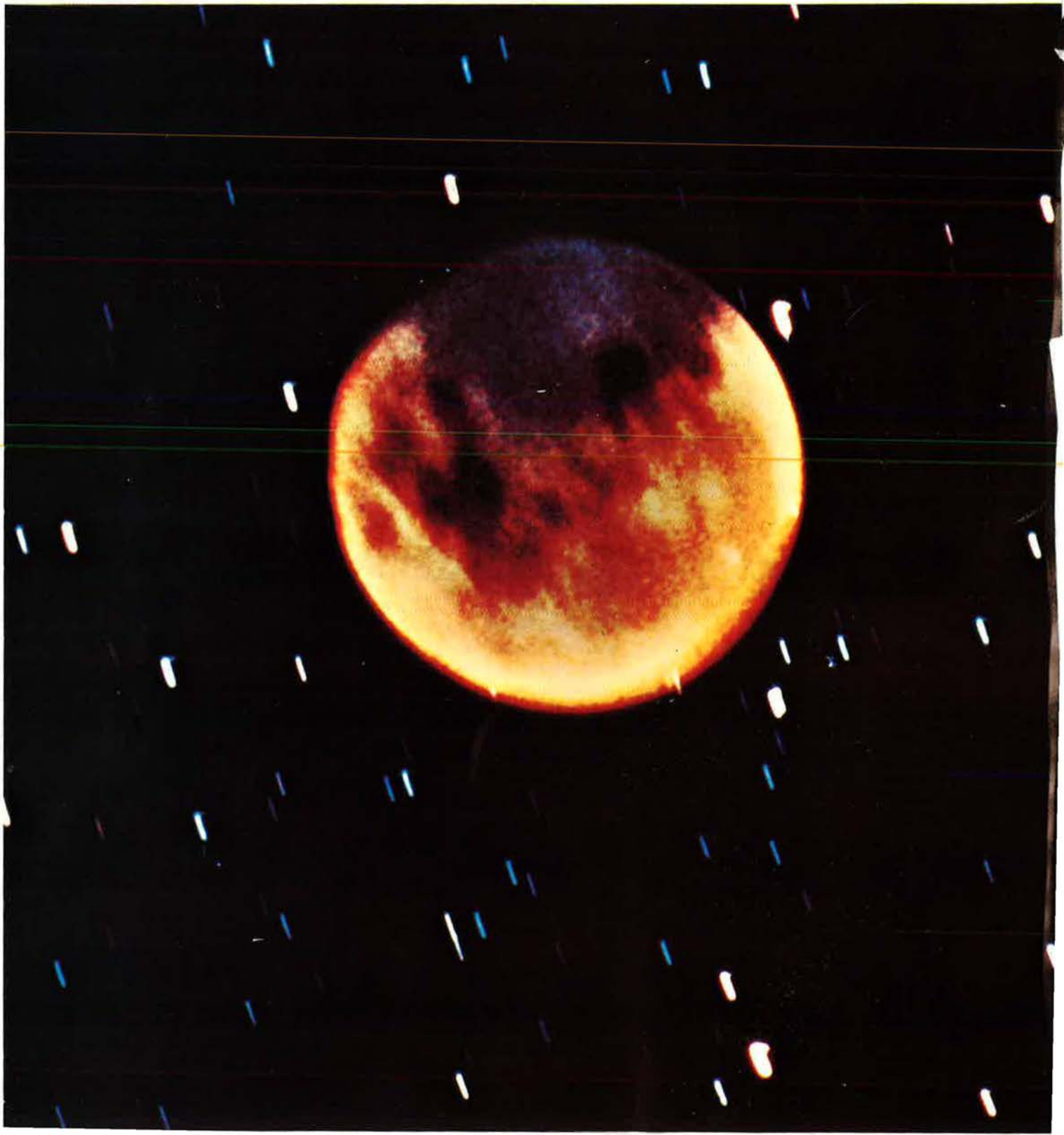

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"B-17s in Battle" ("Retirement Party for Old Thunderbird"), by Keith Ferr

USAF—From V-E Day to Vietnam

BY LT. COL. DON CLELLAND, USAF

Paintings courtesy of the Air Force Art Collection

The Jugs and Mustangs did their thing
Above the Forts en masse below
Which through day skies made dark by flak
Fought to the target and then back.

And by departing from the mold
Which shaped the early strategy,
A tested Air Force came of age
And claimed its place at center stage.

Since that brave time, decades ago,
Does what we've done meet all the tests?
Has doing what we think we must
Resulted in the people's trust?

Beset by pressures from without
We can look back on storm-filled years,
And say with simple honesty,
"What we have done is there to see."

An Air Force Art Portfolio

Colonel Clelland, a fighter pilot and former USAF Academy historian, recently moved from the Office of the Air Force Secretary to a billet in Europe. Three of his poems appeared in our May '70 issue.

"Ploesti, August 1, 1943" ("Operation Soapsuds"), by Nixon Galloway.

"Foul Weather—Tempelhof, Berlin," by Herb Mott.

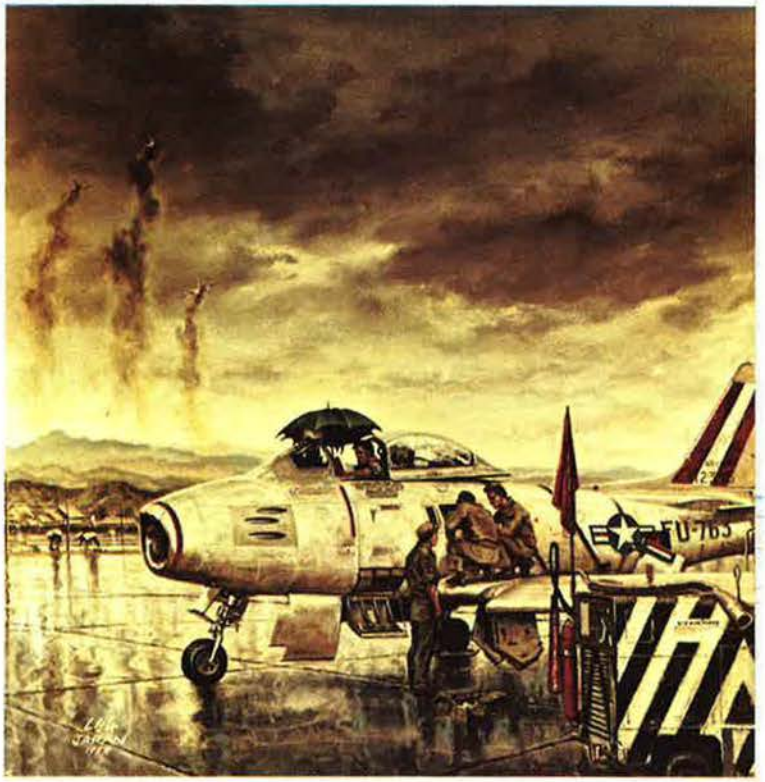
First came the proudness of Berlin,
Its prayerful thousands grouped in thanks.
Few quarreled with performance there
For in those problems all could share.

Then came the names, unknown before —
Yalu and Seoul and Takushan,
Khe Sanh, Ashau, Hanoi, Haiphong —
Restrained performance read quite wrong.

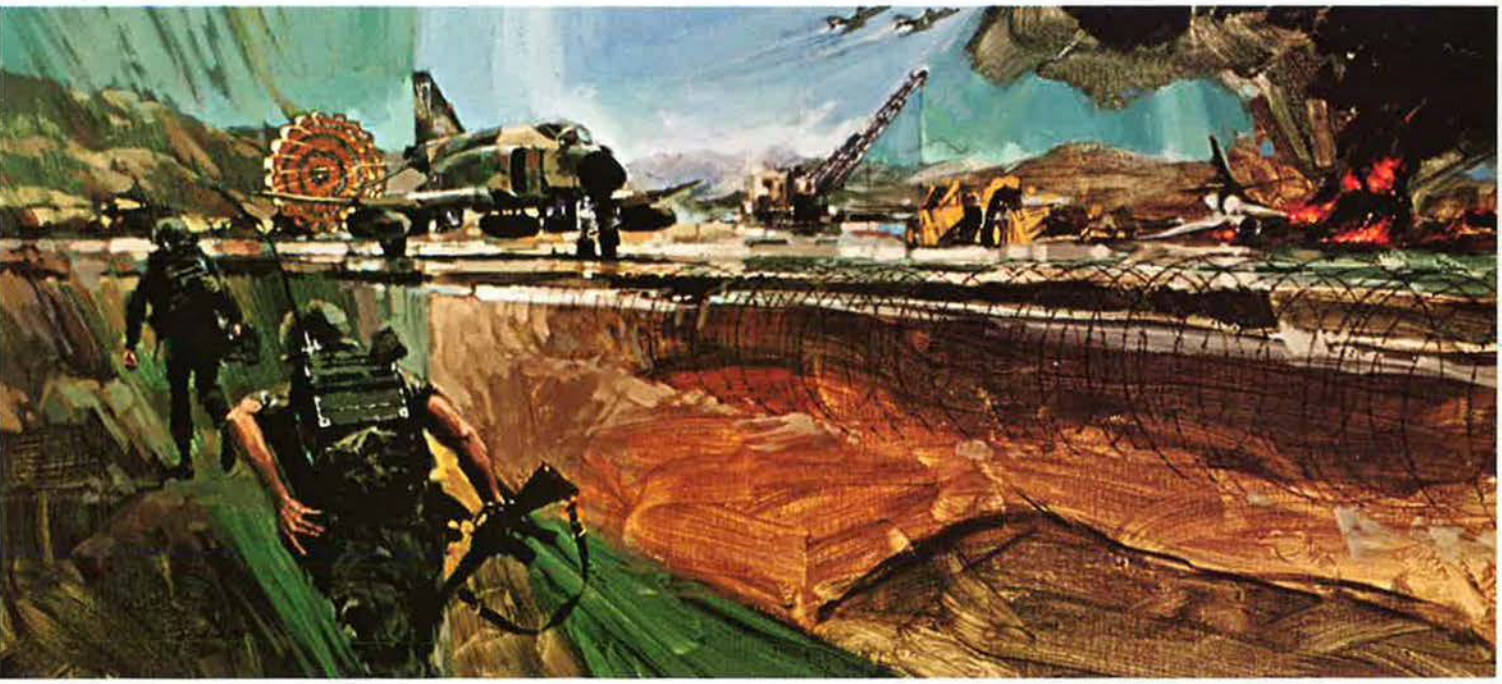
For even overconfidence,
And claims too great to be fulfilled,
Should not obscure the glorious hours
Of shackled but still vital powers.

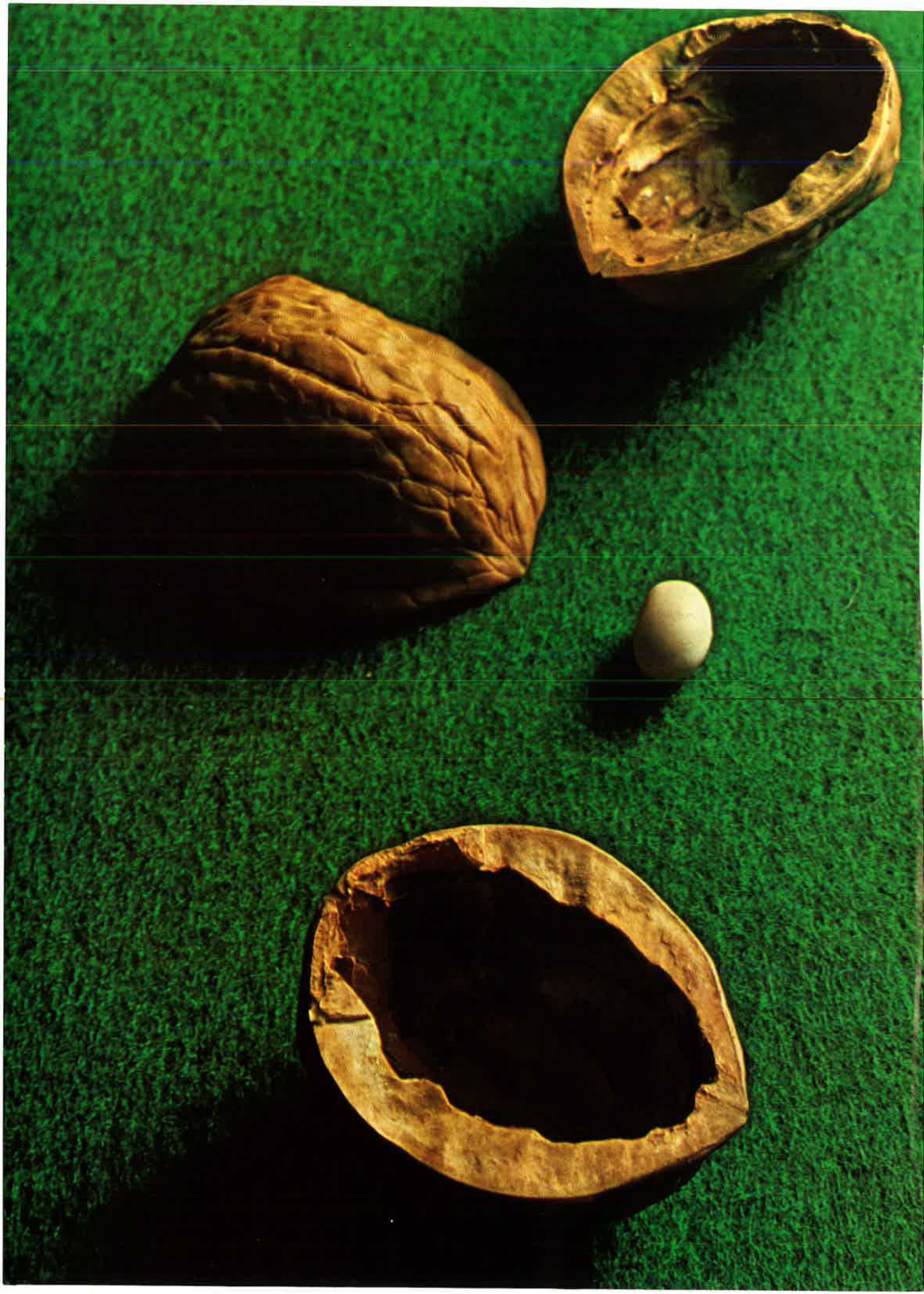
Nor should they blur decisiveness
Of awesome military strength —
An untapped capability
That still must keep our nation free.

"Twenty-Four-Hour Alert in Japan," by Louis Glanzman.



"F-4C Landing at Khe Sanh, Vietnam," by George Akimoto.





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Mastering Technology

BY EDGAR E. ULSAMER

Associate Editor, AIR FORCE Magazine

THE Air Force has been dependent on technology ever since that major technical breakthrough—the invention of the airplane—made military airpower possible. In this regard, the Air Force, "which sprang from the loins of the Army, is much more akin to the Navy—the other military service whose operating mission and mobility requirement dictate full reliance on technology," according to Maj. Gen. F. M. Rogers, AFSC's outgoing Deputy Chief of Staff for Development Plans.

But this intimate relationship has fluctuated, and presumably will continue to fluctuate, in one principal area: Sometimes technology leads concepts and doctrine, and at other times the reservoir of technological options permits doctrine to set the pace.

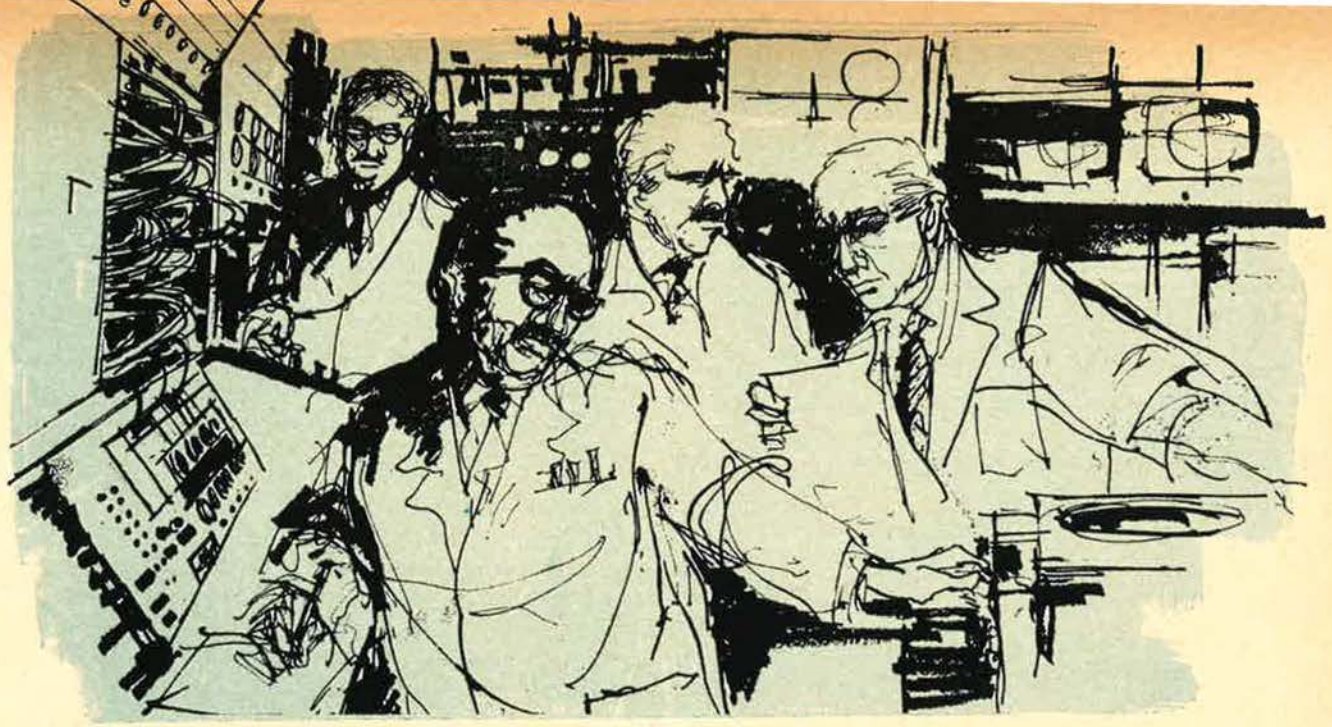
The most frequently obtaining condition, however, is somewhere in between, where the distinction between who is leading whom is blurred. This Air Force/technology "togetherness" is accented further by the fact that the scope and nature of the technological reservoir available at any one time are largely determined by the quantity and quality of the research and development effort launched and carried out over the preceding four to fourteen years.

It follows, of course, that while the Air Force owes its existence to technology, technology would not be what and where it is today without the Air Force's innovative exploitation, management, and relentless pushing against the state of the art. This impact is felt across the technological spectrum, from basic research to manufacturing techniques and systems' life and maintenance.

The past twenty-five years, in the view of the outgoing Commander of the Air Force Systems Command, Gen. James Ferguson, and in the view of other USAF leaders interviewed by AF/SD, were "characterized by the extremely rapid unfolding of technology . . . with at times traumatic impact on strategy, and frequently obsoleting weapon systems which had barely reached a nascent state."

Gen. H. H. Arnold, Chief of the Army Air Forces during World War II, was instrumental in shaping the Air Force's basic policies concerning research and development. He set up the AAF Scientific Advisory Group (forerunner of the USAF Scientific Advisory Board) in 1944.

Dr. Theodore von Kármán, an outstanding aerodynamicist, headed the AAF Scientific Advisory Board and directed the pioneering and prophetic study of the technological lessons of World War II, entitled Toward New Horizons. *Its impact is still being felt by the Air Force today.*



While this examination of the interfaces between technology and aerospace power is arbitrarily confined to the past quarter century, this period, by coincidence, may well be seen as precisely delineated in an historic sense. It begins with the US attainment of broad and undisputed technological superiority and ends at this time with the US relinquishing this lead because of political, economic, sociological, and psychological pressures.

General Arnold Mobilizes US Technology

In terms of US aerospace power, the era of methodical management of its scientific and technical resources and development planning, most Air Force technology leaders agree, began in the waning days of World War II. While the war catalyzed development of nuclear power, radar, strategic missiles, and the jet engine, World War II was fought by the US predominantly in terms of quantity—that is, the country's ability to outproduce the adversary while at the same time laying waste his production base.

For the most part, the technological content of the weapon systems was the product, at least in terms of earlier advanced research, of other nations. These ideas and techniques from abroad included (in the case of aircraft): retractable landing gears, controllable-pitch propellers, and monocoque construction. These were capably mass-produced by US industry.

But the advent of the missile, the jet engine, and the atomic bomb signaled to the more thoughtful managers of the national technological resources the need for a new look in basic as well as applied research. Foremost among this group was the Chief of the Army Air Forces, Gen. H. H. Arnold, whom AFSC's Deputy Director of Laboratories, P. R. Murray, described to this reporter as "that rare combination of visionary and two-fisted pragmatist, a man who could fight the war with one hand while plotting the nation's long-term technological future with the other."

Convinced that a new era in the relationship with technology was dawning, in the fall of 1944 General Arnold set up an organization of scientific advisers (the AAF Scientific Advisory Group), under the direction of the brilliant aerodynamicist, Dr. Theodore von Kármán, with the specific instruction to "forget the past [and] think ahead twenty years, in such terms as supersonic aircraft, pilotless aircraft, and other advanced concepts."

The group, forerunner of the present Air Force Scientific Advisory Board, was also given the dual task of surveying the scientific and technological accomplishments of the Allied and Axis powers, and extrapolating from them long-term development potentials. The findings of this survey were published in August 1945 under the title of *Where We Stand,* and the recommendations, in December of that year, titled *Toward New Horizons.* Significantly, the introductory volume bore the title *Science: The Key to Air Supremacy.* These efforts not only affect Air Force-sponsored technology efforts to this day but eventually resulted in the creation of vital test and laboratory facilities still in use.

The studies also provided the impetus for the development and management methods that underlie the systems approach, which is the axiom of modern technology management. This came about when Dr. von Kármán's group was struck by the unique, single managership employed by the German missile scientists at Peenemünde. There, under central control authority, in one organization, were German experts in aerodynamics, structural design, electronics, servomechanisms, gyros and control devices, propulsion, and all other disciplines necessary to develop a total system. The group, impressed by the eclectic system evolved by the Germans, urged its adoption by this country.

Von Kármán predicted that the development of future sophisticated weapons involving across-the-board state-of-the-art advances could be attained only by

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Bell Aircraft's X-1A and X-1B, derived from the supersonic X-1, attained Mach 2 speed and reached altitudes above 90,000 feet.

emulating the German approach. This would require the creation of an organization of diverse experts who must be provided "with facilities for laboratory and model shop production in their specialties and with facilities for field tests."

These recommendations came to fruition in the Arnold Engineering Development Center and the USAF Laboratories and Test Centers.

The vision of General Arnold and von Kármán also gave rise to what Air Force leaders now view as a fertile age in aeronautical technology, attained during a period marked by an absence of any major foreign threat and by unbridled demobilization. As such, it broke with the historic pattern of withering technology efforts during periods of geopolitical calm.

The first of the X-series of experimental aircraft (X-1 to X-15) plus the B-36 bomber and the Distant Early Warning (DEW) Line radar screen were either conceived or developed during this period. But, while the von Kármán report's impetus was formidable with regard to air supremacy, it accorded only a low priority to the research and development of advanced missiles.

It recommended an evolutionary approach geared to air-breathing missiles, which were to augment the capabilities of bomber and fighter aircraft and to enhance air defense. This proposal was not in accord with the recommendations of the RAND Corporation, which General Arnold's directive had launched in March 1946 as Project RAND (for Research and Development). This group, first of the independent, nonprofit "think tanks" devoted to long-range planning relating to national security in such divergent areas as electronics, nuclear physics, and social sciences, had proposed a "World-Circling Spaceship."

But, because the peacetime budget was extremely lean, the planning emphasis in the late 1940s was directed at manned strategic systems capable of delivering the US's technological trump card—the atomic bomb—to the heartland of any potential enemy. This reasoning becomes more understandable even in retrospect because of the broad skepticism with which many prominent members of the scientific community viewed the prospects for intercontinental missiles. Many considered the German missiles, whose maximum payload was below one ton, as not cost-effective.

The great weight and size of the atomic bomb, as opposed to the later and lighter H-bomb system, seemed to rule out missiles as delivery vehicles. As a result, the Air Force devoted a disproportionate amount of its procurement funds to aircraft for the decade to follow. As late as 1954, the ratio was ninety percent for aircraft and ten percent for missiles. Four years later, however, the balance had shifted to about twenty-five percent for aircraft and seventy-five for missiles, because of the Soviet missile threat and the concomitant high priority for the Air Force's ICBM program. In fact, the actual forerunner of the ICBM was canceled in 1947 and not fully reinstituted until six years later.

The first tangible recognition of the increasing importance of research and development to the Air Force mission was the recommendation by a group of sci-

Convair's B-36 strategic bomber, which eventually attained 10,000-mile range, employed six reciprocating and four jet engines. It was the world's first truly intercontinental strategic bomber and, for years, the only vehicle capable of delivering nuclear weapons.

entists, headed by Dr. Louis R. Ridenour, meeting at the Air University in 1949, that R&D be assigned to a special, full-fledged command. Previously, the Air Materiel Command had performed this function, in addition to its responsibilities in procurement and related fields.

Twin milestones of far-reaching consequence were reached in January 1950, when the Air Force established the Air Research and Development Command (ARDC) and created the office of Deputy Chief of Staff for Development, in Hq. USAF, to streamline and manage technology as a distinctly separate and vital entity. This was followed a year later by the opening in Tennessee of the Arnold Engineering Development Center, initially proposed by von Kármán as a key element in a national test and evaluation complex.

In 1963, another milestone was reached when the Air Force Laboratories became a separate component of the Air Force Systems Command, the successor of ARDC.

The Air Force and the Aerospace Industry

A significant turning point in terms of the systematic management of technological resources was reached in 1949 when Hq. USAF staged a pioneering meeting with about 150 key industry executives representing both prime and subcontractors and outlined to them a then novel approach for developing and building combat aircraft. In place of the previous technique of first building an airframe and later mating it with the subsystems needed to perform the overall mission, the Air Force advocated "systems engineering" the entire weapon system from the outset. This meant optimizing the airframe, the engines, the weapons, and the avionics for one another on a concurrent basis.

In a practical sense, the integral involvement of industry in Air Force R&D is generally seen as beginning at that time. (There had been prior, tentative cooperation with industry in research such as in the case of the missile study program in 1946, which resulted in the radar-equipped Falcon air-to-air missile. The fact that this was done by industry rather than by a Signal Corps or other government laboratory constituted a definite break with military R&D procedures. During the same period, the Air Force also established stronger ties with the academic community, when MIT developed inertial guidance for aircraft and missiles.)

The Air Force's reliance on industry came about in part because of the limited in-house R&D capability of the new service. The Army had to develop its arsenal concept and the Navy its policy of naval gun factories and yards and docks during a time when American industry lacked the ability, size, and inclination to produce the weapons needed by the two services.

By the time the Air Force came into being, one important lesson with regard to the relationship between the military and industry had been learned: During periods of national crisis, when weapons have to be mass-produced, the need for industry involvement becomes categorical. Conversely, retaining the broad in-house capabilities inherent in the arsenal approach in peacetime is neither necessary nor economical if there exists a healthy, vigorous defense industry. As General Ferguson put it, "The Air Force by design depends heavily on industry for its weapon systems because an in-house manufacturing capability is too expensive to maintain."

But industry can mass-produce the Air Force's weapon systems best when it is involved in the R&D progression relatively early. The transfer of knowledge and expertise from one organization to another, the Air Force has learned, involves a great deal more than just the turning over of blueprints, and must take place on a step-by-step basis. This is true whether the transfer is from government to industry, or from one industrial contractor to another.

The relationship between the Air Force and industry has varied both in nature and extent, over the years. In many instances, the degree of industry involvement in USAF R&D was dictated simply by the absence of an in-house capability, a condition especially prevalent during the first decade of the Air Force's existence as an independent service.

During that period, the ability to perform in-house tasks was curtailed because facilities and personnel were being assembled, a process that took a great deal of time and money. The second decade, by contrast, was marked by the attainment of substantial in-house capabilities involving both staff and facilities. But, even today, development of appreciable in-house capabilities in new areas normally requires at least three to five years and depends on the availability of trained manpower.

During the stewardship of Secretary of Defense Robert S. McNamara, in-house capabilities were emphasized to an unprecedented degree and culminated in the so-called building-block concept. This was hailed as a cost-saving shortcut to system development but, in reality, bogged down frequently because techniques and components that were rated ready for "off-the-shelf" use turned out to be "verified" only in a basic scientific sense and encountered major difficulties during the development, engineering, and manufacturing phases.

This condition was made worse by the prevalent aversion to building prototypes and demonstration systems. This attitude overlooked the fact that experimental research often leads operational capabilities by as much as fifteen years, during which theory has to be translated into mass-producible hardware. It took twelve years, for instance, from the time the Air Force fully established the laboratory qualities of titanium to its first use in the compressor section of an operational jet engine.

In the view of many Air Force technology managers, "a good rule of thumb is that the quality of the manufactured product bears a direct relationship to the amount of engineering done at the place you buy from." For this reason, the Air Force's golden rule now is that in-house activities should not reach beyond the preprototype or "brass-boarding" stage.

A third factor also shaped the peculiar nature of relations between the military and the defense and aerospace industry during the McNamara era: the concept of "disengagement." In a break with Air Force management philosophies in effect before and since, the so-called total package procurement concept, in vogue during that period, stipulated that the prime

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The YF-12A, a record-breaking Mach 3 interceptor, was developed rapidly under a tightly structured, orderly management approach.

contractors develop and manufacture complete weapon systems with only a modicum of direct government supervision, but in rigid accord with the specifications stipulated when the contract was let.

A more prudent approach has proved to be reliance on "engaged" cooperation between the government and industry, which was practiced during the 1950s and which has now evolved into the so-called "milestone" approach. It relies on a constant interchange of the best ideas and approaches that can be generated in-house and by industry.

A major, direct influence on the relationship between the Air Force and technology is also the makeup of the governmental management structure. Major changes in this regard occurred frequently during the past twenty-five years and some have had deleterious effects. In the early days, the Air Force could launch development programs simply by presenting the request to do so, with proper documentation, to the Research and Development Board, comprised of the three services and NACA, forerunner of the National Aeronautics and Space Administration (NASA). Industry "accountability" was simple and direct. But as layer upon layer of new authorities and reviewing agencies were superimposed, industry had to match internally the complexity of the "buyer's" management structure, in order to meet the "paperwork" requirements. At the same time, the tendency to furnish either muddled or constantly changing instructions to the program director and industry increased.

The results, of course, were often higher costs as well as technological problems. An often-cited case history of how constantly shifting guidelines can affect systems development is a comparison of how the government managed the A-11 (later designated the YF-12A, and its close kin, the SR-71) and the B-70 programs. In the first case, the contractor was furnished precise and reliable information by one central authority; in the latter example, industry was subjected to a constantly changing set of instructions and guidelines emanating from not only various USAF and DoD echelons, but also from the Congress.

The Need for In-House Capabilities

In order to manage technology and to direct its movement, the Air Force needs a strong and comprehensive in-house capability, in the view of General Ferguson. One principal reason is the need of "pump-priming" industry in areas of high risk. Typical recent examples include the areas of microelectronics, laser, and advanced composites.

Equally compelling is the fact that only government has access to new developments in all phases of technology produced by competing industries and laboratories and, therefore, must be able to evaluate and guide these efforts. This cannot be done without in-house expertise. Intelligent procurement also requires sufficient expertise based on in-house work, to "at least be able to argue with the contractor."

Further, in-house facilities and personnel permit exploratory research in promising areas, without the need to activate the slow and cumbersome contract process involving several Air Force echelons, DoD, the Bureau of the Budget, and Congress.

Secretary of the Air Force Robert C. Seamans linked the need for in-house research to the present funding squeeze, which requires the most careful husbanding of all Air Force resources. This, he said, warranted that "the Air Force must retain a high-quality in-house cadre of scientists who are engaged in scientific research. Their responsibility will be to enlarge the scientific base in areas important to the Air Force, to act as the eyes and ears of the Air Force for the implications of new developments in science elsewhere in the nation and the world, and to provide expertise to our

Secretary of the Air Force Robert C. Seamans, Jr., advocates that USAF retain a high-quality in-house cadre of scientists to enlarge the scientific base in areas important to the Air Force and to guide Systems Program Offices and other users of technology.

Systems Program Offices and other Air Force customers of science."

He cited as an example of the importance of the in-house engineering know-how that "in every accident or failure of an aircraft, experts from our Materials Lab are brought in immediately. They may find that the threads in a bolt were machined rather than pressed into the bolt, thereby setting up stresses which ultimately caused failure. Or they may find that a panel cracked in fatigue because of vibrations, and that it can be corrected by the appropriate incorporation of viscoelastic dampers into the structure. And, while we most assuredly would have preferred never to have had the technical problems that arose with the F-111 and the C-5, these scientists and engineers in the laboratory played a key role in achieving successful solutions. There are literally hundreds of cases where expert scientists and engineers from the Materials Laboratory have been essential to the correction, or avoidance, of problems of this nature."

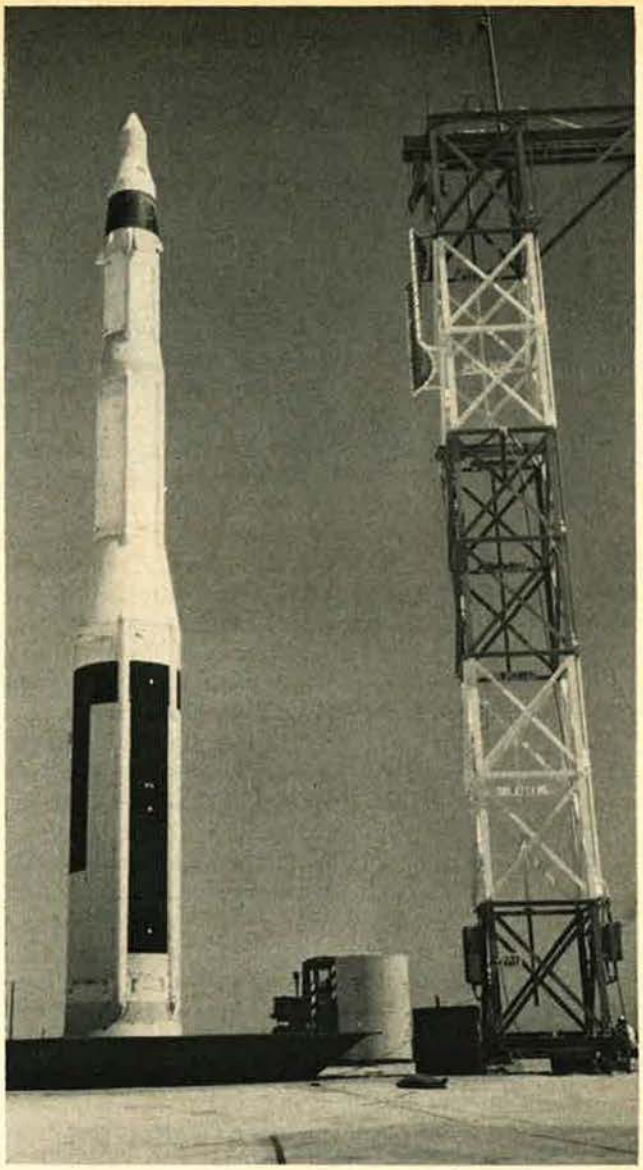
In the aggregate, the "mix" between in-house and contracted research has remained relatively stable from the time the Air Force completed its laboratories and test centers; the average is less than fifty percent for in-house activities. In specific areas, such as in advanced laser technology, the work by Air Force labs will at times reach a much higher percentage.

Air Force experience to date has not yielded any definite information on what constitutes an ideal mix between how much R&D should be conducted in government facilities and how much should be contracted out, except for two general rules: The mix should be kept within ranges that assure both the government and industry of meaningful participation in what the other partner is doing. The general yardstick informally followed by Air Force technology managers is that eighty percent represents the "outer limits" of what can be allocated to in-house activity; conversely, in order to control research programs assigned to industry, the Air Force usually retains a small fraction of the effort for its own facilities and staff.

The other guideline followed by Air Force managers is that of avoiding direct manufacturing involvement in development efforts, beyond the so-called brass-boarding stage, except for isolated, one-of-a-kind systems. Brass-boarding means testing a technology under development in a realistic environment, such as flight-testing the new engine aboard an existing aircraft. This policy is based on the observation that industrial contractors will be hindered in setting up the manufacturing process if they have not had at least prototype fabrication experience.

The Changing Approaches to Technology

It is axiomatic that technology begins with and is undergirded by scientific knowledge. It is also usually true that this scientific knowledge bank, in its basic form, is publicly available, and therefore accessible to friend and foe alike. As a consequence, the race toward technological achievement, by and large, starts out on an equal footing. This makes paramount the manner and degree to which technology is exploited and clearly establishes them as the criteria that determine the outcome of the race.



USAF's ICBM program, involving Atlas, Titan, and Minuteman (shown here), was concurrent in development and procurement.

Air Force technology managers use this line of reasoning to demonstrate that the complexity of their task increases as rapidly as does scientific knowledge.

Over the past twenty-five years, this increase has been explosive. Immediately following World War II, the technology potential was relatively narrow. This made it easy to target on specific areas of technology and exploit them for a military objective. Also facilitating the task was the fact that the US, as well as the rest of the world, had only limited research capabilities.

Research staffs were small and close knit, not fragmented into a multitude of areas of specialization. But growth, much of it germinated during the massive technology efforts of the 1950s and leading to a vast expansion of the technological potential in the 1960s, multiplied the complexity of R&D management.

With the number of technological options constantly increasing, and economic constraints permitting exploitation of only a few, selectivity became paramount. At

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The F-111 program was subjected to an unusually high number of requirement changes during the aircraft's development phase which, because of the peculiar nature of total package procurement, led to much adverse publicity.

the same time, the technological structure had to be diversified and specialized not only into various research phases, such as advanced development, engineering development, and production, but also within a multitude of technological disciplines and categories.

As a result, the integration of research with component technology, and component technology with systems technology, became more difficult. Lead times increased and, with them, the need for crash programs. The ICBM program of the 1950s stands out in this regard. It consolidated a number of earlier, incipient management philosophies into a sophisticated systems approach involving about 14,000 scientists from the academic community and industry, some 1,500 military officers, and an additional 76,000 engineers and support personnel of twenty-five major prime contractors and 200 subcontractors.

Coming to fruition late in the 1950s, it assured the US lead in strategic posture for the ensuing decade. Its key feature was concurrency; all elements and phases of the program were tackled at the same time, including research, development, test, and production. Launched as a top-priority program by the Air Force in 1954, the first operational ICBM squadrons entered the SAC inventory only four years later. On a conventional basis, this would have taken at least ten years. Yet, the program's high technical risks were more than justified in view of the alternatives.

But viewed in retrospect, the program was perhaps too successful: It became the model for later development programs of USAF aircraft and, as General Ferguson puts it, "Unfortunately, the bold idea of concurrent development and procurement, required for the ICBM program because of its overriding importance to the nation's defense need, was adopted for less pressing programs."

It essentially eliminated the "fly-before-you-buy" concept and represented a radical departure from the development approach practiced by the Air Force between 1945 and 1955. During that period, General Ferguson emphasized, the Air Force developed thirty-three fighter and twenty-two bomber prototypes. The underlying philosophy was that "we should select from the available designs the best ones, develop them into test articles, and then flight-test the prototypes, often on a competitive fly-off basis, and ultimately enter the winners into actual production."

General Ferguson went on to say, "In retrospect, we recognize that we would have been much better off if we had utilized the prototype route on a number of aircraft systems that are currently suffering from growing pains, among them the F-111 and the C-5. Rather

The world's largest aircraft, USAF's C-5 Galaxy, was developed and produced in response to national policy requirements of five years ago, and, as a result, incorporated features and capabilities now deemed unnecessarily sophisticated and costly.

than making a major production commitment at the outset of the program, it would have been more prudent to commit ourselves only to a small test quantity and then fly and test these aircraft."

The advantages over total package procurement, General Ferguson added, are that "this way you can ascertain exactly what the aircraft really can do and, further, you have a chance to see if the world for which it was designed has remained the same. The F-111 concept was formulated when the name of the game was massive retaliation and the focus of attention was Europe. Its basic features were geared to low-level penetration for the delivery of nuclear weapons. We selected a design tailored for this role, selected a contractor, and announced a commitment for several thousand of the aircraft, with a dollar value sufficiently large to attract an awful lot of attention. While we had many technical growing pains with this aircraft, its real problem stems from the tremendous number of changes that had to be made because of requirement changes and technology advances that emerged during its development."

A similar fate befell the C-5 transport, designed in response to the national policy requirements of the mid-1960s. This required the ability to airlift complete units, with their equipment, to remote, underdeveloped parts of the world. The C-5 had to incorporate, in addition to size and range, many extraordinary capabilities with regard to navigation and operation from unprepared sites, including a kneeling landing gear, General Ferguson pointed out.

Some of these features are now being viewed as overly sophisticated and unnecessary because the role the aircraft is now to play [in light of the "Nixon Doctrine"] has changed, the General added. "But, because of the concurrency of the C-5's development and procurement, the responsiveness of the government to changing requirements was impaired, compared to what would have been possible under a normal prototype approach," he said.

The abandonment of an orderly development progression based on prototypes and brass-boarding during the 1960s has proved disadvantageous in two other important areas. It hinders incorporation into the production system of technology advances that may occur during the program's development phase. Also, demonstration programs often prove as vital to correct formulation of concepts and doctrine as they do to technology, in the opinion of many Air Force technology managers. Actual demonstration of a weapon system before its design is frozen, and, before it is committed to production, allows the "user" to modify the way in which he plans to use the system, which may introduce changes elsewhere.

Because the prototype approach reduces the possibility of prematurely freezing the final production design, it can be better adapted to changes in the enemy threat. Air Force technology managers are resigned to the "historic fact" that a major share of cost increase, schedule delay, or performance problems incurred during the development and procurement cycle are induced by changes in the requirement and threat or other reasons outside the purview of the technologist but for which he nevertheless is blamed.

Gen. James Ferguson, retiring Commander of the Air Force Systems Command, terms the "much more vigorous" technology efforts of the USSR "alarming" and warns that, in the case of a Russian technological breakthrough, there "is no way of buying time" to catch up.

The Contracting Lesson: Flexibility

One of the principal tools of the beleaguered Air Force technology manager is the contract structure he evolves, or, at times, is ordered to use by higher authority. The absurdities and shortcomings of the total package procurement concept—acknowledged by a strong recommendation against its further use, in the report of the Blue Ribbon Defense (Fitzhugh) Panel—need no further elaboration here.

Two decisive lessons have been learned by the Air Force during the past quarter century with regard to contracting: Different programs require different contracts, and the higher the risks involved in a given program, the greater the need for flexibility and application of a step-by-step contracting approach.

Translated into contractual realities, this means that a program's initial phases will often be premised on a cost basis, while subsequent ones tend toward the fixed-price mode.

The principal lessons learned in contracting by the Air Force over the past two decades found their condensation in the Air Force's contract structure for its F-15 air-superiority fighter, according to General Ferguson. (Variations of this contracting philosophy, keyed to different conditions, are the B-1 and AWACS contracts; the former is geared to cautious prototype development, with the full-scale development of the avionics phased in last, while the latter provides for a competitive fly-off of the system's most critical component, the radar, at the earliest possible moment.)

The F-15's incremental or "milestone" approach enables the government to retain better financial control over the program while also keeping it on solid technical ground and in step with changing requirements.

"The F-15 program is a modern approach to development management, structured to be as fail-safe as is humanly possible. It prevents the government from being stampeded into premature commitments and provides sufficient exposure and experience, so both the Air Force and the contractor may deliberately and safely progress from one development step to the next. The contracts are tailored to the work to be accomplished.

"The software, design-engineering part of the con-

(*Continued on following page*)

tract is a cost-plus-incentive arrangement to encourage the contractor to put forth his best effort the first time around. The R&D phase, involving twenty aircraft, is on a fixed-price-plus-incentive basis because, by that time, the contractor is sufficiently experienced to make a reasonable contractual commitment in terms of price.

"The actual procurement contract also will be on a fixed-price basis but will be negotiated incrementally. We will contract for each wing incrementally, negotiating the price as our experience in true costs and the benefits of the learning curve increase. This places both the government and the contractor on a financially sound contractual basis," General Ferguson explained.

The Unpredictable Requirements

In the view of the experts interviewed by this reporter, nothing has happened in the past twenty-five years to justify the assumption that the broad planning and forecasting functions on which technological emphases are placed will be less inaccurate in the future than they have been in the past. Two of the principal planning factors affecting the technology effort are whether the inventory should be optimized, over a given development period, for nuclear or conventional weapons, and whether for aircraft or missiles. Indirectly, a third factor also has played a role—whether the nation could look forward to a period of peace or not. The forecasts have proved less than infallible; the emphasis during the first five years of USAF's existence was on nuclear-delivery capabilities, but the Korean War, although undoubtedly confined to a localized confrontation by the US's nuclear deterrence, was fought exclusively with conventional technology. The Southeast Asian conflict caught the development planner off guard on both criteria.

The preceding development emphasis had been on nuclear weapons as well as on missiles, while the requirement, of course, was confined to conventional aircraft and munitions. Development efforts on aircraft fire-control systems, possibly the most pressing need of the Vietnam War, had been reduced to almost zero during the preceding five years, for instance.

The Relevancy Dilemma

These vagaries and the inability to forecast correctly are neither surprising nor, from the standpoint of technology, disastrous, so long as a broad-based, strong technology effort is maintained. A comprehensive research program, in General Ferguson's view, is the basis for the qualities most often asked of the Air Force's technology effort—"flexibility and responsiveness."

Historically, two principal obstacles stand in the way of sustaining comprehensive and thorough technology efforts. One is money and the other *relevancy*. The first is obvious: Inadequate funding because of either a real or presumed diminution of the threat or for reasons of national fiscal policy, of course, impairs or vitiates the technology effort. The ups and downs in the Air Force's technology and research budgets, depicted on this page, serve as a gauge for measuring the breadth of the Air Force's R&D programs since 1947.

The second factor, relevancy, is harder to interpret. It is generally invoked more frequently during periods of reduced budgets. Its strictures apply in cases where other government agencies have been given primary responsibility over areas of technology of specific interest to the Air Force. This applies to nuclear-weapons research, for instance.

While the Air Force's strategic mission pivots on nuclear weapons and their characteristics, research in this field is not within its purview but is assigned to the Atomic Energy Commission. (The Air Force recently had to drop a promising research program—involving thermonuclear fusion, clearly pertinent to its mission and meant partly to "prod" AEC into a more active pursuit of this field—because the latter has primary responsibility in all nuclear developments.)

Another constraint on the Air Force's R&D effort in terms of relevancy results from the enactment into law last November of "Section 203," which calls for a "direct and apparent relationship" of all research to a specific function or operation. About seven percent of the Air Force's research projects in progress when the law became effective had to be dropped. Air Force Secretary Seamans described the impact of Section 203, in recent congressional testimony, as "not uniform."

He explained that "virtually all projects in the elec-

USAF RESEARCH & DEVELOPMENT

OBLIGATIONS BY FISCAL YEAR

(IN MILLIONS OF DOLLARS)

FISCAL YEAR	TOTAL TECHNOLOGY*	RESEARCH
1947	$ 112.7	$ 22.6
1948	140.8	28.2
1949	213.5	43.7
1950	223.1	44.6
1951	368.6	73.7
1952	498.6	99.7
1953	1,016.9	203.4
1954	941.4	188.4
1955	939.3	188.0
1956	1,142.8	246.6
1957	1,643.9	184.7
1958	1,858.6	217.9
1959	2,440.0	195.4
1960	2,815.5	367.3
1961	3,588.9	568.3
1962	3,569.8	587.5
1963	3,944.7	644.7
1964	3,784.0	645.1
1965	3,351.0	667.4
1966	3,342.3	827.4
1967	3,794.3	599.2
1968	3,621.7	610.0
1969	3,498.5	516.4
1970	3,220.8	568.1
1971	3,070.9	592.3

Total technology includes Research, Exploratory Development, and Advanced Development. Also included are pay allowances of military R&D personnel, beginning in Fiscal Year 1953, and support from procurement appropriations of development, test, and evaluation, starting with Fiscal Year 1954.

USAF technology effort is largely determined by budgetary constraints. In terms of research and combined R&D, Air Force technology budgets since 1947 show wide fluctuations.

tronic sciences demonstrated a direct relationship to specific military functions, while many in physics and astronomy were deemed too indirect to meet Section 203. For example, the physics of energy processes in stars, which was supported because it could ultimately lead to improved means of aerospace propulsion or to new energy sources, was deemed to be too indirectly related to an Air Force military function. If the research should lead to an understanding of the process, it would next have to be demonstrated experimentally. After successful demonstration, the development project would become the responsibility of the Atomic Energy Commission, and only then would it be ready for a presently unknown Air Force application. We recognize the parallel between this example and the research on the carbon cycle in the 1930s, which subsequently was 'clearly identified' with nuclear fusion, but we still cannot call such research 'direct and apparent' under present criteria."

Combined with the broad reduction in funding experienced by the Air Force during the past few years (USAF's research, development, test, and evaluation budgets were reduced, if inflation is allowed for, by about forty percent over the past five years), the stringent application of the relevancy standard creates, as Secretary Seamans testified, "the danger that we will innovate modest improvements but fail to achieve major breakthroughs." History, he added, "is filled with instances where apparently irrelevant scientific inquiry completely eclipsed carefully directed programs."

To compensate, at least in part, the compartmentalization of the technology effort, which began twenty-five years ago, is being reversed within the Air Force at this time. The research community and the development community, Dr. Seamans said, will be "brought into closer contact to achieve a more effective and economical interaction."

The recent merger of the Office of Aerospace Research (OAR) into AFSC constitutes a first step in this new direction, Secretary Seamans said. At the same time, the Air Force will seek to reinvigorate the cooperation with the nation's universities, which in recent years has suffered severely because of campus opposition to "war research," he promised.

The Technological Outlook

The level of this country's defense-oriented research, when related "to the much more vigorous research and development program of the Soviet Union," is, in General Ferguson's view, "alarming." He termed it "disconcerting when you discover that somebody else is willing to explore the unknown, dynamically and energetically without having to relate these efforts to a given weapon system."

As the spectrum of the technological potential widens—General Ferguson dismissed the idea of a technological plateau as false—the possibility of an intensive research program yielding "breakthroughs of monumental importance" increases, he said.

"Twenty-five years ago, when the technology spectrum was narrow, the potential for breakthroughs was limited to a few areas. Today, the interplay of various technologies creates an almost infinite potential for advance and, if the other side is successful, there just is no way of buying time" to catch up, General Ferguson warned.

An example of the disparity in R&D achievements was the revelation by Russian scientific publications almost two years ago that the USSR had achieved controlled thermonuclear fusion, employing laser technology. Verification of this Russian claim by duplicating the achievement took the US a whole year. If the Soviet Union sees fit to publicize a breakthrough of "such stupendous importance in the field of controlled nuclear fusion," General Ferguson felt, "it must be assumed, on the basis of past performance, that they are really many years beyond that point."

The laser's defensive and offensive potential, he said, typifies "some of the technologies that appear to offer the same kind of revolutionary capability on how wars are fought, or deterred, that nuclear weapons provided at the end of World War II.

"Also, the ballistic missile clearly is gaining major new strategic dimensions through the interrelationship with its own hardpoint and area defense, as well as its mobile basing. Space is another area that might well reshape military strategy in the future," he said.

The impact of space exploration on strategy, he intimated, is already being felt. Until recently, the presence of US troops in many remote parts of the world was deemed vital to the defense of the United States, General Ferguson said, adding, "However, space technology, as now evolving and being applied, makes it feasible to consider the long-range defense of the country with a significant reduction in the number of American troops stationed outside our borders."

Despite curtailed research programs and the "complacent" national mood regarding defense, the retiring head of the AFSC, who has held key technology management positions for the past fifteen years, remains "sanguine" about this country's ability to maintain R&D at a level sufficient to meet national security needs.

One way to extend the buying power of available funds, he believes, is through the systematic "lateral transfer of technology, from one service to another, from one government agency to another, and between defense and the commercial sector. We are making good progress in this field, and more is possible." He cited such areas as joint development of commercial and military STOL aircraft currently under review, as well as joint use of air traffic control satellites to serve the Air Force and commercial aviation.

The other method, already widely implemented, hinges on management philosophies geared to a more efficient utilization of available resources. In both cases, he said, "we are closing the loop back to where we started. Von Kármán strongly urged a unified national approach to major technological resources and test facilities. I think we are finally moving in this direction. At the same time, we started out with a flexible, incremental approach to building systems, and we are back on that same road."

Seemingly, so far as twenty-five years of Army Air Forces- and USAF-sponsored technology is concerned, there is merit in the saying that history repeats itself. As a result, the search for panaceas has given way to the wisdom of such early leaders as General Arnold and Dr. von Kármán.—END

The Arsenals of Peace

BY KARL G. HARR, JR.

President, Aerospace Industries Association

THE aerospace industry of 1970 is a lineal descendant of World War II's aircraft industry, but there is little in the way of family resemblance. A quarter century of transition has completely changed the face of aerospace manufacturing.

Change, of course, has been a way of life for the industry since its origins in the years preceding the first world war. But in the past quarter century, particularly in its latter years, the *rate* of change has accelerated at an incredible pace. The impact has been felt in every sector of the industry's operation, from the product line to the type of facilities required, from research through production, from factory worker to top management.

The transition has not been easy. Each increment of technological progress demanded massive technical adjustments in the industry's method of operation. The technical problems were compounded by fluctuating government budgets and policies that frequently brought on program cutbacks, stretchouts, and terminations. From the hectic and often chaotic quarter century of advance and adjustment, however, there has emerged the greatest industrial technological capability the world has ever known—a national bank of know-how whose resources can be channeled into stronger defense, further strides in space, and a wide range of other activities addressed to the betterment of society.

The Postwar Decline

The quarter century of transition started even before the end of the war. When victory was in sight, the future seemed free of further conflict, except to a visionary few. Understandably, and in accordance with our traditions, the nation was in a hurry to reconvert to plowshare production, and the general attitude toward the aircraft industry was, "Who needs it?"

With the abrupt cancellation of some $20 billion worth of contracts, the aircraft production curve plummeted in a near-vertical dive that was to continue for more than two years. Hundreds of facilities that only months earlier had bustled with round-the-clock activity became ghost plants. More than a million aircraft workers were laid off in the span of one year, and the industry that had been top-ranked employer among manufacturers of durable goods in 1944 slipped to sixteenth place in 1946.

Industry optimists had hoped that manufacture of commercial aviation equipment would take up some of the slack. There had been forecasts of great booms in both civil air transportation and personal flying in the postwar years. One enthusiastic prediction made in 1945 held that civil-plane production would reach 500,000 units over the first five years after the war.

But this shining promise proved illusory. The predicted upsurge in airline travel did materialize, but its thrust was gradual. Real momentum was deferred to later years. Many new commercial operators entered the aviation field, offering nonscheduled passenger and cargo services, but, due to the availability of thousands of war-surplus transports, they constituted a negligible market to the aircraft industry. Although the lightplane-building segment of the industry experienced a flurry of activity in the immediate postwar period, it was short lived. Moreover, it did not begin to compensate for the drastic reductions in military plane procurement.

In the years 1946–47, production of military aircraft dipped to an annual average of fewer than 1,800 units, a rate lower than that of 1938. Struggling to keep their major production facilities in operation and to preserve the invaluable know-how of their engineering teams, aircraft manufacturers branched out into such nonaviation efforts as fabrication of trailer homes, plastic products, office furniture, motorcycles, and boats. It was not enough; plants designed for mass production could not be supported by a trickle of output, and

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most of the leading companies recorded substantial losses. The aircraft industry was at a low ebb, its survivability very much in question.

By 1947, however, the American people began awakening to a new need for a strong defense system. As East-West tensions became increasingly manifest, considerable alarm developed at the extent to which both industrial and operational airpower had deteriorated, and this, in turn, produced a general demand for a reversal of the trend.

One result was the formation, in 1947, of two separate committees—the President's Air Policy Commission and the Congressional Aviation Policy Board—charged with making comprehensive assessments of America's air status and with recommending reconstruction plans. Reporting in 1948, the study groups were in accord on some major points: that the newly independent Air Force and the aviation arms of the Army and Navy should be expanded and modernized; that the operating forces should be backed by a healthy aircraft industry producing equipment at a rate sufficient to allow quick mobilization in an emergency; and that a far more intensive program of aeronautical research and development should be undertaken to assure continuing improvement in aircraft performance. These recommendations found strong support within the Administration and the Congress, and in 1948 funds were appropriated for the initiation of a new airpower buildup toward a planning target of seventy modern Air Force groups and a commensurate Naval aviation strength.

The Buildup and Its Problems

The aircraft industry had a dual assignment in the new airpower buildup. First, it was to supply the military services with modern aircraft in increasing numbers. At the same time, it was to improve its own capability for rapid mobilization through a program of "industrial expansibility," in which existing production lines were to serve as nuclei for far greater output, should it be required.

One major factor posed enormous complications. Even though quantity production had dropped to rock-bottom levels in the immediate postwar years, government and industry had maintained a moderately funded but progressive program of research and development. This program had made available for production a variety of aircraft which, though unimpressive by today's standards, offered substantially improved performance over World War II types. This marked the real beginning of the jet age. Although there were only a few jets in production at the start of the buildup, there were some thirty in various stages of development, and more than a score of these were to be tagged for quantity production within a few years.

But increased performance also inevitably means increased complexity. There was a new emphasis on electronic systems. Where the average 1944 combat plane had carried half a ton of avionic gear, its 1948–50 counterpart needed three to five times as much. This, together with stronger structures, better armament, greater fuel loads, and a multiplicity of other considerations, made the new breed of airplane much bigger and heavier than its wartime predecessor. Its construction also required roughly four times as many man-hours. The same factors combined to stretch "lead time," the time between placement of an order and delivery of the unit.

This increased complexity plunged the industry into the first of several major postwar transitional phases, and its impact affected several aspects of the buildup program.

Industry employment, which had dropped to a low of 237,000 during the decline, began to climb, but the climb was a slow one because the types of skills needed were in short supply. Development and pro-

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By 1946–47, production of military aircraft had fallen to 1,800 units a year. Jet engines excepted, design and materials were not far advanced over wartime years. Less than ten years later, the contract for the rocket-powered X-15 was awarded. Pioneer X-15 pilots Joe Walker, Bob White, and Scott Crossfield first flew the aircraft in 1959, demonstrating its tremendous advances in design, materials, propulsion, instrumentation, and production methods.

duction of the new breed of aircraft demanded a greater proportion of highly skilled personnel. Scientists and engineers, for instance, had comprised only 2.2 percent of the World War II work force; by 1950 they accounted for nine percent of the total. There was a similar proportional increase in other high-skill categories, a trend that was to continue throughout the postwar quarter century.

There was a concurrent change in the types of tools and machines needed for production. They had to be infinitely more complex than the equipment they replaced. Such machinery was not available "off the shelf." Its design, production, and installation required considerably more time. And, although this machinery would eventually effect savings through more efficient production processes, its acquisition was expensive.

Military aircraft costs rose dramatically. More elaborate airborne equipment, more man-hours per unit, a higher average payroll due to both inflation and skilled-worker emphasis, increased prices of materials and machinery, etc., meant that appropriated funds bought fewer aircraft. In 1948, the industry's military sales topped the billion-dollar mark for the first time since World War II. In 1949 they rose to $1.8 billion, and in 1950 they reached $2.6 billion. Yet the number of military aircraft delivered remained relatively constant throughout those years: 2,536 in 1948, 2,592 in 1949, and 2,680 in 1950.

Costs, in turn, affected the industry's ability to broaden its base for possible mobilization. Plans to provide extra tools and facilities for emergency activation had to be subordinated to the primary job of modernizing the military air forces with available funding. Further, the expansion capability was dependent upon the industry's rate of production, a rate more accurately measured in terms of airframe pounds than units. The Congressional Aviation Policy Board had recommended an annual output of 111,000,000 airframe pounds, but mounting costs precluded even an approach to that lofty goal without a massive increase in a funding level already considered high. During 1948–50, the industry was producing only 30,000,000 to 36,000,000 military airframe pounds a year.

Korean War Production

With the outbreak of hostilities in Korea in June 1950, Congress elevated the Air Force strength target to 143 wings and appropriated vast sums for military aircraft production. Despite repeated warnings that plane production could not be turned on like a water spigot, the feeling prevailed that the aircraft industry could easily duplicate its World War II feat of tripling output within a single year and tripling it again the following year. In fact, one unrealistic goal called for a *fivefold* increase the first year.

Even scaled-down production schedules proved optimistic. The mobilization base of 1950 simply was not sufficiently broad for large-scale turnout of complex aircraft. Lead time could not be appreciably reduced. Because of the shortage of trained personnel, it became necessary to train unskilled workers in highly skilled jobs and to provide engineering training for qualified technicians. Directing the efforts of more than 60,000 subcontractors and suppliers strained the available nucleus of management personnel. Under the government policy of "partial mobilization," an effective system of priorities was slow in forthcoming, and lengthy delays were experienced in obtaining scarce raw materials and machine tools.

In spite of these problems, the industry managed to double its aircraft output by the end of 1951. The planes coming off the line, however, were those ordered during the pre-Korea buildup. Moreover, their numbers were insufficient to meet requirements. The operational lifetimes of aircraft long slated for replacement had to be extended. Said Gen. Nathan F. Twining, the Air Force Vice Chief of Staff: "The Air Force we have today is the one we bought three and four years ago. The Air Force we need today is the one we failed to buy at that time."

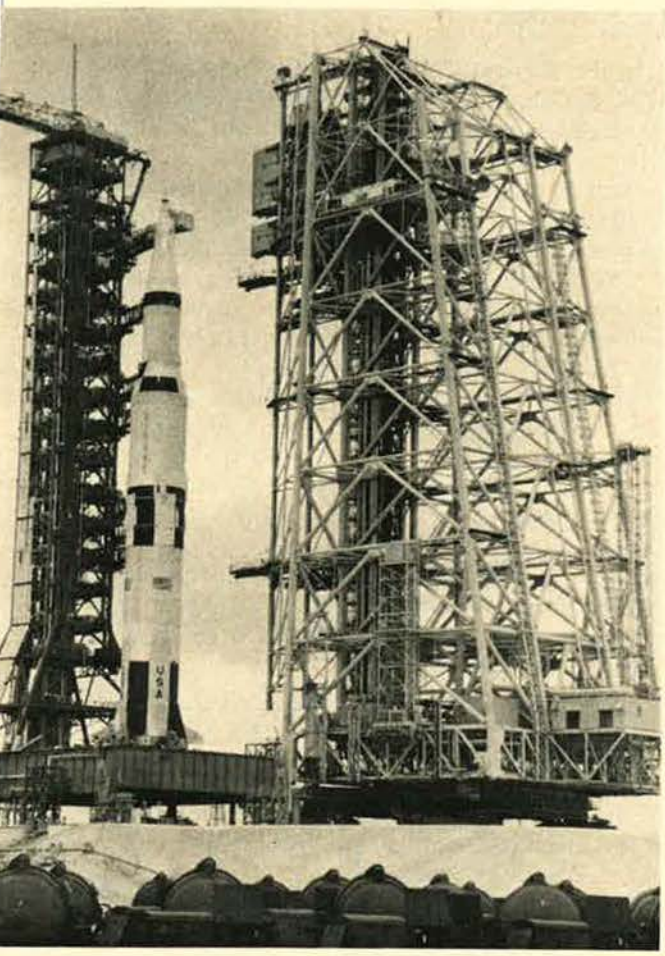
Production moved into higher gear in 1952, and, de-

spite myriad difficulties, the aircraft industry wrote one of the brightest chapters of its history in the three years of the Korean War. Military aircraft output climbed from about 200 planes a month at the start of the conflict to more than 750 at the time of the cease-fire. In all, the industry delivered to the armed services well over 16,000 new, high-performance aircraft. The USAF's air combat record in "MIG Alley" testified to the fact that manufacturers had maintained quality and reliability while coping with the monumental task of increasing output.

Revolution in Evolution

The Korean cease-fire by no means ended international tension; in fact, the cold war took a turn for the tepid. This time there was no sudden dismantling of the industry. The airpower buildup continued, but the nature of airpower took on an entirely new face.

In 1954, the aircraft industry embarked on another phase of its postwar transition, or perhaps more accurately, a series of phases. In the next five years—through 1958—the industry was to undergo its most sweeping transformation. A "revolution in evolution," one industry official termed it, meaning that although adjustment to changing requirements had become a life-style in the industry, the *rate* of change now accelerated markedly.



Missiles and boosters, culminating in the Saturn V (above), projected the industry into a new technical/management era.

The greatest single influence on the new transition was the government decision to proceed with development and production of long-range strategic missiles. The vastly greater destructive capability of the ICBM and other nuclear weapon systems initiated a trend away from mass application of force by numbers and toward greater reliance on the individual weapon.

The knowledge that the Soviet Union was moving in the same direction dictated a reorientation of the industry's role as partner in defense. The premise that any future all-out war would have to be fought with the resources on hand at the outset made obsolete the concept of industrial expansibility. Thus, the industry's assignment became that of supplying the military force in being with the most advanced weaponry it was possible to build, and to compress, to the extent feasible, the time span between concept and delivery. This brought about not simply another increase in research and development but a general elevation of the R&D function, from preproduction ancilla to a status coequal with the production job itself.

Predictions to the contrary, the weapons revolution did not signify the end of the manned airplane era. It did, however, bring forth a new family of aircraft of substantially improved capability. The first operational, barely supersonic fighter of 1954 was followed by a succession of still more advanced types capable of flying at twice the speed of sound. Major performance gains—such as range and payload—were demanded for other military aircraft. The complexity curve took a sharp upward turn, taking the cost curve with it.

There was a corollary decline in numbers of aircraft produced. Cost, of course, was one factor; the military services, of necessity, drifted away from the earlier custom of building several types for one job as insurance. Moreover, fewer aircraft were needed because of the individual plane's far superior performance and punch.

Concurrent with the advent of supersonic aircraft production, guided missile output became a truly significant portion of the industry workload. The Korean War had provided impetus to an extensive program of research and development of a variety of shorter-range missiles—airborne weapons, ground- and ship-launched air defense weapons, battlefield weapons, and pilotless tactical bombers. A few such types had achieved production status during the Korea years, but the big push came in 1954 when missile procurement topped the billion-dollar level for the first time.

The industry was thrust simultaneously into a massive R&D program on strategic missiles. The Department of Defense ordered development of the first ICBM in 1954. The second ICBM project was initiated in 1955, along with two intermediate-range ballistic missile programs. Work was started on the first fleet ballistic missile in 1956 and on a solid-fueled second-generation ICBM in 1958. An example of the efficacy of the industry's compression of developmental time was the fact that the first ICBM made a completely successful initial flight just three years after the start of the program.

Missile development and production shared a number of commonalities with aircraft manufacture. But there were as many differences. New fabrication tech-

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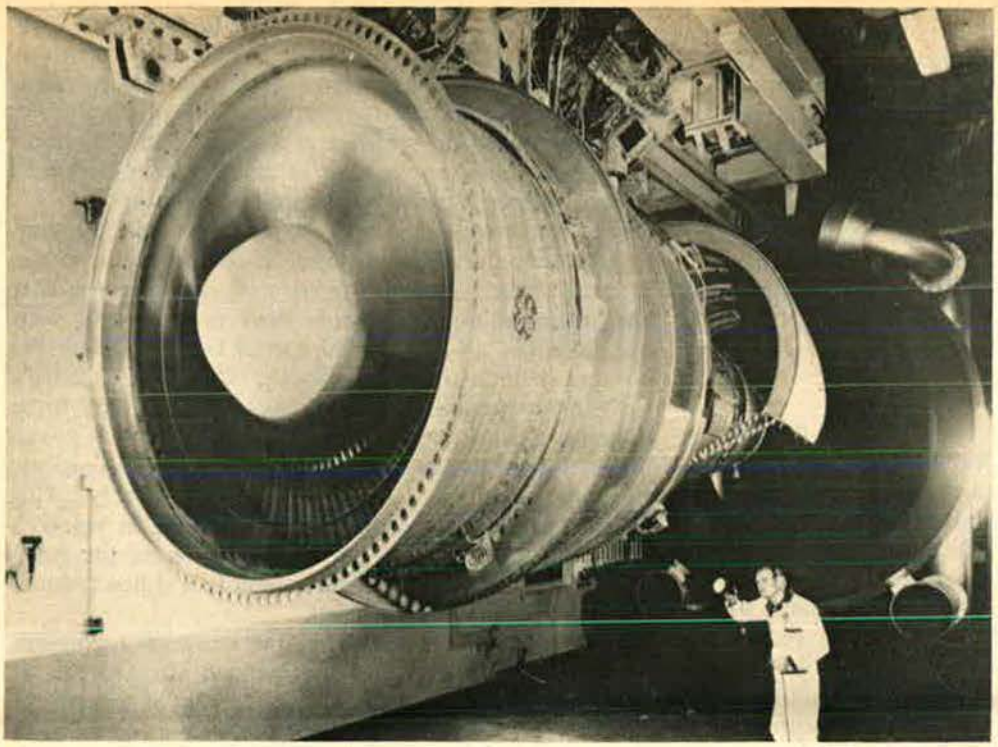

The skills needed for design and production of supersonic aircraft, missiles, space systems, and engines such as the General Electric CF-6 turbofan drastically altered the manpower balance of the aerospace industry. In the mid-1940s, eighty percent of the employees were production workers; today they make up only half of the work force.

niques were required, particularly for the larger weapons; rocket rather than jet engines supplied propulsive thrust; ultrareliability of equipment was a must for a one-shot system that operated without human guidance; new, hospital-like clean-room facilities were needed for assembly. The industry found itself in the paradoxical position of building new facilities, mostly financed from thinly stretched company funds, at a time when it was retiring some mass-production plants that were no longer needed.

In the midst of the weapons revolution, the industry moved into still another transitional phase in commercial aircraft production. Air transportation had snowballed in the latter 1940s and early 1950s, and new technology made possible a major breakthrough in commercial aviation—the jet transport. Manufacture of supersafe, high-capacity, high-subsonic airliners posed its own separate set of technical problems and one major nontechnical difficulty—financing. Transport builders had to put out $1.6 billion in research, development, testing, facilities, production, and other miscellaneous costs before the first airplane was delivered to an airline.

This five-year period of major transition was one of considerable growth for the industry. Overall sales climbed from $12.5 billion to more than $16 billion. Early in the period, in mid-1954, the industry regained its position as No. 1 employer among manufacturing industries, with 823,000 people on the rolls. By the end of 1958, employment was well over the million mark and the composition of the work force had undergone another major change. The need for a still greater proportion of scientists, engineers, and technicians in an era of dramatic technological advance needs no elaboration, but there was, in addition, a new emphasis on more and better managerial talent, due to intensified competition for fewer projects, a heightened demand for cost-cutting productive efficiency, and the increased complexity of program management.

The Space Age

In the decade of the 1960s, the industry—which in 1959 had become the "aerospace" industry—experienced one more major transition as the national space program moved into advanced stages.

Actually, industry's role in space research dates back to 1955, when the government ordered development of a launch vehicle and satellite for US participation in the International Geophysical Year. But prior to 1960 the industry's space effort was not significant, as evidenced by the fact that it constituted only a fraction of one percent of total sales in 1959.

The industrial space effort gathered momentum in the 1960s, particularly in the years following the national commitment to put men on the moon "within the decade." The lunar program, termed by one publication "a near miracle of engineering and production," taxed contractors' capabilities to their limits. In addition, the industry developed and built, for both NASA and the military services, a variety of increasingly complex, unmanned space systems, each of them technologically demanding.

Undoubtedly, the space program was the dominant influence in history's most explosive decade of technological advance. There were two primary contributing factors: breadth and acceleration. The breadth of the program required continual probing of new research frontiers, not simply in aerospace areas but across the spectrum of almost every scientific and technological discipline. The acceleration of effort imposed by the lunar-landing timetable necessitated a *forcing* of technology, compressing into one decade the normal advance of several.

While carrying out its space assignments, the industry continued to move forward on its other fronts. Military aircraft top speeds moved from the Mach 2 to the Mach 3 level. A new breed of airliner, the wide-body or advanced-technology jet, entered production. Missiles progressed through second, third, and fourth generations. With each increment of progress, the industry built a broader base from which to proceed to new levels, but each step of gain was possible only through greater and greater accent on research and development. A quarter century of transition can be summed up in the statement that aerospace has changed from a production-oriented industry to a research-and-development-oriented industry.

Then and Now

The extent of the industry's transformation is best illustrated by a few 1945–1970 comparisons of some major facets of the industry's operation.

• **Product Line.** Except for a few primitive missile experiments, the 1945 aircraft industry's output consisted entirely of aircraft, engines, and components. Today, the major portion of the industry's sales—including research and development contracts—still comes from aircraft work, but it has declined dramatically as a percentage of the total. Aircraft accounted for fifty-five percent of sales in 1969; thus, almost half of the industry's sales involve products that did not exist twenty-five years ago.

Commercial aircraft production has grown substantially. In the immediate postwar years, commercial sales ran from ten to twelve percent of the total, but only because military production was at the nadir. During the Korean years, commercial volume dipped to five percent, but it began to rise in 1956 when output in terms of units outstripped military plane manufacture for the first time. Dollar value of commercial production was still low in that year—8.5 percent of the total—because most of the output was in lower-priced general-aviation planes.

Deliveries of general-aviation aircraft have mounted steadily since 1956. Turbine-powered airliners had an even greater impact on the military/commercial sales ratio. By 1960, commercial dollar volume had climbed to 12.5 percent of total sales, and last year it fell just short of twenty percent.

In 1969, the industry built close to 12,500 general-aviation planes and about 500 jetliners, which compares numerically with about 4,000 military aircraft. Jetliner backlog at the end of the year was well over $8 billion, most of it in orders for the new wide-bodied jets. Of trade-balance importance to the nation was the fact that $2.7 billion of the backlog represented orders from foreign airlines.

The missile effort currently generates 18.5 percent of the total sales, while space equipment and research generate more than sixteen percent. The remainder, more than ten percent, comes from nonaerospace products and services, an area that has become increasingly significant over the past several years. These latter sales stemmed from the broad technological capability built up by the industry, particularly in the last decade, as it carried out its multiple governmental responsibilities. The acquired know-how has found wide applicability in such fields as civil uses of nuclear energy, marine sciences, water desalinization, crime control, urban transportation, and pollution control.

The product line of the individual company has changed appreciably from the years of World War II, when a firm concentrated on one type of product. The switch had its origins in the mid-1950s with the introduction of guided missiles and the growing complexity of aircraft, which demanded an array of new systems. Production capability for many of these systems did not exist, so manufacturers who had long been one-product firms began to branch out into guidance, propulsion, and other areas of specialization. Most major manufacturers today are organized on a multiproduct, multidivisional basis.

• **Employment.** It is an interesting fact that employment in the aerospace industry at the beginning of 1970, at approximately 1,350,000, coincided almost exactly with peak employment of the aircraft industry in World War II. Numbers, however, are the only similarity.

In 1943–44, eight out of every ten employees were production workers, many of them in the low-skill

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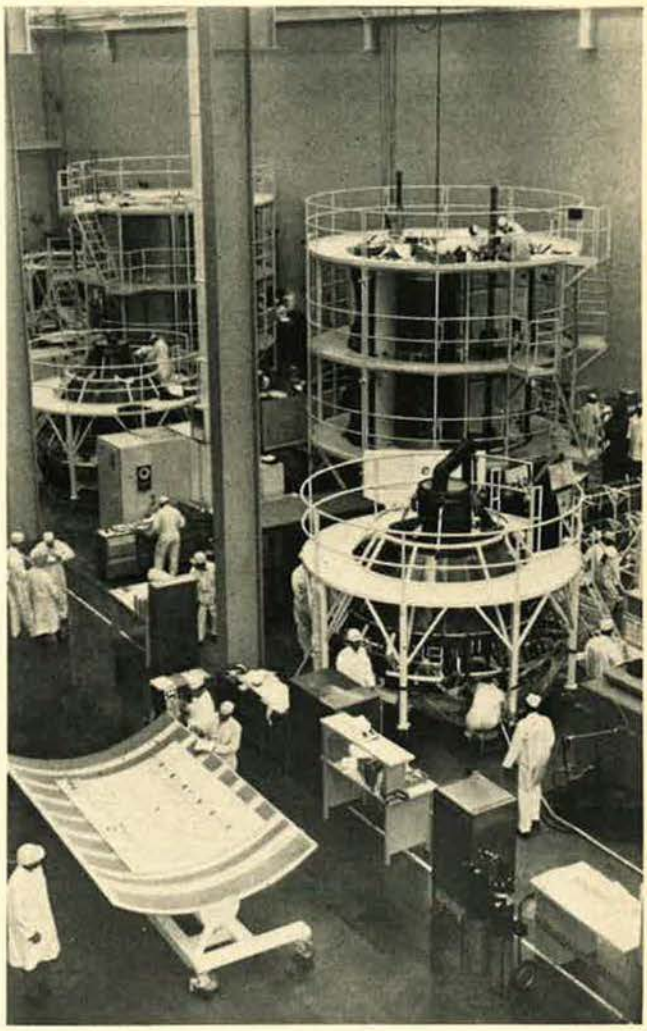


Systems reliability advanced by orders of magnitude as the space age matured. Here, an Apollo command module is assembled in one of the "clean rooms" at the North American plant.

Electronics, a World War II infant, became a key factor in the aerospace world. Spurred by a continuing threat, postwar technology started at high speed, then increased its pace. This BMEWS site at Thule AB is one of its greatest achievements.

categories. Only one in fifty was a scientist or engineer. Today, production workers make up only half of the total work force, and the average skill level is appreciably higher than it was in the war years. The proportion of scientists and engineers has climbed to sixteen percent, technicians to six percent.

• **Manufacturing Methods.** World War II was what manufacturing people call the "tin-bending era." Performance requirements of the day permitted relatively simple construction out of aluminum, which in some cases could be cut by a pair of shears. Manufacture of today's aircraft admits of no such simplicity; modern planes, particularly supersonic craft, need stronger structures and better skins for protection from their operational environment. Hence, aluminum has given way to new materials.

In wide use is titanium, a metal that is stronger than aluminum yet affords a weight saving. But titanium is a superhard material, extremely difficult to drill, weld, and forge, and, of course, it is more expensive. Now coming into production usage are the new composite materials, compounds of very tough fibers embedded in plastic matrices. At the same strength, composites offer twenty to forty percent weight savings over titanium, a very important factor in the continuing demand for greater performance. But, as did titanium, they pose a new set of problems, and their wider usage requires extensive research in manufacturing methods.

New materials dictate changes in plant machinery. The welder of World War II would not even recognize his modern counterpart, the multimillion-dollar automatic electron-beam welder. Rosie the Riveter's job is handled by computer-directed or numerically controlled machines, as are a number of other manufacturing processes.

In the constant quest for greater production efficiency, the industry is taking numerical control a step further. Now in development is CAM (for Computer Aided Manufacturing), a completely automated manufacturing facility that could handle automatically almost every step of the fabrication process, from design through inspection of finished parts. It will be enormously expensive to develop and place in operation, but for the long run it offers tremendous increases in productivity as well as large-scale dollar savings.

• **Procurement.** Prior to World War II, practically all defense contracts were awarded, as required by law, through formal advertising procedures, a method effective in its proper arena—where procurement involves standard, low-technology items and where complete and realistic specifications can be cited, permitting bidder selection on the basis of price alone. Despite the evolution of Department of Defense requirements from "off-the-shelf" items to highly complex systems, purchasing by advertisement and bid remains to this day the only procurement method formally recognized in the Armed Services Procurement Act.

The inference is that the advertising method is universally applicable and is the "one best way," but it clearly is impracticable in cases where the item being procured is an extremely complex defense system demanding the utmost in the contractor's managerial competence, technical skills, and elaborate facilities. Accordingly, during World War II, the military services were granted exceptions, allowing them to negotiate contracts with industrial firms selected for their demonstrated capabilities. Aerospace procurement by negotiation has been continued, in cases where the advertising approach is unrealistic, throughout the postwar quarter century. There has, however, been a significant swing in the type of contract awarded aerospace manufacturers.

In World War II, and for most of the quarter century, the primary emphasis in government/industry

contracting was on the cost-plus-fixed-fee contract, in which the government absorbed the costs and the manufacturer received a fee for the work involved. In the early 1960s, the emphasis shifted toward the use of a type of contract under which the manufacturer was required to quote a fixed price for major development/production projects, and the fee earned depended upon meeting the fixed price. Due to the many technical and pricing unknowns in highly complex programs that might take five to eight years to carry out, this proved to be an inappropriate procurement technique. In effect, it transferred an inordinate risk from government to industry.

Recently, the pendulum took another swing with the adoption by the Department of Defense of new rules to correct the inequities of fixed-price contracting. The fixed-price contract will still be employed where practicable, but, in general, the type of contract will be tailored to the risk involved.

• **Finance.** If there is one thing that has remained relatively constant throughout the quarter century, it is the industry's profit level, traditionally the lowest among all manufacturing industries. Although the reasons for low profits have varied with changing times, earnings as a percentage of sales have ranged from 1.4 to 3.2 percent. Last year's 3.0 percent compares with the 4.6 percent average for all manufacturing industries.

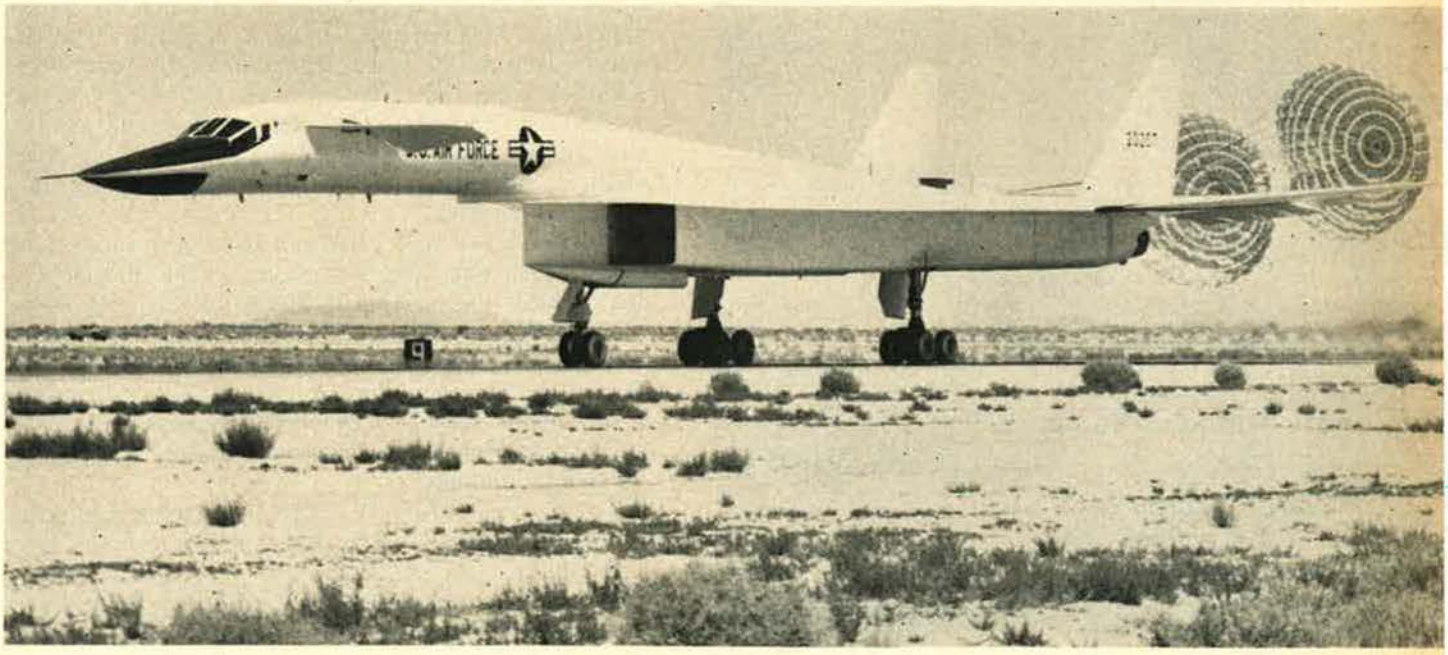
Explosive technological progress, with its attendant increases in complexity, has had an influence on profits. The dollar-volume magnitude of major programs requires large-scale financing at high interest rates. Facilities turnover has increased enormously; where an old-type aircraft plant could be used for many years despite model changes, a modern facility may become obsolete within the span of one project. Intense competition for fewer and fewer programs drives down contractors' bids. Compounding all these influences are the government's over-stringent contracting procedures and, in recent years, disallowances of many costs which the industry regards as reasonable and necessary.

All of these factors similarly influence the contractor's risk. To remain competitive, a company must invest more of its earnings in facilities; the industry total in 1969 was $800 million. The detailed effort that goes into a competitive proposal for a major system may cost a company tens of millions of dollars. And even a successful bid is a gamble rather than an assured profit. The extraordinary risks of government production have forced manufacturers to probe new areas and diversify their product lines, and some companies have even decided that they can no longer afford to work for the government.

The Technological Base

A quarter century of aerospace gain has paid the nation a valuable dividend in an immeasurably broadened technological base that represents the loftiest plateau of advancement ever attained by man. The know-how acquired is not only technical; it embraces the wealth of managerial experience developed in the course of directing complex programs. Nor is it just aerospace lore, because the extraordinary performance dictates of defense and space goals have spurred research on a hundred separate fronts.

This reservoir of know-how can be tapped to help solve many of the nation's—and the world's—most-pressing social and economic problems: air and water pollution control, waste disposal, urban transportation, crime control, food supply, housing, and education. Technology alone cannot remedy these matters of vital concern; the solutions must originate in real public determination, backed by governmental organization of the attack. But, to the extent that technology can contribute, twenty-five years of revolutionary aerospace progress have provided the capability.—END



The B-70 program challenged industry in every area of high-speed bomber operations. Although the program was canceled after only two aircraft had been produced, it contributed significantly to the advancing technology of supersonic flights.

The Air Force and Space

BY WILLIAM LEAVITT

Senior Editor/Science and Education

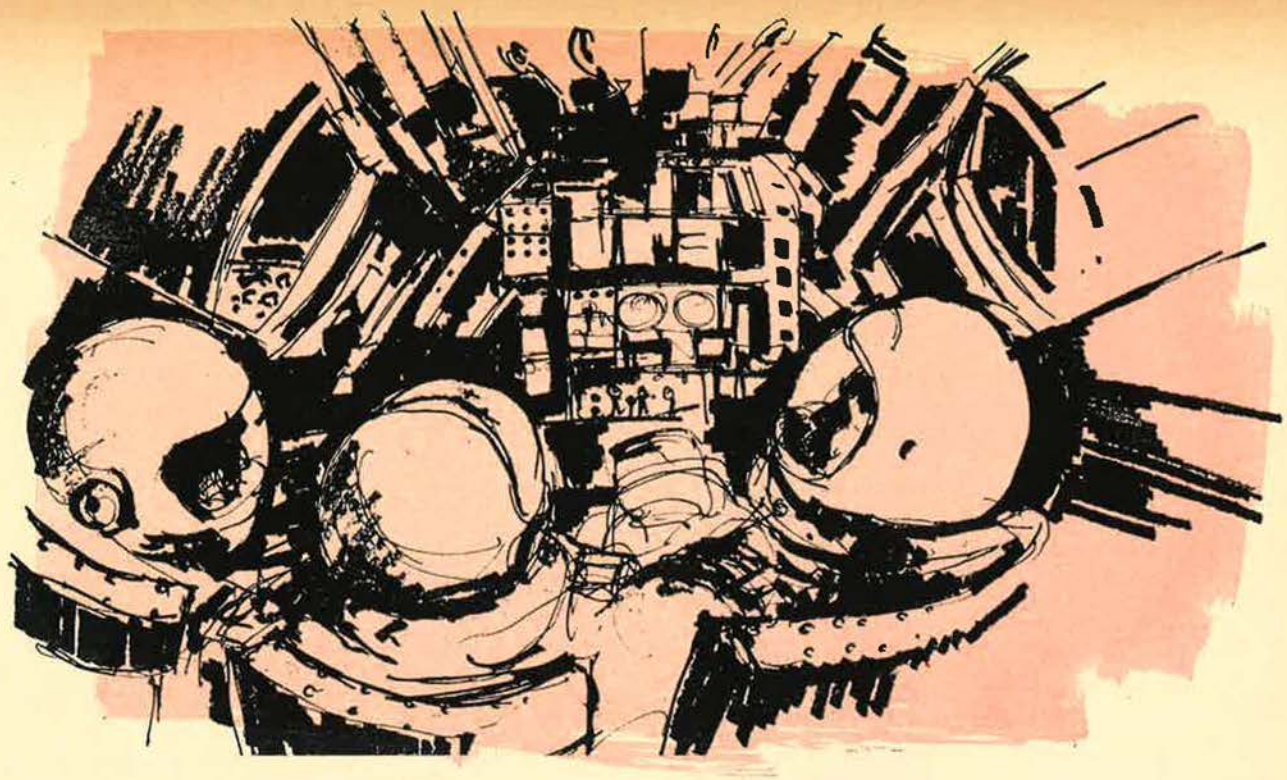
A centuries-old dream fulfilled: Men walk on the moon July 20, 1969, while on earth millions watch the feat on video screens.

ON May 2, 1946, the Air Force's fledgling "think tank," Project RAND, then housed in Douglas Aircraft facilities in Santa Monica, Calif., produced its first Air Force-requested study. The study carried the title "Preliminary Design of an Experimental World-Circling Spaceship." The report was mostly hardware-oriented. But its authors, in some comments projecting social and political implications of such a project, showed significant insight:

"The achievement of the satellite craft by the United States," they predicted, "would inflame the imagination of mankind, and would probably produce repercussions in the world comparable to the explosion of the atomic bomb." A companion report, dated October 18, 1946, declared, "Since mastery of the elements is a reliable index of material progress, the nation which first makes significant achievements in space travel will be acknowledged as the world leader in both military and scientific techniques. To visualize the impact in the world, one can imagine the consternation and admiration that would be felt here if the US were to discover suddenly that some other nation had already put up a successful satellite."

The RAND people could not have been more right. Their predictions were borne out, to the massive embarrassment of the United States, eleven years later, when it was the Soviet Union that launched the first man-made satellite into orbit around the earth. The Soviet "first" need not have happened. Why it happened is a complex story that can probably never be told in its entirety. But it is a chronicle that can be traced in its general outlines.

In the quarter of a century that has passed since the RAND report, enormous technological strides have been made. And in the thirteen years since Sputnik, what had been considered the fantasy of space travel has become reality. Already man has walked the surface of the moon. Later in this decade or early in the next, there will be operational space stations,



both American and Russian, in which highly trained crews of space engineers and scientists will perform significant observational tasks in orbit. As the years go by, man will explore the moon in considerable detail, tramping its surface, overflying its wastes in rocket craft, and observing man's neighbor world from lunar orbit. There will be lunar bases, American, Soviet, perhaps even international. And eventually, unless the experience of coming years reveals some presently unknown impediment to further-out manned excursions, men will travel in spaceships to Mars and land on that planet. The cost will be high and the direct economic returns difficult to calculate. But the knowledge attained of the cosmos will be priceless.

The manned aspect of spaceflight, as dramatic as it has been, is in many ways dwarfed by the achievements on the *unmanned* side. For up to now, manned spaceflight has primarily been by way of dramatic demonstrations. Unmanned astronautics, almost from the start, has been *productive*, not only in the scientific sense (the discovery of the radiation belts around the earth, among many other revelations about "empty space") but also in terms of usable spaceborne weather observation, communications, and—an achievement of monumental importance in a world weary of war—strategic reconnaissance. It can fairly be said that the promise of unmanned space technology, the future yield of robot spacecraft coursing through the void, is potentially enormous. As the reliability of space hardware increases, we can expect to see, as products of space technology, really long-range weather forecasting, air and sea navigation, extensive use of communications satellites for regional and, possibly, global educational purposes, the relay of huge amounts of computerized data of the business world, and large-scale survey of earth resources in a world threatened by despoilment at the hands of man. In the military field, we may expect even more complex and useful spaceborne strategic reconnaissance, plus missile-attack warning satellites, all of them contributing to the world's hope for viable conflict control.

Beyond flight itself, whether unmanned or manned, there are the less tangible, but in the long run equally important, *influences on earth*, of space technology. Space technology has not only placed great new demands for precision on American, Soviet, European, and Asian industry. But also the space revolution has had a major impact on education, particularly in the United States. Sputnik set off a spate of public questioning of the validity of the American educational system that thirteen years later is still having its effects. Although the words and the music have changed—"relevance" is the buzz-word today—the main question is still being asked: Is American education preparing children for a complex technological age in which science and technology need to be understood so that they may be properly harnessed for the good and safety of mankind? The question applies in suburbia, as well as the ghettos.

The earthbound effects of the advance into space have included, too, no less than the creation, here and in the Soviet Union, of vast new industries, built on the foundation of the aviation industries that had existed previously, but different in so many ways from their antecedents as to qualify for consideration as something very new in the world of work. This industry, as it has evolved, sometimes painfully and at great expense, represents what, for lack of a better term, might be called a group marriage of the arts of electronics, propulsion chemistry, computerology, nuclear physics, guidance, optics, materials—to mention only a few of the skills that have been combined in order to build the boosters and spacecraft in the hundreds that have been launched into space since 1957.

The aerospace industry, which didn't even have a name a few short years ago, has become, certainly in

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Rocket genius Robert Goddard, unsung in his own time, helped lay foundations of the space age but didn't live to see it.

this country, a major economic force, employing hundreds of thousands of people of various skill levels. Through its "multiplier effects," the economists' term for the ancillary enterprises—the supermarkets, the shoe repair shops, the restaurants, and the like that have crowded around the space installations to serve the technologists and production people of the aerospace industry—it has created a sizable amount of new wealth. In the years since Sputnik, in this country, whole communities have been transformed economically and politically by the space enterprise. They have boomed, and now many slump, as a measure of the economic health of the industry.

Roots of the Space Age

All this is recent history. It happened, almost literally, yesterday. But the space era, which we have tended to date from Sputnik and the American response to that shock of shocks, has historical roots that go back a good deal further in time: American roots, Russian roots, German roots, and British and French roots.

For every dream there is a dreamer. And, for such a vast dream as man's flight into space, there was an army of dreamers. Some of them were hard-headed engineers and theoreticians: America's Robert Goddard, Russia's Konstantin Tsiolkovsky, Germany's Hermann Oberth, Walter Dornberger, and Wernher von Braun. Others were far-seeing physicians like Hubertus Strughold, the transplanted German who, after World War II, settled in at the Air Force's School of Aviation Medicine at Randolph AFB, Tex., and, on a shoestring, in 1949 established the Air Force Department of Space Medicine, in the conviction that someday men would indeed travel in space and that medical preparations needed to be made.

All these and many others saw the potential of rocketry. The Germans did it most dramatically by building and launching the V-2s, the world's first ballistic missiles, against England in the last, desperate days of World War II.

There were others too, the imaginers, the writers of science fiction like Britain's H. G. Wells and France's Jules Verne. In exciting novels that thrilled generations of readers earlier in this century, they asked the question: What if? There were others, those who combined their artistic skills and scientific training in their writings to come up, as did the remarkable science-fiction master, Britain's Arthur C. Clarke, with feasible proposals for space technology far ahead of their time. It was in 1945 that Mr. Clarke proposed a viable system of communications satellites. It was an idea that was hard to patent at the time but a concept that he has, to his delight, lived to see become reality. As a leading proponent of space technology, it is Arthur C. Clarke who most eloquently and persuasively advocates space technology as a kind of positive substitute for war, as an enterprise that in the future can harness the energies of men and nations in a nonaggressive and international mode.

The roots of the space age, which has blossomed so spectacularly since 1957, were delicate indeed. Despite what they could show by way of the practicability of rocket propulsion, the pioneers like Goddard in the US and his counterparts in Europe received little support in their own countries, although they appear to have kept track of each other's work. Goddard died in 1945, a disillusioned man, at just about the time the first real stirrings as to the potential of rocketry for military purposes were beginning here. Before and during World War II, Goddard's rocketry studies and demonstrations had been closely analyzed by the band of Germans at Peenumünde, led by General Walter

Now a top US space planner with NASA, German-born Wernher von Braun was on the World War II team that built the rocket weapons Germany hoped would stave off defeat. After World War II, working for the US, von Braun fought hard for establishment of an American satellite program.

Dornberger and Wernher von Braun who, with little support from Hitler, had tried to reverse the inevitable defeat of Germany with the first real space-traveling weapons, the V-2s.

Postwar Rocketry

It was only after the war, with Europe in ashes, America triumphant, and the Soviets battered but victorious, that slowly but surely the space idea began to germinate. And even then, to be accurate, it was not so much a *space* idea as a rocketry idea, a conviction that military purposes could be served, as they had been in Germany, by rocket weapons. Out of such ruminations and small beginnings, assisted in the United States by the group of German scientists collected in shattered Germany after the war and brought to this country, developed the US Army and Air Force ballistic missile programs. These programs were lineal descendants of the Nazi V-weapon efforts but were heavily bolstered by American technology of the postwar period. The "Chinese copies" of old German V-weaponry, tested by the US military on western deserts after the war, showed the way to the Thors, Atlases, Titans, and Saturns of the future.

These small but important movements were occurring in the late 1940s. World War II was receding into the past. But already the cold war had begun, and the Korean War, which led to US rearmament, was but a few years in the future. Although most of the US rocketry effort of the early postwar years was in terms of ballistic weapon development, there were those who, even as they worked on the weapons, continued to dream of manned spaceflight and earth satellites. Among them was Wernher von Braun, then working for the US Army. In 1952 and 1953, with other space enthusiasts, he put his name to an imaginative series of feature articles in *Collier's* magazine, on earth satellites, space stations, and manned flights to the moon and Mars.

By the early 1950s, as has been recorded on these pages many times, prescient voices in the US Air Force were urging a top-priority ballistic missile program. Despite the fact that the intercontinental ballistic missile had been pooh-poohed by such scientific luminaries as Dr. Vannevar Bush, who had been chief marshal of the World War II US scientific mobilization, the Air Force missiles advocates, led by the Air Force Assistant Secretary for Research and Development, Trevor Gardner, and then-Col. Bernard A. Schriever, were able to persuade the Eisenhower Administration of the need for what became the Air Force ICBM effort. These men, and many others, battling resistance to new ideas within the Air Force itself, were able to convince the decision-makers that the Soviet Union was seriously engaged in ballistic missile development and that, for our own safety, the US also had to commit itself to an ICBM effort. Thus, after earlier on-and-off starts, was the Air Force ballistic missile program born.

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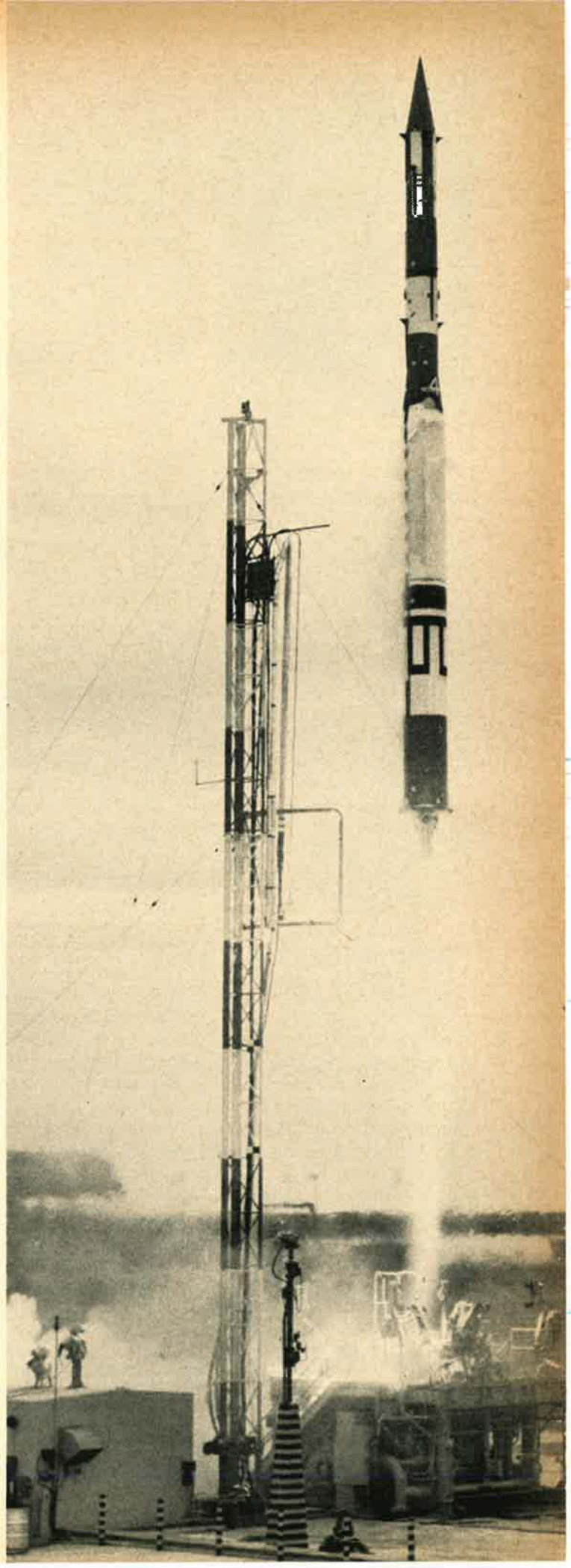

After a disastrous debut, the Vanguard satellite effort, designed for the US IGY program, finally succeeded. But the Russians had already beaten us with Sputnik.

An Air Force officer who risked his career by battling for an Air Force ballistic missile program, B. A. Schriever rose to four-star status and headed the Air Force Systems Command after directing the multibillion-dollar USAF missile program of the 1950s. USAF missilery provided space boosters once space got the green light.

Out of that program came the rockets that later became workhorse boosters for the US space program. While the Air Force ballistic missile program proceeded, so did the Army's, spurred by von Braun, Army missile general John Medaris, and their corps of rocket experts at the Army Ballistic Missile Agency at Huntsville, Ala.

There was a peculiar irony in their triumph that would come to light only later, after the Soviet Sputnik. One of the technical bars to ICBMs had originally been the great bulk of nuclear weapons. It was not really until technical breakthroughs reduced that bulk that the ICBM was viewed as practical. The Russians, in *their* missile effort, had apparently not been concerned with this problem and therefore worked away at much more powerful boosters for their missile weapons. This gave them the early space-age lead in the satellite-launching business, a lead that was overtaken only with great difficulty and at sizable cost by the United States.

International Geophysical Year

Yet even then, with Sputnik only a very few years in the future, space per se was still of minimal interest and indeed unmentionable in the Pentagon. An odd and unexpected turn of events changed everything and led to the real beginning of the space age. The world scientific community deserves the credit. For it was the scientific community, living as it does in the hope that peaceful cooperation in science can help bring international collaboration on broader fronts, that persuaded governments, including the US and Soviet governments, to take part in what would be called the International Geophysical Year—IGY for short. In 1955, the US announced that, as part of its contribution to the IGY, it would launch a small scientific earth satellite, the later-to-be-maligned Vanguard, using a Navy-developed booster. IGY was to run from July 1, 1957, to December 31, 1958. Its purpose was to encourage a vast international effort of research on the earth and the atmosphere, with scientists around the world contributing what they could by way of experimental studies.

As it turned out, the Soviets themselves were quietly proceeding with a considerably more impressive IGY earth-satellite program than the US was contemplating. They beat the US to the punch, with Sputnik, on October 4, 1957, and the world was never quite the same again. The history of the US decision to proceed with the miniscule Vanguard—the first of which failed *after* the Soviet Sputnik had startled the world—is still being gone over. The irony is that in 1957 the US *did* have the skills and hardware to be first into space. Either the Army's von Braun missile team in Alabama or the Air Force's ballistic missile group, headed by General Schriever on the West Coast, could have put a satellite into orbit, had they been given the assignment. Before Sputnik, von Braun had been warning his colleagues in the missile and space business that, unless the government gave the IGY satellite project high priority and used the Army's available booster power, the Russians would mortify the US by being first.

During the same pre-Sputnik period, the Air Force's General Schriever said publicly that the existing Air Force missile program was capable of providing the hardware for earth satellites. Longtime readers of this magazine will recall an article by General Schriever ("The Battle for Space Superiority") which appeared in the April 1957 issue of AF/SD. The article was based on remarks that the General had made earlier in the year at a Convair-sponsored astronautics symposium in San Diego, Calif. Having noted that the "compelling motive for the development of space technology is the requirement for national defense," the General went on to say that "the same propulsive unit that boosts a heavy nose-cone warhead to 25,000 ft/sec, could boost a somewhat lighter body to the escape velocity of 35,000 ft/sec, or to an orbital path around the earth.

"Using the same number of stages, the ratio of thrust to weight would be greater by using a lighter payload, and higher accelerations and velocities could be reached before burnout," he went on.

"Or with our present state of knowledge, it would be relatively easy to add another stage. . . . The same guidance system that enables the warhead of a ballistic missile to reach its target within a permissible accuracy would also be sufficiently accurate to hit a target much smaller than the moon. Or, if we are talking about a circular orbit around the earth, errors in guidance could be easily observed over a period of time

Interservice rivalries, particularly between the Air Force and Army, both trying for the missile mission in the 1950s, set back the US space program and helped set the stage for the unwise decision to build a special "civilian" booster for the Vanguard effort, according to the late Dr. Clifford C. Furnas.

and corrected, and the satellite kept on an accurate orbit. . . ."

In any case, the existing military ballistic missile capabilities of the Air Force *and* Army were not used for the US IGY satellite venture, and a heavy price was paid in American prestige. The story of why the military capabilities were not used is fascinating and illustrative of how political circumstances can lead to mistaken judgments. New light on the pre-Sputnik period has recently been shed by the posthumous publication of an account of the affair by the late Dr. Clifford C. Furnas, who from 1955 to 1957 was Assistant Secretary of Defense for Research and Development. Dr. Furnas' account appears in the Spring 1970 issue of *Research Trends,* the publication of the Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. Dr. Furnas was one of the founders of the laboratory.

Dr. Furnas makes several points in his account. He says that as early as 1955 US intelligence had indicated a significant satellite effort by the Soviets. He says that the Army was making a strong pitch for the IGY satellite assignment. And he says that the Air Force, while capable of the assignment and in possession of the biggest booster (Atlas), was preoccupied with its high-priority missile program. He says, too, that the Army had a good chance of winning the assignment, but that an extraneous matter, the embarrassment of the outgoing Air Force Secretary, Harold Talbott, over his use of official stationery for private business, led to a crucial moment of inattention by the man about to succeed Talbott, Donald Quarles. This in turn created circumstances in which the Army's bid for the satellite job was outvoted by the Navy and the Air Force.

The late Dr. Furnas' account, which may well be disputed by others, illuminates the moods and conflicts of the period. The Air Force and Army in the mid-1950s were locked in a struggle over the missile mission. At the same time, there *were* people in both services who were thinking in terms of *both* missiles and space operations. The Eisenhower Administration was remiss in not settling the missile-mission question definitively, and it was not until Defense Secretary Charles Wilson was succeeded by Neil McElroy that the Air Force won its struggle with the Army. The interservice battle was repeated after Sputnik, this time over the military space mission. And *that* struggle took several years. It was not until 1961 that the military space-mission question would be decided in favor of the Air Force. That, getting ahead of ourselves in this account, was by order of President Kennedy's Defense Secretary, Robert S. McNamara, who assigned military space-mission primacy to USAF while at the same time allowing for Army and Navy military space-system developments for those services' particular purposes.

In the pre-Sputnik period, not only were the Air Force and Army vying for the missile mission, a rivalry that was to cost dearly. There was also the policy error rooted in the scientific community's insistence on a *nonmilitary* cast to the US participation in the IGY program. This, combined with Air Force-Army rivalries, led to the decision, as Dr. Furnas points out, to develop, under Navy management, unnecessarily and, as it turned out, not very successfully, a new "civilian" booster for the US IGY Vanguard satellite. That was double-talk since the military *had* to be involved. It was also silly to have decided to develop a new booster for Vanguard when boosters, available from the Army or Air Force, could have done the job.

At any rate, the mistake was rectified, dramatically, but too late to save the country the embarrassment of the Soviet "first." After Sputnik, the Army and von Braun were given a go-ahead by Defense Secretary Neil McElroy to launch what became known as US Explorer I, on January 31, 1958.

The Post-Sputnik Shock

The rest is more recent history. The post-Sputnik political shock led to public recrimination and a set of major hearings on Capitol Hill. The legislative star of the hearings was then-Senate Majority Leader Lyndon Johnson. The scope of the Senate hearings was broad and covered everything from the confused missile/space organization in the Pentagon to the question of whether some superagency should be created to mount an American space thrust. (Meanwhile, a temporary device for coordinating the military's space capabilities, mainly Air Force and Army, the Advanced Research Projects Agency—ARPA—was set up, and plans were begun to devise unmanned shots at the moon by Schriever's and von Braun's teams.)

Congress decided that, rather than invent a new superagency to run the US space program to come, the old and respected National Advisory Committee for Aeronautics (NACA), which for years had done applied aeronautical research for the military services and industry, would be revamped, renamed, and recast as a new and expanded civilian agency to direct a space program for the United States. The exact nature of that space program was scarcely formulated at the time. Under the terms of the National Aeronautics and Space Act of 1958, NACA became the National Aeronautics and Space Administration and was given the major portion of the space task that would evolve. But at the same time, prudent legislators reserved to the Department of Defense the right to operate space programs "peculiarly associated with the national security." The concept of civilian supremacy was under-

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As a senator, Lyndon B. Johnson led the Capitol Hill investigation after Sputnik of the reasons for the stunning propaganda defeat suffered by the US. As President, LBJ pushed the Apollo moon-landing effort begun by his predecessor, the assassinated John F. Kennedy.

—Wide World Photos

scored in the Space Act, and the approach was generally accepted by the press and public.

But creating a new agency from an old one and developing a space program that transcended the US involvement with the IGY was easier said than done. The Eisenhower Administration was less than enthusiastic about space as a national goal, and only a public howl that "something be done" to recoup US prestige was enough to get the Eisenhower Administration to commit itself, in early 1959, to an American effort to orbit a man. The program was to be known as Project Mercury. Project Mercury itself evolved largely from the Man in Space Soonest (MISS) program under study in the Air Force (*see "Blueprint for Tomorrow's Spacecrews," by William Leavitt,* AIR FORCE/SPACE DIGEST, *May 1958*), with valuable additional input from the space task force assembled by the new NASA agency at Langley AFB, Va., a group that eventually established itself at what was to become the NASA Manned Spacecraft Center at Houston, Tex. Events and policies piled up. The Eisenhower Administration was headed into its last days. Its swan-song space report was quite conservative in tone as to the question of further excursions into space beyond the manned orbital program to which it had already committed the country.

But there was to be no turning back. The aggressive Democratic challenger in the 1960 presidential race, John F. Kennedy, made an issue of US prestige and added a claim that, beyond the space embarrassment, this country was behind the Russians in strategic missile development. The latter claim, after Mr. Kennedy's entry into office, was quietly buried, although to this day it is still argued.

Once in the presidency, Mr. Kennedy, at the outset, was rather conservative about starting any new large-scale US space programs. About all he did before April 1961 was expand the funding for the Saturn booster program, which was then in danger of collapsing. It was not until after the Bay of Pigs debacle in Cuba and the Soviet launching of Yuri Gagarin into orbit on April 12, 1961, that the new President became alarmed enough to ask his advisers for plans for major programs. But when they came, the plans were truly major, even startling. In May of that year Mr. Kennedy asked Congress to commit the country to a NASA-managed manned flight to the moon before 1970. The commitment was made with nary an argument.

Later that year, in December, the civilian space agency announced the Gemini two-man orbital program as a follow-on to the Mercury program, even though no American astronaut had yet been orbited and would not be until February 20, 1962, when John

Persuaded of the danger presented to the US by the Soviet ballistic missile program, President Eisenhower authorized a top-priority US program to develop ICBMs. In late 1957, Sputnik mortified his Administration and Eisenhower authorized a modest US space effort. But to the last, he was never a space enthusiast.

As modest a feat as it may seem today, the ride atop a Redstone rocket, in a sub-orbital flight, by Astronaut Alan Shepard in May 1961, boosted American morale. It happened after Soviet spaceman Gagarin had orbited the earth but symbolized US intent to catch up with and, if possible, to overtake the Russians.

After making a dramatic issue of Russian missile and space prowess during his aggressive bid for the presidency, John F. Kennedy was fairly conservative about US space commitments—until the flight of Russia's Yuri Gagarin, first human into orbit. Then JFK proclaimed the US intent to land men on the moon before 1970.

On February 20, 1962, Astronaut John Glenn became the first American into orbit. The successful mission further boosted the national morale and was the first of a series of US manned orbital flights in the Mercury and then the Gemini programs. Glenn later developed an interest in politics and ran for public office in the state of Ohio.

Russia's Yuri Gagarin and friends: At the 1965 Paris Air Show, national rivalries were forgotten for a time as Gagarin, seated left, greeted US Astronauts Edward White, third from right, and James McDivitt, as Vice President Hubert Humphrey and French Premier, now President, Georges Pompidou, second from right, flashed smiles. Gagarin was later to die in a plane crash, and White was to lose his life in a tragic fire on the pad at Cape Kennedy.

Glenn became the first American to achieve orbital flight. The only US manned flight achievements in 1961 were the brief May 5 suborbital flight of Alan Shepard, an event that glued millions to their TV sets to watch Shepard lift off atop a Redstone rocket for a fifteen-minute-long ballistic vault downrange, followed on July 21 by Virgil "Gus" Grissom's similar flight.

Step by Step Progress

From 1961 on, the US manned spaceflight program proceeded step by step. As the years rolled by toward the moon-landing target date, Mercury was succeeded by Gemini. In flight after flight, US astronauts demonstrated (as did their Russian counterparts) human ability to survive in orbit, to work in orbit, and even to "walk" outside their spaceships, tethered to their craft. During the same decade, from small beginnings, the potential of unmanned "working" satellites, scientific probes to the moon and Mars, and military observation satellites was being demonstrated. In America, the embarrassment of Sputnik had faded. Some critics of the space effort, particularly of the moon-landing program, were asking whether the "race to the moon" was a race at all, since it appeared that the Soviets had decided not to compete.

By 1964, during the presidential contest between Democrat Johnson and Republican Goldwater, new questions arose: Was the hugely expensive moon-landing program drawing money and talent away from military space programs, and were we risking near-orbital military technological surprise by the Soviets? By then there was a sizable body of criticism of the US space effort. Some critics were asking, too, whether trying to go to the moon *before* building manned space-station capabilities in near orbit was not putting the cart before the horse. Should we not concentrate on the near-orbit space station before going to the moon? The first set of criticisms about military space was responded to by the announcement in late 1965 of US intent to proceed with an Air Force Manned Orbiting Laboratory (MOL) program. That effort was to die in 1969, several hundreds of millions of dollars later, as a concession by the Nixon Administration to economy and to antimilitary critics.

By 1966 the Apollo program was moving apace, although under increasing attack from political and social critics who insisted that needed attention to domestic problems was being sacrificed on the altar of technological efforts. Then, on January 27, 1967, disaster struck. Three astronauts—Virgil I. "Gus" Grissom, Edward White, and Roger Chaffee—were killed on the pad at Cape Kennedy, Fla., in a flash fire during a test run of an Apollo crew module. The ensuing recriminations and investigations revealed cer-

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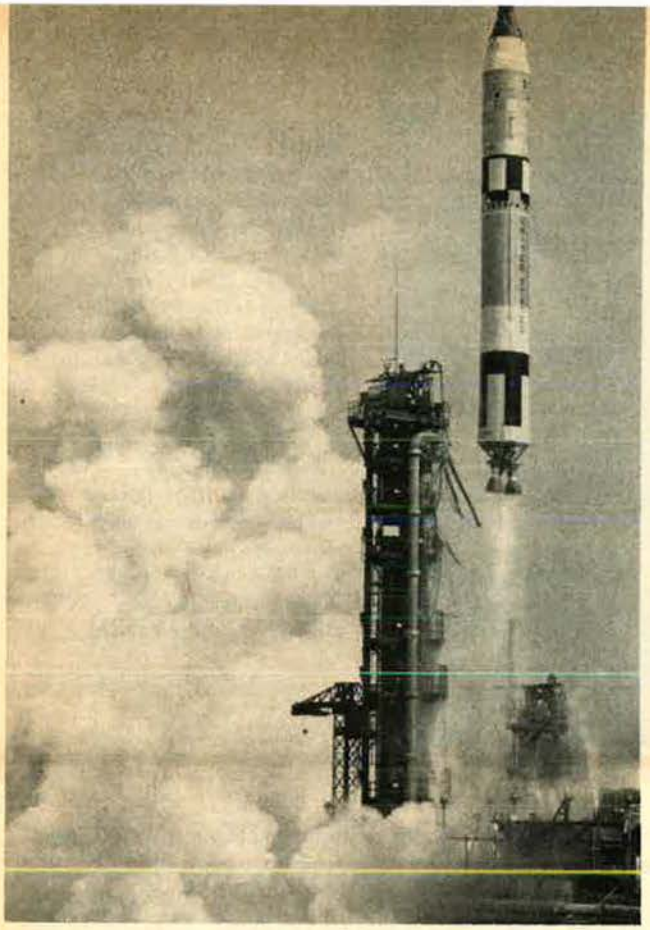
Beset by antimilitary criticism and budget pressures, President Nixon canceled the Air Force's Manned Orbiting Laboratory project in 1969, ending Air Force hopes for a manned space system of its own. However, Air Force is taking part in the NASA space-shuttle program for the 1970s.

—Wide World Photos



Sight of the sixties: With two astronauts aboard, an Air Force-developed Titan II booster, mainstay of the Gemini manned orbital spacecraft program, lifts off from Cape Kennedy.

tain management shortcomings in industry and NASA that seemed for a time enough to destroy the entire manned spaceflight program. But the pieces were manfully picked up, and before long the moon-landing effort was back on schedule. Americans circumnavigated the moon in December 1968, demonstrated the capabilities of the Apollo hardware in orbit in early 1969, and in July 1969 landed on the moon, followed in a few months by a second American crew. Disaster struck again when the third attempt, Apollo-13, was mounted. Faulty equipment caused an explosion aboard the spacecraft en route to the moon. Only a combination of incredible luck, coolness of the crew, and the skills of the flight controllers managed to bring the astronauts of Apollo-13 home safely to earth. No one is sure when the next Apollo flight will occur or how many more there will be.

Looking Ahead

Now it is 1970—twenty-five years since the end of the second world war. The impossible dream of man in space has been fulfilled. Unmanned satellites work away in the blackness hundreds and thousands of miles out. We are still at it. The Russians are still at it Western Europe is looking for ways to operate in space in cooperation with the United States while at the same time retaining some measure of technical and fiscal independence. Japan promises to become a space power. Red China has launched a satellite.

Here, while war still rages in Southeast Asia and domestic crisis has become routine, NASA and military space planners are finally bringing the space program back closer to earth. Coming are American manned space stations and a space shuttle that will carry men and supplies from earth to orbit. Coming are unmanned satellites whose complexity will dwarf the intricate hardware of today. Coming is a future the shape of which we cannot discern with precision but a future inevitably influenced by man's physical and mental leap beyond the planet he has till now called home.

The US Air Force's role in this vast effort has been, at the same time, staggering and often frustrating. Against a background of internecine rivalry among the services over the missile mission in the early 1950s, and relegated after Sputnik to a *support,* rather than dominant, role in the national space program, the Air Force has managed since 1957 to provide to NASA a major portion of the systems management and launch capability and the space-medical expertise without which the civilian agency could not have gotten off the ground. At the same time, the Air Force's own manned spaceflight programs have several times been shot down. The Man In Space effort of the 1950s, which was incorporated into Mercury, the Dyna-Soar orbital glider, and the Manned Orbiting Laboratory project of the 1960s, not to mention the unaccepted Air Force plan for a manned moon landing offered prior to the Kennedy Apollo commitment, all died. And today, on the manned spaceflight front, the Air Force is a junior but insistent partner with NASA in the projected space shuttle, campaigning for militarily useful capabilities on the craft.

But, withal, the Air Force, as prime space operator in the Defense Department since 1961, has developed a huge unmanned space program geared to strategic observation, early warning, and satellite-borne defense communications. For the most part, the Air Force's space program is based on the passive military use of unmanned spacecraft. Certainly the wild-eyed military moon-base ideas that infected some Air Force planners in the late 1950s have gone by the boards. But, at the same time, thought has to be given, and is being given, within the Air Force to the future. Active space weaponry, at least in terms of devices to counter hostile activity by others, has to be studied. Although not much is said about it these days, it is a fact that the Soviets have the devastating capability to attack the US from orbit with nuclear weapons. Counter techniques, perhaps laser weapons or other devices using exotic technology as yet unperfected, may well be needed in the future to protect the US against space-borne Pearl Harbors. What the Soviets can do now, the Chinese may be able to do the day after tomorrow—despite all the international proscriptions against the deployment of weaponry in space.

The Air Force's existing array of passive space devices—particularly the unmanned observation satellites that have been orbited since 1960—has already played a major role in the keeping of the peace in a space-age world still plagued with conflict. And in an era in which superpowers, fearful of their own strength, seem to be groping toward some sort of agreed-on standoff, for mutual protection, that role will probably enlarge during the uncertain years to come.—END

Fight erosion

Rain . . . sand . . . dust . . . ice crystals . . . weaken structures, cost thousands of dollars in maintenance of fixed and rotary wing aircraft, spacecraft and missiles, turbine blades and radomes.

An unique supersonic test apparatus for evaluating the erosive effects of rain and sand on aerospace materials at velocities up to Mach 3.0 now is available for the first time.

A significant advancement in materials research, this new installation permits testing of all types of materials under rigidly-controlled, exactly-repeatable conditions.

Erosion has become increasingly important with the advent of supersonic aircraft, missiles and space vehicles. In recent years, rainstorm erosion damage to high-performance fighter aircraft has been so severe that it has seriously affected structural integrity. Sand erosion of turbine engine and helicopter rotor blades has substantially reduced their operational life.

Under contract from the Air Force Materials Laboratory, Bell Aerospace has designed and built the largest erosion test installation of its type in the world to help find solutions to material erosion problems.

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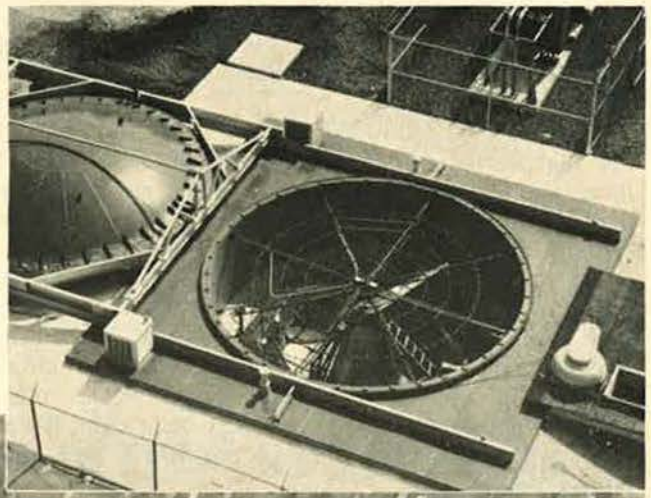
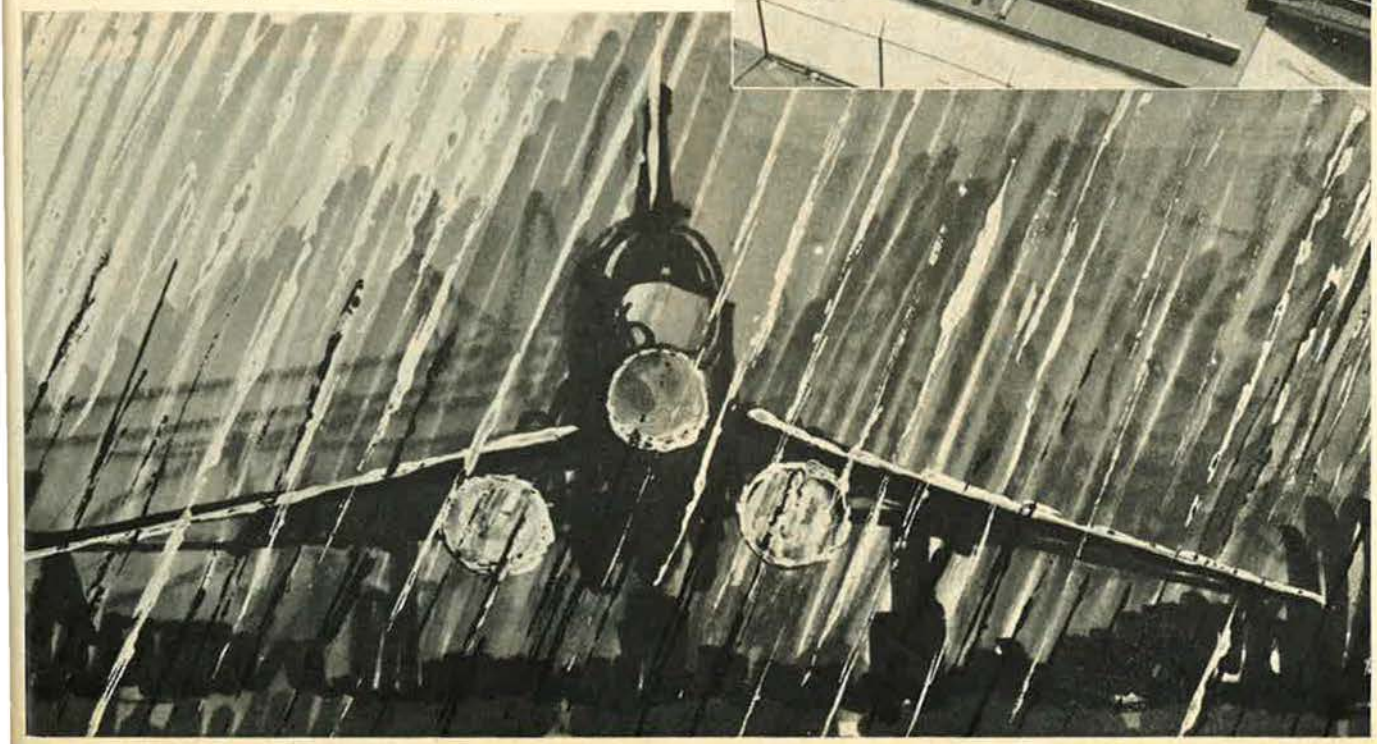
Bell has completed almost 1,500 specimen tests in rain and sand at speeds from Mach 0.66 to 3.0 including polymers, elastomers, ceramics, nucleated glasses, composites and a wide variety of steel, aluminum and titanium alloys.

AFML and Bell have made arrangements for utilization of the new apparatus by government agencies and industry. Your inquiries are invited.

The apparatus, housed in a 26-foot diameter chamber with a six-ton hatch, permits simulating flight altitude pressures. Test specimens are mounted on the tip of a 12-foot, 1,800-pound maraging steel blade which whirls at up to 3,600 rpm. Specially-designed spray nozzles produce a rain field of precisely-shaped, uniform size raindrops. A special sand injection system is included and provisions are made for future ice erosion testing.





The View from the Hill

BY CLAUDE WITZE

Senior Editor, AIR FORCE Magazine

GEN. Curtis E. LeMay likes to tell a story about the time he entertained a delegation of officials from Norway at Strategic Air Command headquarters in Omaha, Neb. His guests included the Norwegian Minister of Defense, the Deputy Minister of Defense, and the Norwegian Parliament's entire Military Affairs Committee.

They were at Offutt AFB for a single day, a busy one that started with a briefing at 8:00 a.m. At 9:30 there was a coffee break, during which an officer delivered a folder of photographs to General LeMay. The General distributed a picture to each of his guests.

They were delighted to find they had a fine aerial photo of Oslo, one so distinct they could recognize City Hall, the airport, the cathedral, the Parliament building, and many other landmarks. General LeMay stood to one side until they had everything identified and then calmly announced that they were right, it was Oslo. And, he stated, "One of our B-47s took that picture this morning."

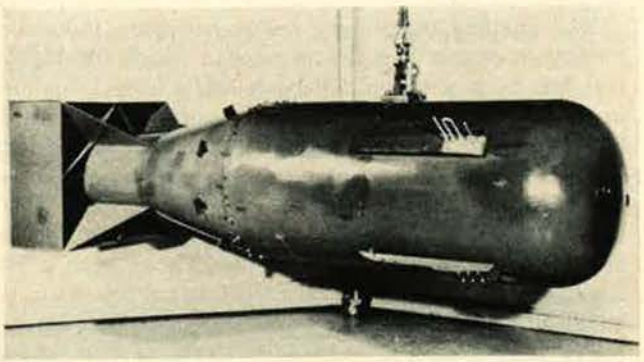
When he recounts this incident, General LeMay usually is making the point that he was able to demonstrate to the entire Military Affairs Committee of the Norwegian Parliament what SAC could do. He never was able to put on a comparable performance for the edification of equally key members of the American Congress and Executive offices. It is a common complaint, among the men with the mission, that these decision-makers do not understand the complexities and capabilities of modern weapon systems.

It is not many years ago, in fact not more than twenty-five, that a Minister of Defense or a Military Affairs Committee had little concern with the problems of science and technology. But now there are events, like the bursting of a thermonuclear bomb or the launching of a Sputnik, that demonstrate that these men have a concern with these matters. And, more important, that this concern is deeply involved with their responsibility for defense of their nation.

The aerial photo of Oslo, taken and delivered to Omaha in a matter of hours, demonstrated how profound is the impact of technology, not only on the tools of war, but on the policies and plans that the government lays down for the soldier to follow on his path. The path, hopefully, leads to peace. SAC's motto is "Peace Is Our Profession." But the path may lead to war.

The realization that a thermonuclear bomb or a package whirling in space is a political fact as well as a technological one has been grasped by our executive and legislative chieftains with painful slowness. There are signs, now that this quarter century has passed, of a dawning realization. The debate over the antiballistic missile and its potential as both a defensive weapon and a diplomatic weapon has these chieftains studying both the vulnerability of radar and the ABM's potential

When the Air Force, following a policy decision, prepared for counterinsurgency warfare, it turned to the AR-15 rifle. Here is part of the 1st Air Commando Combat Control Team.



Little Boy, believe it or not, was a bomb. It was 28 inches in diameter, 120 inches long, weighed 9,000 pounds, and fell on Hiroshima with the force of 20,000 tons of high explosives.

impact on the amiability of Russian delegates to disarmament talks in Vienna. That's progress.

The next step, it can be argued, is to convince these people that the planning must be coordinated. The technology, the military applications of that technology, and the political aspects of the posture that results from what we build, once research and development have shown what we *can* build, must be planned together.

Emphasis on Counterinsurgency

In the Administration of President John Kennedy, we put new emphasis on counterinsurgency capability. The Army got the Green Berets, the Air Force perfected its own Air Commandos. Would we still be in Vietnam today if we had put our scientific and military energies into different kinds of efforts? It is a question that exemplifies the American dilemma, because Vietnam is blamed on political policy by everyone from the campus rebels to the Senate Foreign Relations Committee. And the villainy, if there is any, may lie in the decision to exploit one technology in preference to another. The implications of such decisions must be understood if we are to avoid the kind of morass we found ourselves in in Southeast Asia.

There have been innumerable occasions, in the twenty-five years since World War II ended with a couple of atomic explosions in Japan, when the nation's experts in uniform have been hard pressed to justify a new deterrent or defensive program. In this quarter century, the United States has spent something in the neighborhood of a trillion dollars on its defense establishment, a fact that, in 1970, can lead a commentator to write loosely that "the organization of the Pentagon and the decision-making process in the Joint Chiefs work to make every service want the most expensive of all possible weapons."

The fact of the matter is that national policy went on a new path in 1945. The atomic bomb was a factor. So was the passing of Franklin D. Roosevelt, who died on April 12, 1945. It was only two weeks after that, on April 25, that delegates from the Allied powers met in San Francisco to write the United Nations Charter. We no longer were isolationist. We were committed to defend much of the non-Communist world.

Many eminent men, probably best typified by Michigan's Sen. Arthur Vandenberg, did a 180-degree turn to endorse the new policy. The basic reason for this turnaround did not originate in our own government or our armed forces. It originated in Moscow, and soon led to our first acceptance of the term "cold war" to define our effort and that of the free world to contain Soviet expansionism and deter Russia from any action that could lead to general war.

In 1970, it is easy to find someone on a podium declaring that the cold war is over and that we can put

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the bombs away, pressing on for negotiation. But it is equally easy to reply that Czechoslovakia has negotiated with Russia with results that most Americans find repulsive. And the Brezhnev Doctrine is with us, asserting that treaties are legal abstractions and that Russia has a right to intervene unilaterally by arms in "any socialist country."

Early in the period from 1945 to 1970, there were other alternatives to discuss. There was talk of preventive war, based on the general idea of beating a potential enemy to the draw, a la Dodge City. There were advocates of what was called Fortress America, which probably grew out of the prewar America First concept, a concept that would call for resurrection of the slogan "Don't Tread on Me." Another faction called for liberation of the Communist satellites as our contribution to world freedom. None of them rallied much political support.

Actually, it was technology that dictated the choice of an alternative. The United States had absolute superiority in strategic weapons. It could deliver them anywhere in the world. This situation persisted until the mid-1950s, when Soviet technology had advanced to the point where "mutual deterrence" emerged out of "deterrence."

A Divided West

Years later, Dean Acheson recalled those days for a Senate subcommittee and said the Russians always knew what they wanted—"to consolidate their sphere on a line drawn as far to the west as possible and to keep the West divided and off balance." They did not want to tangle with the North Atlantic Treaty Organization (NATO). Said Mr. Acheson:

"All of us were ready to cooperate with the Russians after the war. But they were not ready to cooperate with us. Having lived through the 1930s and having learned that war was the price democracies pay for weakness, we recognized that only the strong can be free. President Truman, General Marshall, Arthur Vandenberg, Bob Lovett, Will Clayton, and many reflective and farsighted Europeans did not have to waste time discussing whether strength was to be preferred to weakness."

Recognizing this situation, our entire political and military establishment has been embroiled, since the end of World War II, in a never-ending and crisis-laden exertion to innovate the required programs. One committee on Capitol Hill, recognizing that the size, nature, composition, and equipment of our armed forces are the products of defense policy, said the basic issues are:

1. Does our national defense policy provide proper and sufficient guidelines for decisions on the nation's strategic posture?
2. Are present forces adequate to ensure our national security?
3. Will the currently programmed forces provide adequate protection in the future?
4. Can our decision-making processes be depended upon to make the hard choices that may be necessary to meet the future threats?

It is impossible to review these twenty-five years of military issues in the political arena and conclude that any of these questions ever has been properly and affirmatively answered. Historian Samuel Huntington says that the history of military policy after 1946 "is a series of prophecies of disaster which never materialized." On the other hand, it is equally true that a number of events took place that the prophets never suggested and our present involvement in Vietnam is only one of them.

Gen. George C. Marshall, soldier and diplomat as well as administrator, was Secretary of Defense during one of our most bitter national controversies over policy. The fact that he was a retired soldier did not detract from his eminence as a civil servant.

The shaping of military policy has been influenced by Congress, but it is a rare case in which the legislature has been decisive. All basic shifts have originated in the executive branch of the government and have been endorsed by the Congress. There have been times when Congress appropriated less money than requested, but there are only a few instances in recent years where this had any effect on a specific system or on the general trend of military spending. There were a few cases in which Congress appropriated more than requested; the funds simply were not spent for the Air Force by Presidents Truman in 1949, Eisenhower in 1956, and Kennedy in 1961.

Congressional Influence

There are examples of congressional influence on policy and strategic matters. The Joint Atomic Energy Committee has an influence on nuclear weapons policy, and it helped make the H-bomb possible when that issue was being debated in 1949. Certainly Congress reacted to Sputnik and created the whole new empire of NASA. For most of the twenty-five years we are talking about, the Air Force maintained a high level of popularity on Capitol Hill, a face that was reflected in appropriation levels and strategic policy development.

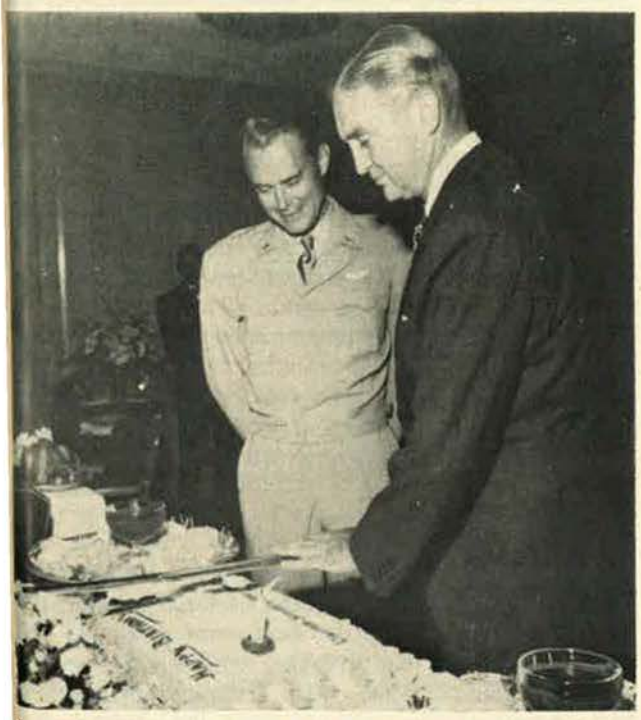
At the same time, President Truman wanted universal military training and didn't get it. Both Eisenhower and Kennedy strained to cut the Reserve and National Guard, with no success. Civil defense aroused no enthusiasm in Congress, and we hardly ever hear of it any more.

The universal military training (UMT) issue is an interesting case in point. Immediately after World War II and before the cold war had been defined, it was assumed that rapid mobilization of trained men would be required if we faced another national crisis. Presi-

dent Roosevelt had said UMT would be required, but he died before sending a message to Congress on the subject. In 1945, there were hearings on UMT by the Woodrum Committee on Postwar Military Policy, and the armed forces were joined by the State Department in endorsing the idea. The pressure was on to demobilize the veterans, and these agencies were worried for fear that Uncle Sam's guard would be lowered too far. Opponents argued that action should be at least delayed, citing what they viewed as the menace that UMT would impede efforts to ensure world peace.

The struggle went on for about four years. The House minority leader, Rep. Joseph W. Martin, Jr., of Massachusetts, actually filed a resolution in July of 1945 demanding an end to compulsory military service, arguing that it "never has prevented war" and in fact is "a further incentive to war." Other congressmen suggested a national referendum on the subject even before they knew the present war would end later in 1945. It was in October that Mr. Truman asked for a UMT law, and the House Military Affairs Committee held more hearings as the year ended. Peace was here, and the public opinion polls showed waning support for the idea.

The draft kept being extended as the UMT concept continued to get kicked around, and the pay scales for soldiers were increased. There were more hearings in 1947, the year that Dr. Karl T. Compton headed the President's Advisory Commission on Universal Military Training. This group warned that we faced "extermination" within seven years unless UMT and defense unification were enacted. A bill was reported out in the House to carry out the recommendations and to create a National Security Training Corps, but there was no action taken on it.



The date was September 17, 1948. Secretary of the Air Force Stuart Symington now a senator, cuts USAF's first birthday cake, In uniform: Gen. Hoyt S. Vandenberg, the Chief of Staff.

At this point, technology took a hand, as it has so many times. Our defense strategy was to be based on our atomic deterrent, delivered by air if the need should arise, and Mr. Truman's effort to get UMT was doomed to failure. Hearings were held by the Senate and Congress extended the draft.

If we try to focus on the impact of political debate and policy on the US Air Force, the story starts in 1947, the year the National Security Act was passed and USAF was created as a branch of the armed forces. The new law did not have a painful birth, and there was not much debate. The first draft came out of negotiations between the Secretary of the Navy, James Forrestal, and the Secretary of War, Robert P. Patterson. This was revised considerably as House and Senate committees rewrote the bills and reported them out for consideration. In the Senate there were only two days of discussion, including action on such trivia as an amendment from Sen. Joseph R. McCarthy that sought to ban any revision in the missions of naval aviation and the Marine Corps.

It was in the same year, 1947, that the part of the defense budget allocated for airpower naturally assumed new proportions. USAF wanted 1,850 new planes as a step toward its seventy-group plan. The Navy wanted a supercarrier. The President wanted a ceiling on spending. He cut the Air Force request to 932 new planes and disallowed the carrier. Congress struggled and, at one point, cut the Army-Air Force figure from $5,717 million to $5,241 million. That would have given USAF only 561 new planes. The Senate, warned of a threat to airpower and the aircraft industry's capabilities, restored much of the money, including more than $300 million for the Air Force alone. USAF ended up with $829 million in cash and $430 million in contract authority.

The Finletter Report

Early in 1948 came the Finletter Report. The President's Commission on Air Policy opined, in one of Professor Huntington's "prophecies of disaster," that we had until 1953 to prepare for an atomic attack. "Survival in the Air Age," the report's title, called for faster aircraft procurement and a seventy-group USAF by the end of 1949. There also was a Congressional Air Policy Board that endorsed essentially the same goals.

The international situation was a bit gloomy in 1948. There were potential crises in Greece, Italy, and Palestine, on top of the general intransigence of Communists all over the world. At this point, the Navy was challenging the Air Force monopoly on strategic airpower. It wanted a 65,000-ton supercarrier that could launch planes able to carry the then-heavy atomic bombs. Mr. Forrestal, who had advanced to become the first Secretary of Defense, called the Chiefs of Staff to an unprecedented meeting at Key West, Fla., to thrash out the missions problem. The new carrier was given a blessing, along with the draft and a request for supplemental appropriations to beef up all the services.

The Chiefs at Key West were concerned about their ability to perform their mission. The meeting was convened only five days after Gen. Lucius D. Clay, our

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The second Secretary of Defense, following James V. Forrestal, was Louis Johnson, who served for only eighteen months. It was not a happy period. He followed early Truman policy and tried to cut the defense budget. Then came Korea, and all estimates for saving money proved to be wrong.

At one point, when the United States adopted a policy of relying on deterrent power and all of that power was vested in the Air Force, there was a "Revolt of the Admirals." Their leader was Adm. Arleigh A. Burke, later (1955–1961) to be Chief of Naval Operations. The Navy did not change the policy.

commandant in Berlin, warned that war "may come with dramatic suddenness," and barely a month after the Communists had seized Czechoslovakia. It was on June 24 that the Soviets invoked a total rail and road blockade of West Berlin, a move that gave General Clay's apprehensions more credence. It was only a few days after the Key West conference that Britain, France, Belgium, the Netherlands, and Luxembourg signed a fifty-year mutual defense pact in Brussels. And, immediately, President Truman went before a joint session of Congress to urge resumption of the draft and quick action on UMT and the European Recovery Program. He said that Russia had a "clear design" to subjugate the "free community of Europe." He got everything he wanted except UMT, and an originally proposed defense budget of $11 billion for Fiscal 1949 was upped to $15.5 billion, including funds for the seventy-group Air Force and expanded development of atomic weapons.

That same year, 1948, saw the nation's policymakers press on with the NATO treaty, abandon China to the Communists, and base US military security on the defense of Western Europe. USAF was in the forefront of more than the claim on budget money. In the spring, it moved B-29s into Germany, and in the summer even more of them started to operate out of England. The President said $15 billion was all the economy could stand, despite this increased activity, and that he would impound funds in excess of that ceiling. He and Secretary Forrestal disagreed with Congress to the extent, at least, that they favored a fifty-five-group Air Force and "balanced forces."

Technology reared its head again in 1949, when the Russians exploded an atomic bomb, years before they were expected to do so. The Democrats were in full charge, pledged to give the nation "adequate" military strength and "sound economy." The armed forces got half of what they asked for, which still came to $15.6 billion. The atomic monopoly was ended, but that produced no immediate change in our policies. The old ones continued with the addition that Korea was left to its fate with the withdrawal of American troops.

Of equal import was the replacement of Mr. Forrestal, in March 1949, by Louis Johnson, who started an "economy" regime in the Pentagon. He canceled the Navy's big carrier, a decision clearly taken without any reference to policy or consideration of the kind of war we might fight. Understandably, it resulted in turmoil because the Navy's reaction was an all-out assault on USAF's B-36 bomber program. The "Revolt of the Admirals" ended badly for the Navy. Possibly more important, it consumed months of Air Force time, effort, and talent devoted to defense of the big Convair airplane at a point when it was needed to contend with potential conflagrations around the world.

The real issue in the "Revolt of the Admirals" was the role of the aircraft carrier vs. the USAF bomber, specifically the B-36. It was Mr. Johnson who canceled a carrier, carrying out policy.

The Lion's Share

The first postwar recession got under way, and this contributed to the heat of congressional arguments in 1949. Nevertheless, the Air Force was given the lion's share of the new budget along with a scolding from the White House. When Mr. Truman signed the defense appropriations bill, he said the authorizations would result in "a serious lack of balance in our defense program, and that he would not spend the extra

funds voted for USAF and would stick to forty-eight groups.

Well, it was not many months before we were locked in a full-scale war. Korea completely unhinged the idea that there should be a $15 billion ceiling on defense. Looking back, it seems clear that when the policy-makers decided to get out of Korea they were not contributing anything to either of their professed goals of leveling out the military effort and saving money. The reaction, of course, was a shift from low to high gear, with almost as much momentum as that which followed Pearl Harbor. Avoiding the gyrations of numbers tossed around in steamy congressional debate, the Defense Department compilation shows that, in Fiscal 1950, the true federal outlay for the Pentagon was $11.9 billion, the lowest figure since World War II. By Fiscal 1953, it had jumped to $47.7 billion.

While this was happening and Mr. Truman's $15 billion ceiling was shattered, the armed forces had their hands full fighting a war and fighting at the same time for the equipment to do it. Congress passed an omnibus appropriations bill for Fiscal 1951; it included only $13.3 billion for defense. The White House came back for supplemental funds and got another $16.8 billion. The almost pathetic Louis Johnson quit after fewer than eighteen months in office, admitting that as Pentagon boss he had made more enemies than friends. He was replaced by Gen. George C. Marshall, whose selection created a bitter argument in Congress. Marshall was a military man who had been Chief of Staff in World War II and an envoy to China as well as Secretary of State. There was concern that he would menace civilian control of the Pentagon but, if he did, the evidence has not been disclosed.

It was while General Marshall was Defense Secretary that the "Great Debate" over national security policy was launched by the Republicans early in 1951. The key man was Sen. Robert A. Taft. The clash of opinion was the harshest since before Pearl Harbor, in the days when President Roosevelt gave destroyers to Britain and Charles Lindbergh became a center of controversy. The argument was provoked by a Truman decision to send more American troops to Europe for the NATO buildup, but the Korean situation added heat to the atmosphere. The Taft argument was that we must rely on sea- and airpower for our defense and stay clear of land wars in Europe or Asia. He accused the Administration of formulating policy since 1945 "without consulting the Congress or the people," an attitude that the Democrats were to assume a couple of decades later.

The fact remains that the executive branch laid down the policy and made it stick. Mr. Truman and his advisers had defined the strategy. We would limit our fighting in the Far East to Korea and build up our forces in Europe. We would abandon the idea that we could mobilize in case of a crisis and, instead, expand the arsenal of weapons and the forces in being. The critics of this idea could not make their case and probably the most important reason was that the next President of the United States was Dwight D. Eisenhower. Early in 1951, before becoming a candidate, he had addressed a joint session of the Senate and House, telling them, "we must give Europe assistance . . . because there is no acceptable alternative."

An interesting sidelight on this period is found in the decision of Mr. Truman and the Joint Chiefs that atomic bombs would not be used in Korea. The grounds for this were both military and political. We continued to improve the technology, making bombs that were more compact—tactical, if you please—and adding volume to the arsenal. In 1951, Thomas K. Finletter was Secretary of the Air Force, and he spoke of that era as the "age of atomic plenty." Both the United States and Russia continued testing improved devices. The proposal to build a hydrogen bomb was put into high gear, and technology again seemed to have an effect on the policy-makers. The chairman of the Joint Atomic Energy Committee called for an "all-out" production and development effort to achieve "peace power at bearable cost." He argued that there would be real economy in the effort. If the Atomic Energy Commission were given $6 billion a year, he said, within three years the US could save $30 to $40 billion on defense outlays by cutting the price of an atomic bomb to "less than the cost of a single tank."

The discussion appears to have included no consideration that the policy-makers did not want to use the bomb. It surely was banned in Korea, and we know it was not considered in Vietnam. Only once, in the Cuban missile crisis, was it even waved as a big stick.

Truman vs. MacArthur

No review of the impact of politics on military strategy in this era can overlook the conflict between President Truman and General of the Army Douglas A. MacArthur. Here, certainly, was a military giant and, if any man in uniform ever stood a chance of prevailing over directives from his civilian superiors, it was MacArthur. He failed. Like some of his successors who fought in Vietnam, he blamed the "extraordinary inhibitions" of his bosses in Washington for curtailing the use of airpower to curb the Chinese. He also wanted to win. There was a confrontation and MacArthur was fired. A hot argument in Congress followed, but even the Democrats joined in welcoming the General to a joint session. Nevertheless, the issue was partisan, and most Republicans defended the famous soldier while the Democrats supported the President. The General testified for three days before a closed Senate hearing that also heard from Defense Secretary Marshall, the Joint Chiefs, and Secretary of State Dean Acheson. MacArthur got little support for his political and military opinions, but there was mixed opinion as to his guilt, as charged, of insubordination.

The Air Force was doing well when President Truman turned the government over to President Eisenhower. Deterrence and containment were basic to our strategy; SAC was well equipped and had the promise of more tools to do its job. The assumption was that our maximum peril was just around the corner, and there was a USAF goal of 143 wings that had been pushed back to 1955. The peak of the preparedness effort was expected in 1954. The rub was that General Eisenhower was pledged both to continue the Truman foreign policy and security plans, and to cut federal spending.

Probably the most significant happening for security

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policy was the Eisenhower decision to use the National Security Council for the formulation of both defense and foreign policy. It was the kind of staff operation that appealed to an experienced general, who chaired the meetings each Thursday morning at 10:00 a.m. There was a Policy Planning Board and an Operations Coordinating Board. Out of this setup came the "New Look," which gave USAF and the other branches of the armed forces still another shift of direction. The New Look has been called a compromise between the Truman policy, which leaned toward intervention, and the Fortress America concept espoused by Senator Taft and other Republicans. It was hoped that the defense budget could level off at $30 or $35 billion. There was to be continued stress on airpower as the most economical deterrent, and a cutback in the ground forces.

Under the New Look, USAF had to bolster its strategic and air defense capability; it cut back on airlift, and tactical support went into limbo. The Army was unhappy and refused to go all out for tactical nuclear weapons, hanging on to the kind of firepower it knew so well, and that demanded a continued high flow of manpower. The interest of Congress and the policy-makers in these issues was minimal. So far as the budget was concerned, there was a return to an emphasis on ceilings. Charles E. Wilson, as Secretary of Defense, showed negative interest in research and development, scorning it almost entirely and mismanaging the activity until the advent of missilery forced him to a more tolerant view.

Charles E. Wilson was Secretary of Defense in the Eisenhower Administration. Fresh out of the automobile industry, he had litt'e respect for technology and no interest in basic research. He refused to spend money given to him by Congress to buy bombers.

The Atomic Energy Act of 1954 was debated for 181 hours in the Senate. Most of the argument was about domestic implications—the public power issue—but the military angles were gigantic. The New Look called for the use of all kinds of nuclear weapons, including tactical, and it meant that our troops and those of our NATO allies should be able to use them. The law required that the US retain all control, but our allies would have to share information on the uses and effects of these weapons. The 1946 Atomic Energy Act made this illegal. President Eisenhower asked for changes and, for the most part, got what he wanted.

There were a great many questions raised about how the weapons might be used and why our allies should know all about them except how they were built. These questions were pregnant with future dilemmas, but the basic decisions were left up to the executive branch; Congress seemed to have little interest, or intelligence, about the implications. It was a matter that worried the military men, particularly in the USAF, but not the basic policy-makers and people who thought they should be influencing policy.

Eisenhower Landslide

The year 1956 was important to airpower, and this time it was the Democrats who protested. President Eisenhower and Secretary Wilson refused to spend additional B-52 funds voted by Congress; at the same time, missile program funding was called inadequate. There was a presidential election, but Democratic candidate Adlai Stevenson seemed to ignore the issue of military adequacy. The Hungarians revolted and were crushed by Soviet tanks. Eisenhower won in a landslide.

Gen. Maxwell D. Taylor was Army Chief of Staff (1955–1959). He quit, irritated because he did not agree with policy. Called out of retirement by the Kennedy Administration, he reappeared as Chairman of the Joint Chiefs of Staff (1962–1964).

Early in the year, Sen. Stuart Symington, who had been the first USAF Secretary, in the Truman Administration, headed an elaborate investigation into airpower by a subcommittee of the Senate Armed Services Committee. There were forty-one public and closed-door sessions. All USAF top generals—LeMay, Donald L. Putt, Earle E. Partridge, and Nathan F. Twining, to name a few—offered testimony. Only Admiral Arthur W. Radford, then Chairman of the Joint Chiefs, disputed their alarms about Communist capabilities. The Symington probe was the most complete study of airpower ever made on Capitol Hill, but it is hard to pinpoint any real results other than the fact that Congress added $800 million for B-52s to the defense request for Fiscal 1957. Secretary Wilson said the extra money would go in the bank.

The economy mood persisted at least through October 1957, when Sputnik spun through the sky. Eisenhower was trying to hold defense outlays to about $38 billion a year, but came under attack by both Repub-

One of the unsung heroes of the national defense effort was Trevor Gardner, who, as head of USAF's research effort, struggled with a policy he did not like but built an ICBM.

licans and Democrats. Then came some reports: one to the National Security Council by a committee headed by H. Rowan Gaither; another sponsored by the Rockefeller Brothers Fund; and a third was from the Senate Armed Services Preparedness Subcommittee, headed by Lyndon B. Johnson.

All favored stronger strategic systems, dispersal of SAC bases, a missile alert system, acceleration of our ICBM and IRBM programs, development of an anti-missile missile, and reorganization of the Defense Department to speed the decision-making process.

The Administration reluctantly agreed to go part way. Eisenhower was not aroused by Sputnik, nor by the alarmist views of the committee studies. The National Aeronautics and Space Act was passed, opening a new demand for federal funding. There was an informal agreement by the US, Britain, and Russia to suspend further nuclear tests, which was taken seriously by some people, not including the Russians.

The final years of the Eisenhower Administration saw the Air Force fighting harder than ever to maintain its stature. The political administration, despite the fact that a military man headed it, seemed to have less and less interest in military technology and paid almost no attention to its potential effect on the warp and woof of politics and diplomacy.

When Gen. Thomas S. Power, then SAC Commander, argued for an airborne alert, his Commander in Chief called his view parochial and said, "There are too many of these generals who have all sorts of ideas." There was supposed to be a Summit conference with Russian Premier Khrushchev, but a US U-2 spy plane was shot down and the meeting was called off. The Administration fumbled badly with its explanations and almost nobody paid any attention to the technology involved, and to the intelligence that came out of the U-2 program.

It was fortunate that the space-surveillance program was in high gear. The Eisenhower Administration faded out, still trying to meet the rising costs of defense by scuttling or stretching out old weapon systems. The fact that the ICBM was developed was due in large part to the tenacity of a few men in the Pentagon, some of them in uniform but, particularly, Trevor Gardner, who was Assistant Secretary of the Air Force for R&D.

Kennedy's Administration

With the Administration of Democrat John F. Kennedy, starting in 1961, the Air Force faced another new whirl of changing concepts, policies, and directives. Basic was the choice of Robert S. McNamara as Secretary of Defense and the strong centralization he introduced for all decision-making. USAF soon found it almost impossible to get all the facts about a given project to the White House when the decision had to be made at that level. There was a new system of compiling budget requests on the basis of function instead of service, which meant that the Air Force's missiles and bombers had to compete with the Navy's submarine-launched Polaris in the cost-effectiveness contest.

Gen. Maxwell Taylor, an Army Chief of Staff who had quit in a huff in 1959, at least partly because he did not agree with airpower doctrines, came back strong. As an adviser to Mr. Kennedy, he was sent to Vietnam in October of 1961, and from there on, our involvement in that land war escalated.

Defense spending, which had slipped to $44.6 billion in Fiscal 1961, started to climb, so that before long it was close to the $80 billion level. In the entire McNamara regime, only a limited number of new airplane projects got the green light, and their design as well as the contractual details were dictated not by USAF but by the Defense Department. General Taylor continued his climb, becoming Chairman of the Joint Chiefs for a couple of years in the 1962 to 1964 period. The Army flourished, with its own Army Concept Team in Vietnam (ACTIV).

USAF's role in this fight was curtailed by the policy-makers, who insisted on holding a veto power over the targets to be hit. Probably the only real demonstration of deterrent power was permitted in the autumn of 1962 when President Kennedy, after denying that Soviet missiles in Cuba were a threat, then got from Congress a resolution backing the use of force if necessary to deal with the situation. Then the President decided the Russians were being provocative and imposed a quarantine.

Most important, John Kennedy declared it US policy "to regard any nuclear missile launched from Cuba against any nation in the Western Hemisphere as an attack by the Soviet Union on the United States, requiring a full retaliatory response upon the Soviet Union." The missiles were removed. The event seemed to demonstrate that, while the policy was to increase emphasis on "flexibility of response," as advocated by General Taylor, there was little room for flexibility when a real threat developed—one that got its bite out of a technology more advanced than that of the tools used in jungle warfare.

Increasing Concern

The airpower story since Cuba is one of increasing concern over our ability to retain the clear preponderance of power we demonstrated on that occasion. It is

(*Continued on following page*)

not the kind of power, as the Army and Presidents Kennedy and Johnson have learned, that can prevail under the rules ordained for Vietnam. Yet, it is the kind of power needed to prevail over the Russian threat. The technological race, as being run in 1970, is reviewed elsewhere in this issue of AIR FORCE Magazine. USAF has seen deterrence erode into mutual deterrence and then to strategic stalemate, which Mr. McNamara accepted as a desirable state. The real issue in recent years has been the Defense Secretary's continued veto of projects that the military professionals consider essential to our military superiority.

The policies continue to be set by the executive branch, and it is hard to avoid the conclusion that the House and Senate Armed Services Committees are suffering from bedevilment by their counterparts on the Foreign Relations Committees. The debates in Congress today tend to be bipartisan. Generally, the liberals view the Pentagon as more or less subversive, bleeding just social causes of essential financial support. The conservatives are concerned about national security. When a Foreign Relations Committee becomes excited by a commitment made in the interest of security, it is easy to come in conflict with the men of Armed Services most concerned about security. At this point, the technology of weaponry frequently takes a back seat to some aspect of ideology. It was pointed up last year when President Nixon, speaking at the Air Force Academy, called some critics of defense policies "isolationists" and advocates of "unilateral disarmament." He defended patriotism and military strength and denied there is a threat that the US would become a garrison state.

Here in 1970, the congressional clashes over military policy have spilled out of the closed committee meetings onto the floor of the House and Senate and into the press and television programs. The opponents of particular weapon systems, such as the ABM or a new bomber or multiple-head missile, are taking their issue to the public, even with full-page advertisements in the newspapers. Their motivation seems to be antimilitary, and they have made the most of attacks on our chosen machinery, which means the military-industrial complex. Technology is mentioned only when it can be scorned or brought into some kind of disrepute, such as an indication that some new device, still in development, is not working as expected.

This kind of material is particularly appealing to such organizations as the Military Spending Committee of Members of Congress for Peace Through Law, which has gone over the Fiscal 1971 defense budget and can show how to save from $4.4 to $5.4 billion, almost all from the $18.9 billion sought for procurement. The committee is convinced that Pentagon planners make "the worst assumptions about enemy intent and capability," including the preposterous idea that "the Soviets are seriously determined to excel all US strategic deployments." To the committee, this is unrealistic.

On this Military Spending Committee, which is circulating an immense document attacking the defense budget, item by item, there are eleven senators. Ten are not on the Armed Services, Appropriations, or Foreign Affairs Committees. There are sixteen congressmen on the Committee. Of the sixteen, only two are on Armed Forces, three on Foreign Affairs, and two on Appropriations. The last are not on the Defense Appropriations Subcommittee.

It is legitimate to question the expertise and motivation of such a group. The amount of misinformation they are capable of collecting and circulating is monumental. And there is no opportunity for a military spokesman to intervene, or to put on a modest demonstration, such as General LeMay once provided for Norway's top defense contingent.

In the mid-1930s, Sen. Gerald Nye went after the "Merchants of Death" in much the same manner as, today, the Military Spending Committee, itself not a legitimate agency of Congress, is focusing on the "military-industrial complex." Harry Truman described the Nye probe as "irresponsible demagoguery" and blamed it for much of our unpreparedness for World War II.—END

This presentation was held in February 1963, to disclose facts known to the Administration the previous October, as the date on the map shows. The Defense Department intelligence officer giving the briefing is discussing the emplacement of Soviet missiles in Cuba. They were withdrawn, after President Kennedy warned Moscow that he would "push the button" if one of them was fired in the direction of the United States mainland.

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Funding the Future

BY ROBERT C. MOOT

Assistant Secretary of Defense (Comptroller)

THERE has been much talk in recent months about setting new national priorities. This kind of talk is basically healthy. We should constantly be reviewing our federal programs, discarding old ones, including new ones, and changing priorities to meet the country's needs as effectively as possible.

To many people, however, a new set of national priorities means just one thing—cut the military budget and reallocate the funds to the long-suffering civilian sector of public spending. The logic is as straightforward as that of Willie Sutton. Asked why a man of his talents went around robbing banks, he responded, "because that's where the money is." Any critic of the military will assure you, not once but many times, that the defense budget is where the money is. And by cutting the war-swollen defense budget, our critics claim that inflation as well as all other domestic ills can be cured.

This just isn't true. The budget situation that the critics are describing does not exist today. Trends in government spending have changed over the past two decades, and our critics continue to address past history rather than current facts.

Consider all government spending in three pieces. The Department of Defense (including military assistance) is one piece; federal civilian agencies, added together, are the second piece; and state and local governments, added together, are the third. Back in 1953, when spending for Korea peaked, defense spending was clearly dominant; nearly half of all government spending was for defense; the other two components (all federal civilian agencies and all state and local governments) barely equaled the defense spending total. The situation is drastically different today, for defense has dropped from fifty percent to twenty percent of total government spending. Spending by federal civilian agencies is twice that of defense; and spending by state and local governments is also twice as high as defense spending. The figures are, roughly, $136 billion for federal civilian agencies and $145 billion for state and local governments vs. $71.8 billion for defense. Defense spending no longer dominates total government spending.

To continue the illustration, let's take the matter of budget growth, beginning with Fiscal 1964—the last full peacetime year. Defense spending is up $21 billion from FY 1964 to FY 1971, the current fiscal year. Federal civilian agencies are up $65 billion in the same span, and state and local spending is up about $75 billion, both roughly doubling. It's worth noting that state and local spending has grown more since FY 1964 than the total FY 1971 defense budget, which includes wartime costs. Almost the same growth pattern is true for federal civilian spending. We've added the equivalent of two new defense budgets, in seven years, to government spending—but in civilian, not defense, programs.

The defense budget for FY 1971 is equivalent to seven percent of the gross national product, and it's 34.6 percent of the federal budget total. These are the lowest defense shares since Fiscal 1951 and 1950, respectively—since before the Korean buildup. In peacetime FY 1964, for example, defense spending was 41.8 percent of the federal total and 8.3 percent of the GNP. Many people seem to have a permanent impression that defense spending is a fixed fifty percent or eighty percent or ninety percent of the federal total. Actually, defense hasn't had half of the federal budget since FY 1958, a milestone that was passed with little fanfare *(see accompanying chart, p. 114).*

Is There a Peace Dividend?

Manpower impacts need to be considered as carefully as dollar impacts. Defense clearly has been a major factor in manpower in the past, as anyone of World War II vintage knows. During the Korean buildup, defense manpower requirements for all purposes grew by 5,500,000. The total labor force grew by only 2,500,000. This meant that there were 3,000,000 fewer in the labor force in 1953 for all civilian pursuits than there were in 1950. During the Southeast Asian buildup, defense manpower grew by 2,600,000, but labor force growth was 6,800,000, leaving 4,200,000 additional people for other activities. From pre-Vietnam 1964 to 1971, the labor force will grow by about 11,000,000. However, defense manpower will only be about 500,000 above the 1964 level, so that 10,500,000 additional workers will be available for other purposes—four times the number of the corre-

sponding period in the 1950s. These figures include defense-related employment in industry, in addition to military and civilian personnel of the Department. The relative impact of defense on the nation's labor force has changed over the years.

On June 30, 1964, the number of military personnel was 2,700,000. This peaked at 3,500,000 in 1968. By June 30, 1971, the number will be 2,900,000—roughly nine percent above the prewar level. About half of our military personnel are nineteen to twenty-two years of age. How many of America's young men of these ages are now serving in the armed forces? In World War II, of course, just about all of them were, unless they could not qualify. At the Korea peak, forty-three of every one hundred men in this age group were in the service. In 1964, the figure was ten percent; at the Southeast Asia peak (1968), sixteen percent; for 1971 the estimate is less than eight percent. Defense clearly doesn't dominate the labor force the way it did in the past.

Defense spending has grown by $21 billion from pre-Vietnam Fiscal 1964 to 1971. With the phase down in Southeast Asia, it is fair to ask, shouldn't we see the defense budget returning to the prewar level of about $50 billion? And shouldn't this produce a peace dividend of some $21 billion, which can be applied to nondefense programs? The answer, unhappily, is no—unless we cut military strength far below the prewar level. In fact, such a defense budget level, even with no special war costs, would involve lowering our military strength to the level of the late 1940s—to the level that prevailed before the Soviets developed nuclear weapons, before Korea, and before NATO.

The reason is quite simple; pay and price increases since FY 1964 have eaten up $16 billion of the $21 billion added to the defense budget since then. In real terms—that is, in dollars of constant buying power—our budget for FY 1971 is only $5 billion, or six percent, higher than the prewar level of 1964.

Pay increases alone account for $8 billion. Payments to retired military personnel are up $2 billion, with a growing retired population and automatic increases tied by law to increases in the cost of living. And another $6 billion is involved for increased prices of goods and services purchased by the Department. Pay raises, increased retired pay, and higher purchase prices account for a total of $16 billion, which adds not one man nor one weapon. The 1964 program—the same number of men, the same number of ships and aircraft, the same amount of jet fuel—would cost $66.8 billion today. Our FY 1971 budget is $71.8 billion. We are fighting the war within a budget that is $5 billion above the peacetime level, in real terms. This does not come close to covering our war costs. The incremental cost of the Southeast Asia conflict is more than double this $5 billion increase in our budget.

The Cost of Inflation

The question of incremental war costs vs. full war costs has caused much public confusion. Full war costs are the total costs of Southeast Asian operations, including all costs for military pay, B-52 sorties, fleet operations, and so forth. Incremental costs are the difference between total war costs and the cost of normal peacetime operations. Thus, combat pay for regular Army troops in Vietnam is an incremental cost while their basic salary is not. The cost of ammunition fired above the normal training allowance is an incremental cost, as is the extra aviation gasoline and munitions used in B-52 operations. There are many more examples.

Southeast Asia costs peaked in FY 1969, when full costs were about $29 billion and incremental costs were about $22 billion. Defense Secretary Laird has

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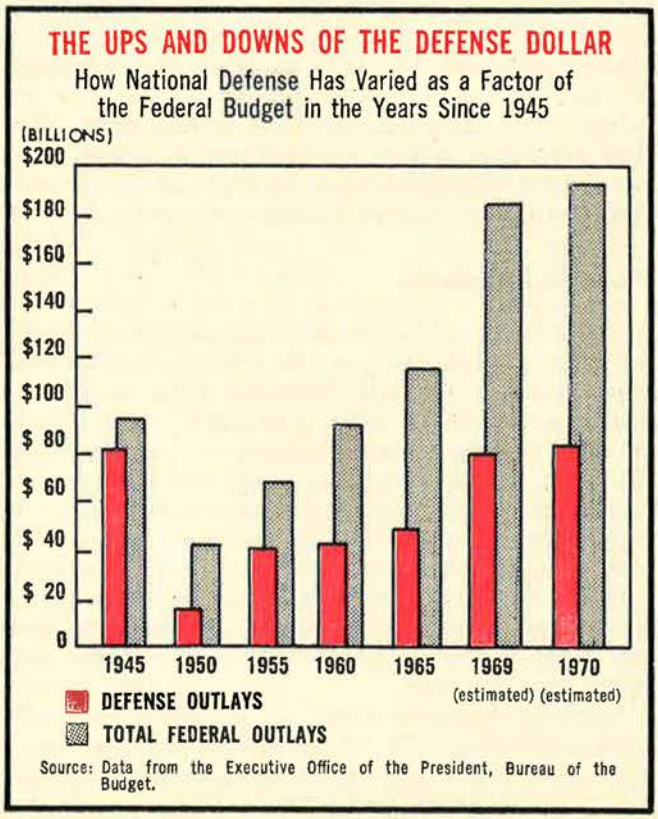
stated that both the full and incremental cost of the war would be halved after all currently announced troop withdrawals have been accomplished. This means that the additional cost due to the war will have been reduced by some $10 to $11 billion after the announced figure of 150,000 troops have been withdrawn by April 30, 1971. It is a very fair question to ask where this money went. Part of the answer can be seen in the budget totals for Fiscal Years 1969 and 1971. The Fiscal Year 1969 budget was $78.7 while Fiscal Year 1971 is planned for $71.8, which is $6.9 billion less. This is a large and readily apparent portion of the peace dividend.

The other portion is not as apparent. You will recall that inflation added $16 billion to the DoD budget from FY 1964 to FY 1971. As everyone knows, inflation has accelerated in recent years and the rise from FY 1969 to FY 1971 alone accounts for $5.9 billion. This $5.9 billion in inflation costs must be added to the $6.9 billion of current dollar cuts to get the total real program reduction—$12.8 billion. The reduction in the incremental war cost of $10 to $11 billion is included in this total reduction. Funds have not been diverted from war costs to nonwar programs. Nonwar programs, in fact, have also been sharply reduced since 1969.

This defense cutback is very real. We had 3,500,000 military on June 30, 1968. We will have 2,900,000 on June 30, 1971, for a reduction of 600,000. Civilian employment will be cut eleven percent from the 1968 peak, and purchased goods and services will be down thirty percent. We have to go all the way back to 1946 to find a year when we bought fewer aircraft than FY 1971. We have laid up nearly 200 ships, and the Navy still has forty-seven percent of its ships more than twenty years old. These are some of the consequences of fighting a war with a peacetime-level budget.

Most of the military and DoD civilian cutback planned through June 30, 1971, has already occurred. However, because of a six- to eight-month order backlog, there is a greater time lag between defense reductions in procurement and the impact on the economy. We estimate that defense-related employment in industry will fall by more than 1,000,000 from the 1968 peak, with more than one-half of the cut still to come.



Tax Policies as a Factor

Total defense-related employment, including that of industry, has decreased by 958,000 jobs from June 1969 through June 1970. During this same twelve-month period, the ranks of the unemployed have increased by 1,137,000, driving the national unemployment rate from 3.4 percent to 4.7 percent. While our information is incomplete, we know that not all of the defense reductions go directly into the unemployment total. As an example, many of the military who have been released return to school. However, defense reductions have had a big influence on the increased unemployment rate, and the reductions that are planned for the remainder of the fiscal year will keep the upward pressure on unemployment.

Now let us turn to rising prices and the inflation trend. Despite common beliefs, defense spending is not the cause, and the facts will illustrate this. Let's look at this matter by comparing two periods in our history—first, 1950 to 1956 covering the complete Korea cycle. From 1950 to 1956, annual defense spending rose by $26 billion; all other government spending by $13 billion. During Korea, defense was clearly the dominant factor. Second, let's look at the Vietnam period. From 1964 to 1971, defense spending rises by $21 billion; all other government spending rises by $122 billion. Prices are undoubtedly higher today than they were in 1964. If you think that higher government spending is the answer, try to bear in mind that defense accounts for about fourteen percent of the government spending increase since 1964. Clearly, defense had a decisive impact in the 1950s; it does not have such an impact today—prices continue to rise as defense is being sharply cut.

Our tax policies in the 1950s were very closely attuned to shifts in defense spending. Major tax increases were enacted in anticipation of Korean War costs. This has clearly not been the case in the 1960s. The Southeast Asia buildup began while the economy was being stimulated by the twenty percent tax reductions of 1964, and even though taxes were not raised until defense spending had peaked, our price experience was no worse than during Korea. One shudders to contemplate what our price experience would have been in the 1950s had our tax policies then been established with such indifference to defense spending trends. Such a course was possible, if not desirable, in the 1960s because defense spending was no longer dominant.

Some people say that defense takes eighty percent of the controllable part of the budget. That has gained some currency lately, but how does it square with the

facts? The current figure is now about sixty-five percent, not eighty percent, but that's a minor point. About half of federal spending, or roughly $100 billion in FY 1971, is subject to annual control through the appropriation process. That is, the President asks for specific appropriation amounts in the budget; Congress provides appropriations in specific amounts; thereafter, the President allows, or does not allow, the agencies to spend the money the Congress has provided.

The uncontrollables are not subject to the same restraints, but represent payments authorized under basic legislation that is not subject to annual review. The payments are made, often according to a formula prescribed by law, and the funds are automatically available unless Congress takes positive action to change things. This is roughly the other half of the FY 1971 budget, or $100 billion. The defense uncontrollable cost is military retired pay, which is about four percent of our budget in FY 1971. The law prescribes what a military retiree will be paid. Unless the law is changed, there is nothing that can be done by the President or the Secretary of Defense, or through the appropriation process, to alter this fact. Over seventy percent of civilian spending is in this uncontrollable category, compared to four percent of defense spending.

Defense Is "Controllable"

This condition is a matter of extreme concern in federal budgeting. The uncontrollable items are very difficult to change in a given year, and spending in this area has grown sharply—often through the operation of formulas set years ago. In a time of budgeting stringency or economic necessity, one must control what can be controlled and make cuts there regardless of the fact that huge increases in the uncontrollable area are of lesser priority. It simply takes too long, and is too difficult, to make the changes.

Since defense is sixty-five percent of the controllable portion of the budget, defense still must bear the brunt of short-term reductions even if it means that some military readiness must be sacrificed. The fact is that we just can't go on much longer with an allocation and review process that covers only half of federal spending.

Ignoring what has been done, critics of defense say that we must start to reorder our national priorities, and cut the defense budget to its proper level in the context of these priorities. They say that the Pentagon must be forced to plan more realistically and manage more effectively, so that billions ($10 to $15 billion) can be diverted from the swollen defense budget. And these funds should be reallocated to the real business of America—halting inflation and curing urban blight, crime, pollution, inadequate health care, inadequate housing, and all other domestic problems.

Unfortunately, by ignoring the facts and addressing the past rather than the present, our critics do the country a disservice. The peace dividend produced by reductions in defense to date has already been returned to the country or used to offset inflation. We have made additional reductions in the defense baseline force and have announced that our baseline force plans ultimately involve a cut well below that prewar level. In real terms, that is in constant dollars, defense spending has been cut over $17 billion since 1968 and the President has reallocated these funds to nondefense programs.

Back to Pearl Harbor?

The critics, however, assume that nothing has changed and talk about cutting from today's level. War costs have been and are being rapidly phased out so such reductions must be applied to the peacetime baseline forces. Suppose you wanted to cut that baseline, or nonwar budget, by $15 billion. This would reduce our military to about 1,800,000 men—1,800,000 men is the number of men we had under arms in June 1941—six months before Pearl Harbor. In other words, a $15 billion cut in the baseline force would result in a pre-Pearl Harbor level of defense, a level about in line with the lowest point in the demobilization period of the late 1940s—pre-NATO, pre-Korea, and prior to Soviet nuclear weaponry.

In broad terms, that's what a $15 billion further cut in the defense baseline budget would mean. On the nondefense side, how big is that $15 billion? Nondefense total governmental spending is $245 billion this year, and it's been growing at about ten percent per year. At that rate, it will grow about $150 billion in the next five years. So that $15 billion or twenty percent cut in defense would be equal to, roughly, six percent of nondefense spending this year. It would be equal to about ten percent of the five-year increase in such spending.

The defense budget simply is not, and cannot be, the central element in our resource allocation problems for the years ahead. It should be scrutinized carefully, and it should be placed in priority review with other needs. But defense spending cutbacks cannot be assumed to be the source of all resource needs. Our national security is too important for such erroneous reasoning to be accepted. We are dealing with a gross national product that will be growing some $350 billion or more in the next five years, toward $1.4 trillion; total governmental spending growing perhaps $150 billion to some $465 billion; and revenues of the same magnitude. In this context, the size of the defense budget doesn't loom as large.

In the context of all of these facts, it does not seem logical to make massive cuts in defense and seriously weaken national security for what must be only a marginal increase in domestic spending. Defense reductions, based on force cuts or improved efficiency or both, cannot be the principal source of funding for new domestic initiatives. Like Willie Sutton, we need to look where the money is.—END

Robert C. Moot has been Comptroller of the Pentagon since August 1, 1968, having been retained in the post by the Nixon Administration. This article is taken from a commencement address he delivered on July 31 at the Army Comptrollership School, Syracuse University.

Behind the Iron Curtain

BY CAPT. AARON D. THRUSH, USAF

Department of Political Science, Air Force Academy

A Soviet military writer of 1940 proclaimed that "military strategy is part of political strategy. The aims of political strategy are also the aims of military strategy."

Strategy in the Soviet Union is inexorably interwoven with the Marxist-Leninist ideology. Marxism-Leninism has, of course, been twisted at times to provide ideological justification for political imperatives. But political and military actions of the Soviets, whether in the domestic or the international arena, are continually presented and defended in Marxist-Leninist terms. As a result, there is an inevitable and important influence exerted on Soviet strategy by Communist ideology.

These two contentions—that the aims of Soviet political and military strategy are identical, and that strategy and ideology are interwoven—are basic to an understanding of Soviet affairs. Short-term policy fluctuations notwithstanding, the consistent objective of Soviet strategy has remained the worldwide advance of communism so long as that objective does not endanger Soviet security.

Ten years ago, this continuing long-term objective of the Soviet Union, derived from Marxist-Leninist ideology, would hardly have been worth discussing. Today it is, for many writers are claiming that the ideological motivations of Soviet foreign policy have been supplanted by motivations based solely on Soviet national interests in the traditional manner of great powers.

But admitting the basic agreement between Soviet political and military strategies and the importance of ideology in shaping these strategies does not tell the whole story. Factors other than ideology have an impact upon the formulation of Soviet strategy. These other factors include capabilities (of both the Soviet Union and its allies), perceived opportunities (and thus the capability and will of the United States and its allies as well as those of neutral states), personalities, internal Soviet group and fractional interests, and Soviet national pride and prestige considerations.

This brief review of the development of Soviet strategy since World War II can cover only highlights along with some of the motivational variables. A consistent element throughout this period has been the impact of ideology upon Soviet strategy.

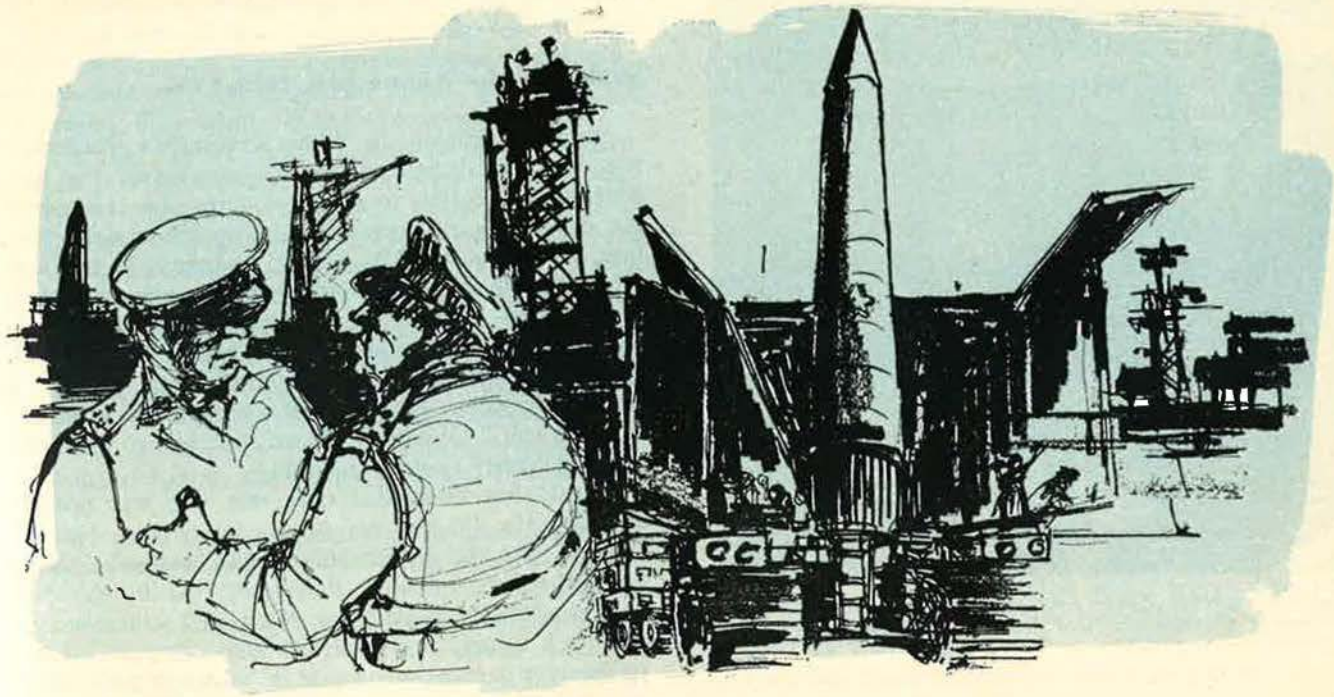
Stalin's Strategic Theories

The Soviet Union, under the autocratic rule of Stalin, emerged victorious from World War II—a battered nation but also a new empire as Russian hegemony followed the path of the Red Army across Eastern Europe. Because of the weakened condition of its neighbors, the Soviet Union now enjoyed a security from ground attack unprecedented in its history. A new potential threat had emerged, however, in the form of nuclear weapons, then possessed solely by the United States. American willingness to share our nuclear secrets and to limit the uses of nuclear energy to peaceful purposes did not quell Soviet suspicions and uneasiness over American intentions.

While the United States and its Western allies rapidly demobilized their armed forces, the Soviets maintained a relatively large military establishment. While other war-weary nations were transitioning their economies toward peace, Stalin, in February 1946, called on the Soviet citizens to gird themselves for a new internal drive to build Soviet strength in order to protect the nation from the prospect of invasion by capitalist states. Stalin made it clear that the wartime cooperation with capitalist nations was a thing of the past and that the Marxist-Leninist hypothesis of inherent conflict between socialist and capitalist societies was once again the rule.

Even before Stalin's 1946 speech, the Soviets had severely shaken the wartime alliance by their actions in northern Iran. Only stiff American opposition and the Iranian promise of oil concessions to the USSR

The views and opinions expressed in this article are those of the author, and do not imply the endorsement of the Department of Defense or other agencies of the United States Government.



convinced Stalin to withdraw the approximately 30,000 Russian troops then in northern Iran. The Iranian episode is a good example of Stalin's strategy in the immediate postwar years. In short, he attempted to expand Soviet influence and hegemony wherever prospects seemed favorable, but he cautiously retreated from situations that might escalate to a confrontation with the nuclear-armed Americans.

Stalin obviously had great respect for the American nuclear monopoly, but he reacted to the situation somewhat ambiguously. He did not make the cardinal mistake of neglecting a Russian nuclear program, but neither did he grasp the deep significance of nuclear weapons in modern warfare. Until after Stalin's death in 1953, the Soviets maintained his dogmatic, out-of-date theories of warfare. Stalin's personal theories, mostly a rationalization of World War II, were virtually unchallenged in the Soviet military press during the period, and thus prevented the development of a Russian military doctrine suitable for the emerging nuclear age. As H. S. Dinerstein points out in his book *War and the Soviet Union,* the principal failing of Stalin's "permanently operating factors" as applied until his death was that they did not come to grips with the significant question of how nuclear weapons modify warfare.

Early development of Soviet nuclear strategy was inhibited by theories of Stalin, shown here with Foreign Minister Molotov.

Strategy in Transition: 1953–1957

Within months after Stalin's death, Soviet writers began discussing military doctrine openly and were questioning the validity of his stagnant theories. Major General Talensky, one of the significant Soviet military authors of this period, criticized Stalin's overemphasis on economics as related to war and instead focused upon the armed conflict itself. This change of emphasis permitted Talensky to discuss the impact of nuclear weapons upon warfare.

Contrary to the Stalinist theories, Talensky argued that the same principles of war affected both sides. He discussed the possibility that a successful initial nuclear campaign could mean ultimate victory. In addition, he held that the probable decisiveness of the initial nuclear campaign made surprise all the more important. This represented a decided break with Stalinist theory, which had glossed over the factor of surprise in evaluating World War II. In Stalinist terms, the Nazi surprise attack in 1941 and the subsequent Soviet victory proved the importance of such "permanently operating factors" as the economic system and morale vs. a "temporary" factor such as surprise, when one attempted to predict the outcome of warfare.

Soviet development of an atomic bomb by 1949 and the appearance of doctrinal discussion so quickly after Stalin's death undoubtedly meant that Soviet military theorists had considered the impact of nuclear weaponry on warfare long before 1953. But Stalin's dictatorial

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Under Khrushchev, Soviet strategy swung from balanced forces to missile preeminence and "wars of national liberation."

control and the ideological underpinning of his theories about the superiority of socialist economics and morale made it doubly difficult to call publicly for revision of Soviet strategy and doctrine.

Talensky's views and those of his supporters were not immediately accepted, but they did reopen discussion. The Soviet journal *Military Thought* received forty articles and letters in response to Talensky's original article in the magazine's September 1953 issue. A principal result of these discussions was a growing Soviet belief that the USSR might not have to fight a major nuclear war unless it chose to do so. This was derived from the expectation that the capitalist powers might not launch a last, desperate attack as hypothesized in the traditional Marxist-Leninist scenario. Fear of Soviet nuclear retaliation might convince the capitalists to accept a gradual loss of power rather than to strike out, once they realized they were losing their dominant position.

Except for this hint of a change in the Soviets' perception of their national security, Soviet strategy remained relatively unchanged. The Stalinist emphasis on the use of large ground forces on a continental scale, combined operations, and the importance of the economy and morale were still the heart of Soviet doctrine. Discussions stimulated by Talensky's article merely added theories about nuclear weapons and surprise, as an appendage to the main body of Soviet doctrine.

This new analysis of nuclear strategy could provide little permanent comfort to the Soviets, however, unless they could be sure that they had enough nuclear weapons to deter the capitalists. They had exploded their first hydrogen bomb in August 1953, acquired intercontinental jet bombers in 1954, and had a few intercontinental ballistic missiles by 1959. At what time in this period the Soviet leadership decided it had, in fact, an effective deterrent force is not known. As early as 1954, Malenkov, in his struggle for leadership, was citing the Soviet deterrent capability as a reason for reorienting more of the Soviet resources toward the civilian sector.

Strategy Under Khrushchev: 1958–1964

Malenkov lost out to Nikita Khrushchev. Nevertheless, as Khrushchev moved to consolidate his new leadership role, he, too, indicated that he recognized the importance of nuclear weaponry for modern warfare. In February 1956, at the Twentieth Party Congress, Khrushchev proclaimed that, although the danger of war still existed, the traditional Marxist-Leninist theory of the inevitability of war was no longer valid, due to "mighty social and political forces possessing formidable means to prevent the imperialists from unleashing war." Obviously Khrushchev had in mind the growing Soviet nuclear capability.

Khrushchev contended only that war was not inevitable. He did not say it was impossible. He still claimed that the Soviet Union must maintain strong military forces to ensure deterrence. During this part of Khrushchev's ascendancy, the USSR still relied on balanced forces, and believed that, despite nuclear weapons, a general war would be a long, bloody struggle. A large standing army and preparations for combined-force operations in nuclear war were believed essential.

Khrushchev stabilized his position with the ouster of Marshal Zhukov from the Presidium in October 1957, after Zhukov had helped him demote the so-called antiparty group of Malenkov, Molotov, and Kaganovich in June of that year. Khrushchev then was ready to launch his own "grand strategy" for the struggle against capitalism. In the 1956 speech mentioned earlier, he had stated that war no longer was inevitable; rather, he had proclaimed "peaceful coexistence" as the basis of Soviet relations with nations not in the socialist bloc. Khrushchev's conception of peaceful coexistence differed from the view of that phase of Communist development as described by Lenin in the early 1920s. Khrushchev held that peaceful coexistence might continue until communism finally triumphed without open warfare. Lenin had seen peaceful coexistence more as a temporary phenomenon that did not affect the theory of the inevitability of war.

Khrushchev used his new interpretation of peaceful coexistence as ideological justification for his belief that the Soviet nuclear capability would deter a capitalist attack, while the professed superiority of the socialist mode of production served as an example to the proletariat of other states. The example supposedly would induce these proletarian groups to launch their own successful revolutions without the need for direct Soviet intervention. At the same time, peaceful coexistence, as defined by Khrushchev, would not preclude the Soviets from encouraging this revolutionary process in non-Communist states by all available means, short of direct intervention with large numbers of Russian troops.

In 1955, Khrushchev and Bulganin had made a triumphant tour of Asian nations, spreading promises of Soviet economic aid, in a moderately successful attempt to supplant Western influence in the area. The purpose of the trip was probably derived from a modernized version of Lenin's theory of imperialism: that

is, a shortcut to weakening the capitalist powers by depriving them of their "colonial" sources of raw materials and markets. Actual communization of the states in question was less important at the time than was separating them from the non-Communist bloc.

With the October 1957 launch of Sputnik, Khrushchev possessed another weapon with which to wage "peaceful competition." He could point to Sputnik as an example of Soviet scientific and technological superiority, and the obvious military applications of a rocket powerful enough to orbit an earth satellite gave him the means to challenge Western military power. The size of the Soviet ICBM force was exaggerated by Khrushchev as he sought to use it, not only as a deterrent, but also as a club to enforce Russian political demands. His demand that the US, Britain, and France pull out of Berlin, and the Western response are well known.

After much concern among Western leaders over the supposed missile gap, the United States announced in 1961 that it had solid evidence that the numbers of operational Russian ICBMs had been exaggerated by the Soviets. This fact, and the accelerated American missile buildup that was at least partially a product of Soviet blustering, became vividly apparent at the time of the 1962 Cuban missile crisis, when Khrushchev and the Soviets were forced into a humiliating retreat by American willingness to call the Soviet bluff.

During the period when both sides were developing missile forces, Khrushchev proclaimed two significant changes in Soviet strategy. The first change came in January 1960, when he asserted the superiority of Soviet missile forces and proclaimed these forces to be the backbone of Soviet deterrence. He argued that even if deterrence failed, these forces would play the decisive role in any world war. As a corollary to that proposition, he asserted that manned aircraft, naval surface forces, and large standing armies were now obsolete. Consequently, Khrushchev proposed, and carried out to a degree, major reductions in the Soviet armed forces. His proclamation was a sharp break with the Soviet "balanced forces" principle, and it especially hit the traditionally dominant land forces. Khrushchev's emphasis on the importance of nuclear-armed missiles also violated the traditional Soviet doctrine that only combined operations of all forces could achieve victory. These far-reaching attempts by Khrushchev to formulate military doctrine resulted in a prolonged conflict between him and certain elements in the military. While that alone hardly caused his fall from power in 1964, it is significant that, unlike Zhukov's support in 1957, no military man or group of men acted to help Khrushchev when his leadership was challenged.

One can only guess at Khrushchev's motivations for introducing these changes, but it is reasonable to suggest that he moved toward a posture resembling the Eisenhower "New Look" of the 1950s, and for much the same reasons. Just as Eisenhower wanted to economize without reducing American influence internationally, Khrushchev was searching for a means to cut defense outlays in order to increase Soviet investment in the civilian economic sector. The Soviet missile advantage, especially when exaggerated, may have seemed to Khrushchev to be the best means of reallocating funds while still retaining, and perhaps even increasing, Soviet influence internationally. The entire episode would seem to have had little or no ideological content.

The second major change in Soviet strategy was proclaimed by Khrushchev in January 1961, and was much more heavily influenced by the Marxist-Leninist ideology. Khrushchev declared that wars of national liberation were inevitable so long as imperialism and colonialism still existed, that such wars were just, and that the Soviet Union would favor such wars in principle although Soviet support would be neither unqualified nor universal.

The whole question of fomenting and supporting national-liberation movements has been a continuing bone of contention in the Sino-Soviet war of words. Though the Chinese have acted with considerable restraint, they have advocated a policy that would entail more direct involvement in such conflicts than the Russians have been willing to risk. The Chinese even go so far as to accuse the Russians of being opposed to national-liberation movements and of siding with the "imperialists and colonialists." The Soviet Union, under Khrushchev and later under a more collective leadership, denied such allegations but also refused to endorse revolutionary movements on an unqualified and universal basis.

Toward a Global Military Strategy

The Russians today are better able to support liberation movements than ever before. The latter half of the 1960s saw a significant buildup of Soviet forces, with potential global application. Khrushchev's emphasis on strategic nuclear forces cut the size of Soviet general-purpose forces, but not to an insignificant level. His proposed cutbacks of 1960 were later reduced, and his successors have maintained and modernized this portion of the Soviet military. The Soviet Navy has undergone a large-scale modernization program and an increase in transport tonnage. The Naval Infantry was

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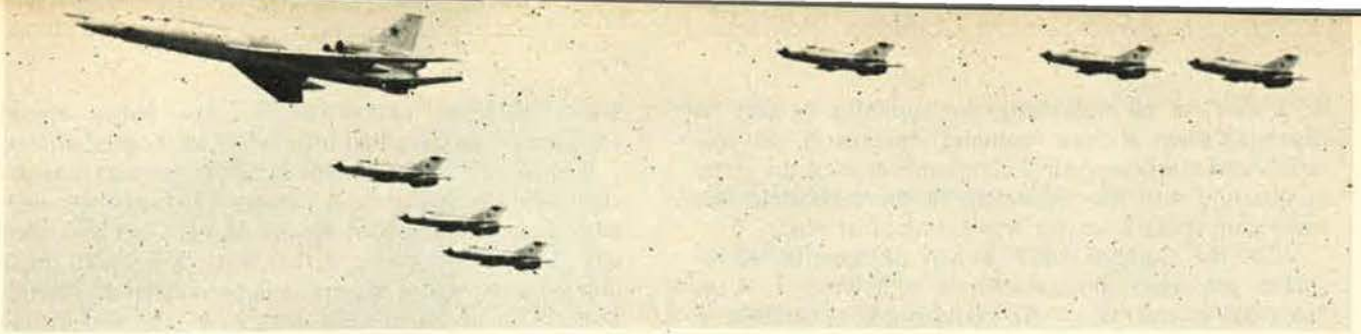
The USSR invested heavily in offensive forces and in defensive systems like these mobile SA-4 and SA-6 surface-to-air missiles seen parading through the streets of Moscow.



The Soviets' supersonic Blinder medium bomber with MIG escort. Khrushchev discounted, but didn't reduce, the Soviet bomber force.

reestablished in 1964, after having been disbanded early in the 1950s. Naval construction has included two helicopter carriers as well as amphibious support craft and landing vessels. The Soviet Air Force has also seen its long-range transport capability increased and its general-purpose forces modernized. The airlift invasion of Prague in 1968 demonstrated how capable and proficient the Soviets have become in the use of airborne operations.

Insofar as Soviet military doctrine is concerned, these capabilities are meant principally for general-war purpose and, as such, they indicate one of the paradoxes of current Soviet strategy. The outcome of the struggle between Khrushchev and his opponents over Soviet military strategy and force structure was essentially a compromise. While the "decisiveness" of the initial nuclear campaign was accepted, sizable and important roles for all the other branches of the armed forces were also retained. Thus, the old "balanced forces" and "combined arms" concepts are still present to a considerable degree today.

Current Soviet expectations of a general war see an opening stage of short duration that will be characterized by exchanges of strategic, nuclear-tipped missiles. The Soviets have steadfastly refused to publicly accept the idea of using a counterforce strategy although their continuing buildup of SS-9 missiles could well be aimed at obtaining just such a capability. In point of fact, the Soviets do not reject counterforce targets; instead they refuse to avoid city targets. Whether the emerging nuclear parity between the US and the USSR will cause the Soviets to accept a city-avoidance, counterforce approach, only time will tell.

Forces entrusted to deliver the Soviet nuclear salvo include the Strategic Rocket Forces with their missiles of differing ranges, the submarine forces with their ballistic and cruise missiles, and certain units of the Long Range Aviation Fleet, most of which possess standoff air-to-surface missiles.

After the initial nuclear exchange, the Soviets insist that final and complete victory can be achieved only by the annihilation of enemy ground forces and by the occupation of the enemy homeland through large-scale frontal ground offensives. Such offensives will require the use of theater forces strongly reminiscent of pre-nuclear combined-arms operations, but with a recognized need for widely dispersed, rapidly advancing, largely armored, open frontal offensive formations in a nuclear environment. The use of tactical nuclear weapons is part of Soviet planning for such theater operations. Soviet military writing makes no mention of large-scale amphibious operations of the type that would be necessary to invade and occupy the territory of the United States. One can only surmise that Soviet military planners believe final victory in a war with the United States would be gained by the use of ICBMs to devastate US military, economic, political, and population centers to such an extent that both our war-making capabilities and our will to fight would be destroyed.

It is difficult to avoid the conclusion that, to the Soviet mind, political and military strategy are still merely two facets of the same basic entity. The Marxist-Leninist ideology has made the furthering of world communism, in any way possible, the primary objective of Soviet strategy, so long as it does not jeopardize the national security of the Soviet Union.

There are many who argue that Marxist-Leninist ideology has become no more than empty rhetoric with little or no influence upon Soviet policy. Soviet words and actions of the past decade give small support to that argument.

If a decoupling of Soviet strategy and Marxist-Leninist ideology does, in fact, take place, it is more likely to come about through a process described by Zbigniew Brzezinski—an authority on Soviet affairs and a former member of the US State Department Policy Planning Council. In 1961, Brzezinski wrote:

> In brief, the process of [ideological] erosion is likely to begin with the specific core assumptions, lead to skepticism about the general doctrine, and finally result in the Soviet bloc's sharing the fate of other imperial systems. For this to take place, however, the ideology must first be denied both victories and enemies, a difficult and paradoxical task since denial of one can be construed as the manifestation of the other.

To date, there is no indication that the Soviets have attributed the "defeats" they have borne over the past twenty-five years to any reason other than the actions of their perceived enemies, in what they see as the continuing struggle between socialist and capitalist societies.—END

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A New Look at Old Lessons

BY MAJ. DAVID MacISAAC, USAF

Associate Professor of History, Air Force Academy

IT IS now just twenty-five years since the end of World War II. During that war, airpower, in its many forms, advanced from infancy to adolescence —such, at any rate, was the verdict of the late Maj. Gen. Orvil A. Anderson, wartime Director of Operations for the Eighth Air Force and later Chairman of the Board of Military Advisers to the US Strategic Bombing Survey. That he should use the term "adolescence" rather than "maturity" is interesting. Surely he was not being condescending. Rather, his various papers and speeches make it clear that, in 1945, he saw airpower on the verge of full maturity, but such maturity would come about only after an Air Force was organized as a separate service on an equal level with the Army and Navy.

At the same time, however, no man was more aware of the controversies that had surrounded the employment of air forces in the war. Also, Anderson's tour with the Strategic Bombing Survey convinced him that airpower's battle for recognition had not ended with the Japanese surrender. Perhaps "adolescence" was a well-chosen word, selected to disarm the critics in advance. Forever fearful that airpower would not be accorded its just due for its part in the war, Anderson devoted his remaining days to an energetic personal campaign aimed at educating the public in: (1) the demonstrated achievements of airpower during the war, and (2) the latent potential of airpower for the future.

Generals "Tooey" Spaatz (left) and Ira Eaker, two of the Air Force's leading experts in World War II strategic bombing.

The growth and development of our modern Air Force owes much to men like Anderson—Generals Arnold, Spaatz, Eaker, Twining, Doolittle, Vandenberg, Kenney, White, and many others. Broadly speaking, the advanced capabilities we have achieved are a testament to the fact that the American public as a whole was not blind to the role of airpower in World War II. Nonetheless, the wartime experience continues to draw the fire of critics. Although the debate tends to center on the events of twenty-five to thirty years ago, there are those who draw conclusions *about the present and the future,* based on judgments drawn from the wartime experience. Generalizing from a few selectively chosen particulars, some of the more severe critics question the very basis for the existence of air forces in general, and particularly strategic air forces. Accordingly, it is clear that the World War II experience is something with which those on active service should be familiar; indeed, rather more so than is the norm among serving officers today.

By way of illustrating this thesis, I would like to address three related matters. First, a recapitulation of the documented achievements of World War II might serve to remind some readers of the facts that are available. Second, I would like to provide an example of the type of criticism based on World War II that continues to muddy the waters. Finally, by describing a particular theme of two recent studies of World

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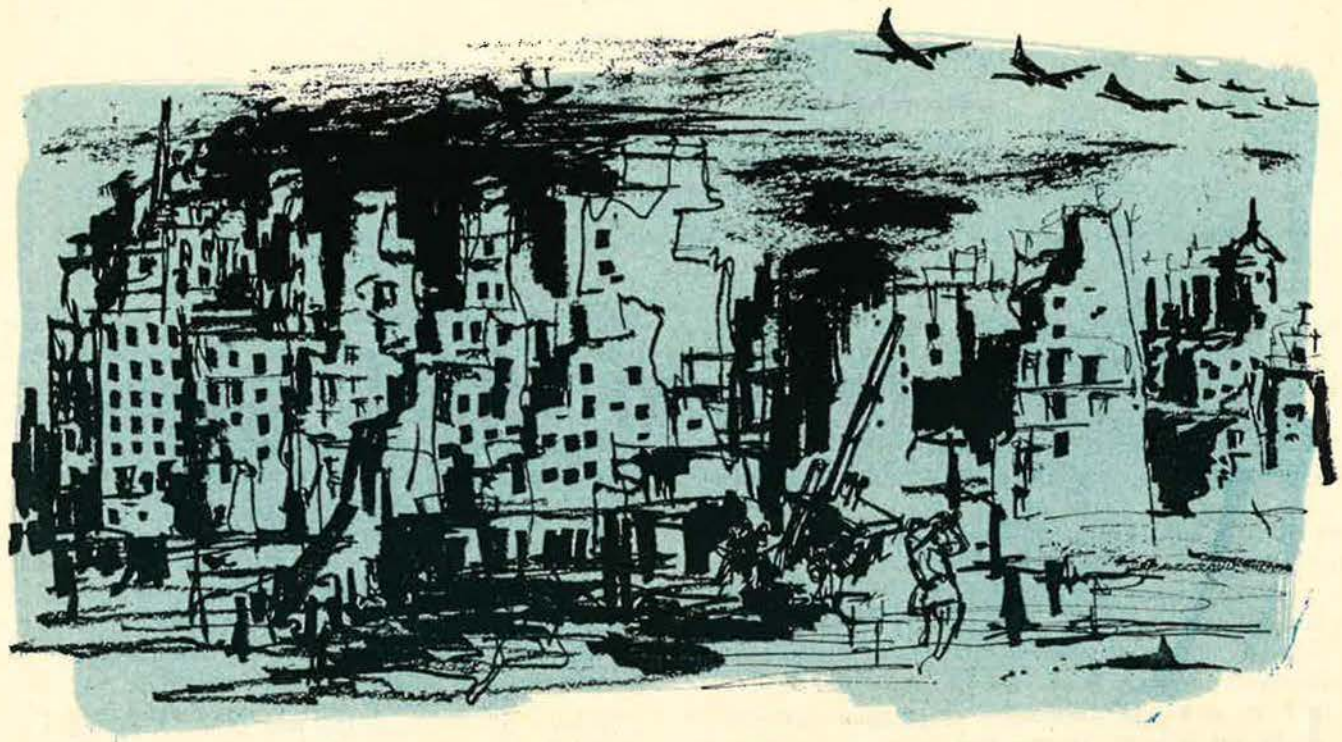


War II, I would suggest that, by looking back over the span of a quarter century, it *is* possible to draw some conclusions about the events of those days, conclusions that were not so obvious at the time; further, that such research (sometimes speculation would be a better word) does, in fact, go on and should not be allowed to escape our attention.

US Strategic Bombing Survey

The most authoritative source for the effects of strategic bombing in World War II are the reports of the US Strategic Bombing Survey. The Survey, in essence a Presidential Commission, concluded that "Allied airpower was decisive in the war in western Europe." Noting that airpower might have been employed more effectively at various times and places, the Survey's final report nonetheless stated emphatically: "Nevertheless, it was decisive. Its power and superiority made possible the success of the [Normandy] invasion. It brought the economy which sustained the enemy's armed forces to virtual collapse . . . [even if it is true that in the prevailing circumstances] the full effects of this collapse had not reached the enemy's front lines when they were overrun by Allied forces."

The men who reached that decision and how they reached it are treated extensively in a forthcoming history of the US Strategic Bombing Survey now being prepared by this writer. For present purposes, however, perhaps it is sufficient to say here, as evidence that the Survey's many conclusions can be labeled authoritative, that: (1) the Survey gathered together hundreds of experts in manufacturing, production, and air operations; (2) these men set to work both in England and on the Continent well before hostilities ended; (3) they visited targets and interviewed survivors at the lowest as well as the highest levels; (4) they laboriously sifted and cross-checked evidence from every available source; and (5) they reached the consensus cited above. Throughout their deliberations, they were subjected to *no* pressures of any sort, either from General Arnold in Washington or from General Spaatz in Europe. In fact, Arnold repeatedly avoided the opportunity to discuss the project with them while it was under way, and Spaatz was, as he remains today, more amused than anything else that so many important men could spend so much time worrying over the obvious.

Finally, the quality of mind among the men who formed the Survey's top echelon is revealed clearly by their illustrious careers both before and after their service with the Survey: Franklin D'Olier, Chairman of the Survey and President of the Prudential Insurance Company of America; Henry C. Alexander, D'Olier's deputy and effectively in charge of operations, later President of the Morgan Guaranty Trust Company; Paul H. Nitze, later Secretary of the Navy and Deputy Secretary of Defense, now a principal negotiator in the SALT talks; George W. Ball, later Under Secretary of State and Ambassador to the United Nations; J. Kenneth Galbraith, internationally known economic philosopher and sometime Ambassador to India.

To be sure, the Survey's conclusions involved some suggestions for the future, based, as the Survey's leaders admitted, on hindsight. But how could it have been otherwise? Orvil Anderson was never more right than when he characterized the operations over Europe as "an improvised air war."

Given the Survey's basic conclusion then, a conclusion that was fortified by an even more positive evaluation of the effects of bombing in Japan, why is it that more half-baked criticism—"nonsense" as Gen. Ira. C. Eaker so aptly calls much of it—has been written about the strategic bombing campaigns than about virtually any other aspect of World War II?

A thorough answer to this knotty question requires more space than is available here. In briefest terms, however, I would suggest that the critics tend to draw

By September 1944, Luftwaffe fighter opposition had been drastically reduced, but the flak was still heavy over Ludwigshafen, the target for this B-17 formation, and other strategic areas. By the following April, such key elements as fuel and munitions were completely destroyed and German military forces were essentially immobilized.

their inspiration from a combination (different in each individual case) of two points of view. The first is that the war could have, and hence presumably should have, been conducted in some other way than it was. The second is that there was something inherently immoral about bombing per se, especially whenever the targets involved other than tanks, ships at sea, and infantrymen in battle. Never averse to citing critical paragraphs from among the many reports of the Strategic Bombing Survey (either out of context or in a context so contrived as to disguise the intent of the Survey's final conclusions), the more vehement critics take positions that would seem to justify Noble Frankland's observation that "people have preferred to *feel* rather than to *know* about strategic bombing."

The Role of Strategic Bombardment

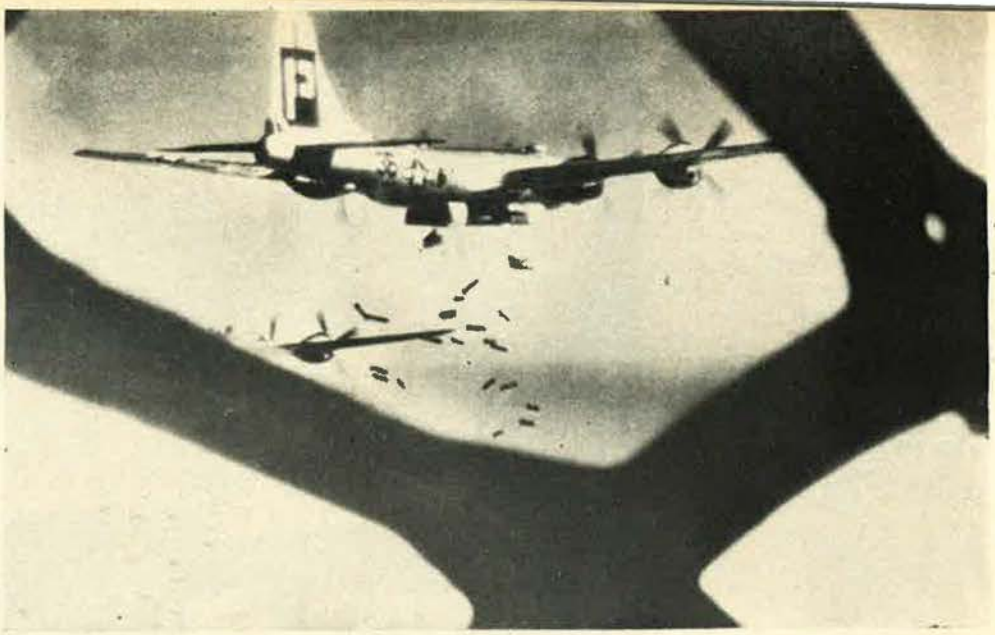
Whatever the motivation of the critics in any particular instance, the basic facts about the role of strategic bombardment in the Allied victory in World War II are clear: (1) The mission of the so-called Combined Bomber Offensive, as established at the Casablanca Conference in 1943, was to make possible an invasion of the Continent. Not only was this mission achieved absolutely, but the bombers were capable, when called upon, of assisting the ground forces in breaking out from the initial lodgment. (2) By April 1945, the German war economy was destroyed—there was no fuel, no munitions, and no means for transporting either war materials or large bodies of troops. (3) In Japan, while it would be narrow-minded to say simply that strategic bombing "won" the war, it would do violence to the facts to say less than this: that strategic bombing, taken together with the long-range effects of the naval blockade, induced surrender before the time that the planned invasion could take place. Or, as the USSBS Chairman's Report for Japan stated:

> Based on a detailed investigation of all the facts, and supported by the testimony of the surviving Japanese leaders involved, it is the Survey's opinion that certainly prior to 31 December 1945, and in all probability prior to 1 November 1945, Japan would have surrendered even if the atomic bombs had not been dropped, even if Russia had not entered the war, and even if no invasion had been planned or contemplated. . . . By July 1945, the weight of our air attack had as yet reached only a fraction of its planned proportion. Japan's industrial potential had been fatally reduced, her civilian population had lost its confidence in victory and was approaching the limit of its endurance, and her leaders, convinced of the inevitability of defeat, were preparing to accept surrender. The only remaining problem was the timing and terms of that surrender.

The record, clearly, is one of achievement. Yet the detractors continue to muddy the waters, in some instances their purpose being quite inexplicable. As recently as last April, *American History Illustrated*, a monthly journal of popular history, published a dual article under the title: "Was the Bombing of Germany Worth the Cost?" Speaking for the affirmative, Maj. Gen. Dale O. Smith ably defended the record in an altogether calm and dispassionate recital of the principal USSBS conclusions and the testimony of Nazi leaders. Taking the other side was Stephen A. Ambrose,

(Continued on following page)

Maj. Gen. Orvil A. Anderson served as senior military adviser to the US Strategic Bombing Survey. The Survey concluded that ". . . even a first-class military power . . . cannot live under full-scale and free exploitation of air weapons over the heart of its territory."



By the summer of 1945, incendiary bombs dropped by B-29s of the Twentieth Air Force had destroyed much of Japan's war-supporting industry. Strategic bombing and naval blockade had made a Japanese surrender inevitable, probably by the late autumn of 1945, even if the two atomic bombs had not been used.

at the time Ernest J. King Professor of Maritime History at the Naval War College, now Professor of History at Kansas State University. In arguing that the money and effort devoted to strategic bombardment operations should instead have been expended on landing craft, Ambrose gave informed readers reason to question (in at least this one instance) his judgment as an historian. His article began as follows:

> In the spring of 1968, at a scholarly conference at the U.S. Air Force Academy in Colorado Springs, two eminent historians pronounced the strategic bombing campaign of World War II an unmitigated failure. The Lancasters and Flying Fortresses and the other big bombers did not justify their existence. The men, time, material, and money involved in delivering a bomb on Berlin or Hamburg was enormous, but the damage it did was light and transitory. German production facilities were never seriously hampered in their work by the bombing; indeed, German production reached its peak in 1944. The conclusion was that the strategic bombing campaign . . . far from hastening the end of the war, certainly did nothing to speed unconditional surrender and probably, because of the wasted effort, delayed the final victory.
>
> Sitting in the audience at the meeting, along with 100 or so cadets and a few dozen scholars, were Generals Ira Eaker and Carl Spaatz. . . . Both felt that the air cadets ought to hear the other side of the story, and both asked for and received permission to make a reply. Eaker and Spaatz roundly declared that everything that had been said so far was academic nonsense, the kind of tripe that could be uttered only by someone who had never seen action and only read about it in a comfortable chair in some ivy-covered tower. (Both historian-critics, however, had been RAF bomber pilots in the war.)

Now the only thing wrong with this account—and the historian Ambrose was an eyewitness to the event he is describing—is that it is largely false and altogether misleading. (It so happens that I, too, was present and that I have before me, as I write, the published account of the proceedings.) The conference described was one of the sessions at the Academy's Second Annual Military History Symposium. Chairing the session was Professor James Lea Cate, coeditor of the official history of the US Army Air Forces in World War II. Delivering the principal paper was Dr. Noble Frankland, coauthor of the official history of RAF Bomber Command in World War II and now Director of the Imperial War Museum. (To set the record straight, Frankland was a navigator with RAF Bomber Command, not a pilot, as Ambrose stated.) Offering critical commentary on Frankland's paper were Professor Robin Higham of Kansas State (a World War II Dakota pilot in the CBI, not a bomber pilot) and Dr. Robert F. Futrell of the Air University.

First, neither Cate, nor Frankland, nor Higham, nor Futrell suggested that the campaigns were "an unmitigated failure." What Frankland did present was a provocative analysis of certain aspects of the Combined Bomber Offensive, stressing its many paradoxes: how it was at the same time both classical and revolutionary, combined and divided, planned and fortuitous. In short, he showed that not everything about the offensive went exactly the way some planners had thought it would go; that much had to be learned in the course of operations; that, in recognizing such facts, we might learn something of the caution that should attend the drawing up of plans for future emergencies. Moreover, that he said any of the things implied by Ambrose's first paragraph cited above (from "The Lancasters and Flying Fortresses" all the way through to "delayed the final victory.") is simply not correct. As to the opening accusation that Frankland pronounced the offensive "an unmitigated failure," the record, one would have thought, was clear. In the course of his remarks, Dr. Frankland observed that

> I have sometimes been accused of advancing the theory that the combined bomber offensive was a failure and you will no doubt now have some appreciation of why this charge has been levelled at me. [Frankland had just made a few comments about how the defeat of the Luftwaffe, which proved a prerequisite to success, showed that prewar air theorists had sometimes overlooked in their "revolutionary" zeal a "classical," or Clausewitzian, element of strategy.] I say "charge" because *I believe that to suggest that the combined bomber offensive was a failure would be greatly to distort history.* It

did, in fact, produce a sweeping victory which exerted a decisive effect upon the total air, naval, and military defeat which eventually engulfed Germany from the West and even more so from the East. [Italics added, and legitimately so, it would seem to me.]

The first commentator following Dr. Frankland was Professor Higham. Electing to use Frankland's paper "as a springboard," Higham proceeded wearyingly to speculate about how the bombers might have been used strategically in other ways than they were, especially in the early part of the war. Harmless and unproductive as were his comments, they did imply criticism of the very basis on which the Combined Bomber Offensive was conceived. Which brings us to Ambrose's second paragraph and the parts taken at the session by Generals Spaatz and Eaker.

Both Generals, it is true, were there. Moreover, it is true that both—but especially General Eaker—were taken somewhat aback by Professor Higham's commentary. But that either of them used words such as "tripe" or "comfortable chair in some ivy-covered tower" is not so. Further, that they "asked for" permission to speak is, at best, misleading. What happened was this: Both Generals were at the Academy in connection with a meeting of the Falcon Foundation. Knowing this, the Symposium Committee asked them if they would like to attend. Both said yes, stipulating that they would have to leave early for another appointment. Their announced time for departure coincided with the end of Professor Higham's commentary, so the Chairman, Professor Cate, interrupted the proceedings at that point to ask if they would like to comment. Visibly perturbed at Higham's comments, General Eaker took the podium to defend forthrightly the record of achievement as he saw it, and implied that the matter at hand was too important to be left to the professors alone. General Spaatz followed, suggesting, in a very brief statement, that he agreed completely with General Eaker's comments. At that point, both Generals departed—to a standing ovation—and the session concluded with the able paper of Dr. Futrell.

I have treated this matter in some detail, not only to set the published record straight, but to offer the instance as a minor case study of the manner and degree in which the record of the bomber offensives continues to be distorted. My contention is this—*one*, that the World War II achievement should be recognized for what it was, to a degree greater than that to which some of my more "future-oriented" colleagues might agree; and *two*, that the distortion cited here is not an isolated instance and is likely to be repeated in the absence of a capability to present informed rebuttals. No matter what we do or don't do, today's and tomorrow's self-proclaimed strategists will vigorously debate such requirements as that for the advanced manned bomber. That they should be allowed to buttress any of their arguments with distorted images of past achievements is clearly unacceptable. That our service has at long last seen fit to establish a formal Office of Air Force History, reporting directly to the Chief of Staff, may well prove a circumstance of great importance.

Interpretive Histories

My final point, alluded to earlier, is that we have now arrived at the point in time we can expect to see a number of *interpretive* histories, both of the period as a whole and of the air campaigns in particular. (By interpretive history is meant one that goes beyond simple narrative, adding to an account of events an attempt to explain or interpret either *why* things occurred as they did or what might be the implications for the future of what happened, and how it happened, at a particular time in the past.) A characteristic of such studies is that they usually contain at least some implied criticism of the manner in which earnest men strove to find the right answers in difficult situations. For that reason, the intent of their authors to interpret can easily be mistaken for captious criticism.

Two such instances are the recent works of Anthony Verrier (*The Bomber Offensive,* Macmillan, 1969, $8.95, 373 pp) and F. M. Sallagar (*The Road to Total War: Escalation in World War II,* RAND Report Nr. R-465-PR, April 1969, 278 pp). In each case, the overriding concern of the author is with the manner and degree in which the strategic bombing campaigns had escalated by 1945 to greater levels of intensity than had generally been either foreseen or planned. Just how that came about, both authors suggest, is something that today's planners might well ponder. It might

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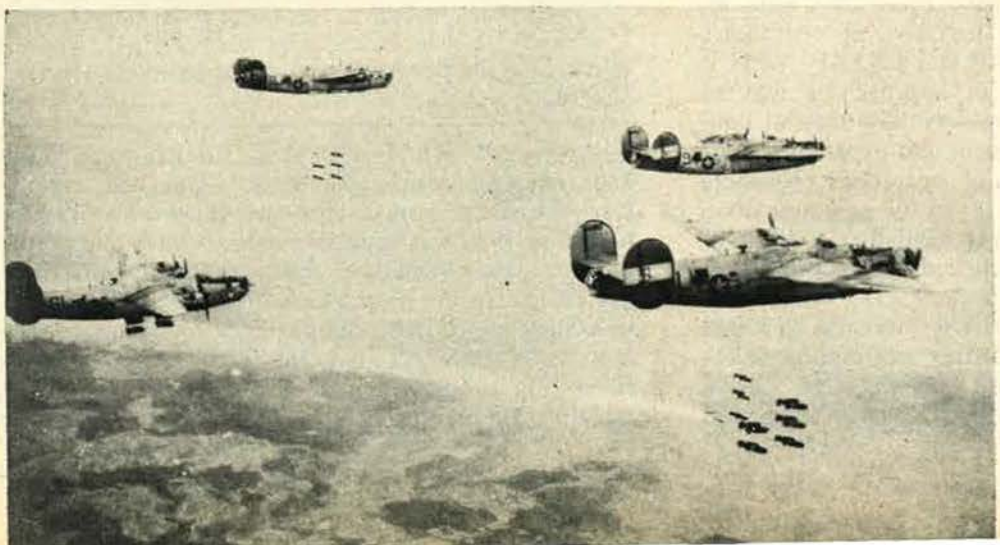


US B-24s, based in Italy and the UK, joined B-17s and the RAF Bomber Command in a round-the-clock, Combined Bomber Offensive that broke Germany's war machine. Some lessons, pertinent to the nuclear era, may still be drawn from the strategic bombing experience of a quarter century ago.

Shizuoka, Japan, a city of more than 200,000, was largely destroyed by a single fire-bombing attack. The vast destruction of World War II has led to a continuing search for strategies and means to deter large-scale war that, with today's weapons, would be unimaginably destructive.

well help them, in a memorable phrase of Noble Frankland's, to learn something of "the lessons of experience and the wisdom of history."

Best One-Volume History

Verrier's book represents perhaps the best *one-volume* history of the strategic air offensive over Europe that has yet appeared. It is true that the writing is now and then laboriously awkward, that his primary concern is with RAF Bomber Command, and that all readers will not agree with his thesis. Nonetheless, it is a good book, and its emphasis on tactical details and crew life (both in combat and in training), and its relative brevity when put alongside the multivolume official histories—these and other factors suggest that it will prove more congenial to the average reader, especially present-day crew members, than the official accounts.

Verrier begins between the wars with a treatment of the origins of the concept of strategic bombardment in Great Britain and Germany—a chapter each on "The Trenchard Years," "The Goering Years," "Rearmament," and "On the Brink." He then treats the controversies of the period 1939 to 1942, which centered on the question of how RAF Bomber Command should be employed, both as an instrument of policy and as an instrument of politics. From then until his final chapter, he presents a narrative of operations, both day and night, both RAF and USAAF. What is particularly valuable about his approach is that he takes great pains to show precisely how tactical limitations, particularly of equipment and experience, profoundly affected the course of operations. Nowhere is he guilty of the common error of assuming that, because a given capability was available in 1944 or 1945, it should have been applied earlier (when, in fact, it did not exist).

For all this, however, Verrier is journalist first and historian second. A former defense correspondent for *New Statesman, Observer,* and *Economist,* he sees in the conduct of the offensive over Germany a message for today. That offensive, he argues, directed by men who became obsessed with what was tactically feasible, got out of control in its later stages; *e.g.,* Dresden. He builds this argument by showing how improvements in accuracy and increases in the numbers of available planes opened up possibilities for employment that did not exist in the early stages of the war. These increasing options (and here Air Marshal Sir Arthur Harris is especially criticized) were often ignored, says Verrier, by men wedded to tactical doctrines that *earlier* in the war were inescapable. After citing the differences and disagreements about bombing policy at the highest levels (FDR, Churchill, the Combined Chiefs of Staff, Eisenhower and his staff at SHAEF), he concludes: "The fact nevertheless remains that they were not of one mind and it follows, therefore, that airmen who knew what they wanted to do were allowed to go ahead and do it, and in their own way." If Verrier's analysis is correct, how might it be relevant for us today?

> The short answer to the question [writes Verrier] is that the twentieth-century version of total and global war has led to a search for deterrents to it, but one on the whole conducted by men whose capacity for taking a political or strategic argument to its logical conclusions has been rather less than their wish to preserve the fabric of national armed forces and, above all other considerations, retain separate and, so far as administratively and operationally possible, independent services for the planning and the prosecution of campaigns by sea, land or air.

As I have written elsewhere, "Hard words these, and reflecting deep-seated fears." This one example from Verrier's work—there are numerous others—points up what was suggested earlier about interpretive histories: They sometimes reach conclusions that were not evident to the participants in the events; and, further, their conclusions can be taken for arrogant criticism when that is not really the author's intent. In such statements as that quoted above, Verrier is a man thinking. He may be right or he may be wrong (more

likely somewhere in between). The question, however, is whether his explanation is plausible. If it is, then his suggestions are valuable at least as guides to introspection for today's planners.

Conduct of Air Operations

Remarkably similar concerns mark the RAND study prepared by F. M. Sallagar. As with other RAND historical studies, the author's purpose is more blatantly pragmatic than that usually found among so-called academic historians. Like Verrier, Sallagar's principal interest is the conduct of air operations by Great Britain and Germany, the part played by the US Eighth and Fifteenth Air Forces in the European war taking second place.

Sallager states his purpose is an attempt "to provide a possible guide to the future by identifying the causes of escalation that may be present in any war fought for high stakes." Using the European experience in World War II as a case study of the sort of circumstances that can lead to escalation, "and specifically to the gradual transition from controlled to indiscriminate air warfare," Sallagar recounts the decisions and the tactical imperatives that led both Germany and Great Britain "to wage war in a fashion neither would have chosen voluntarily: Hitler despite his preference for reliance on ground forces; Britain despite strong misgivings about the killing of civilians."

Nonetheless, this is not a tale of villains but one of human attitudes and impulses. Specifically denying that the escalation of air warfare had any single cause, Sallagar shows the effect of such human impulses as seeing the enemy as a mirror image of oneself when assessing either his intentions or his probable reactions. Going further, he shows how, in the British instance, the very slowness of the transition to city-bombing eased the way for its acceptance as official policy, "for each escalatory step seemed so small as to require no explicit policy decision." The British planners (as has happened to others and could well happen again) "undoubtedly believed that they could stop escalation whenever they chose." In short, escalation by both Germany and Britain "resulted from a variety of factors that impelled the leaders on both sides to respond to immediate problems with actions whose effects were often neither planned nor foreseen. In that sense, escalation was not willed so much as it was allowed to happen."

Well written and carefully reasoned throughout, Sallagar's study concludes with some speculations about how a so-called "controlled general war" between the US and (for example) the USSR might, for reasons similar to those obtaining in World War II, escalate out of control, "not because of Soviet intent, but because American actions could trigger defensive responses and thus set off a chain of ultimately calamitous events." A sobering analysis throughout, Sallagar's study ought to be required reading for the Herman Kahns amongst us.

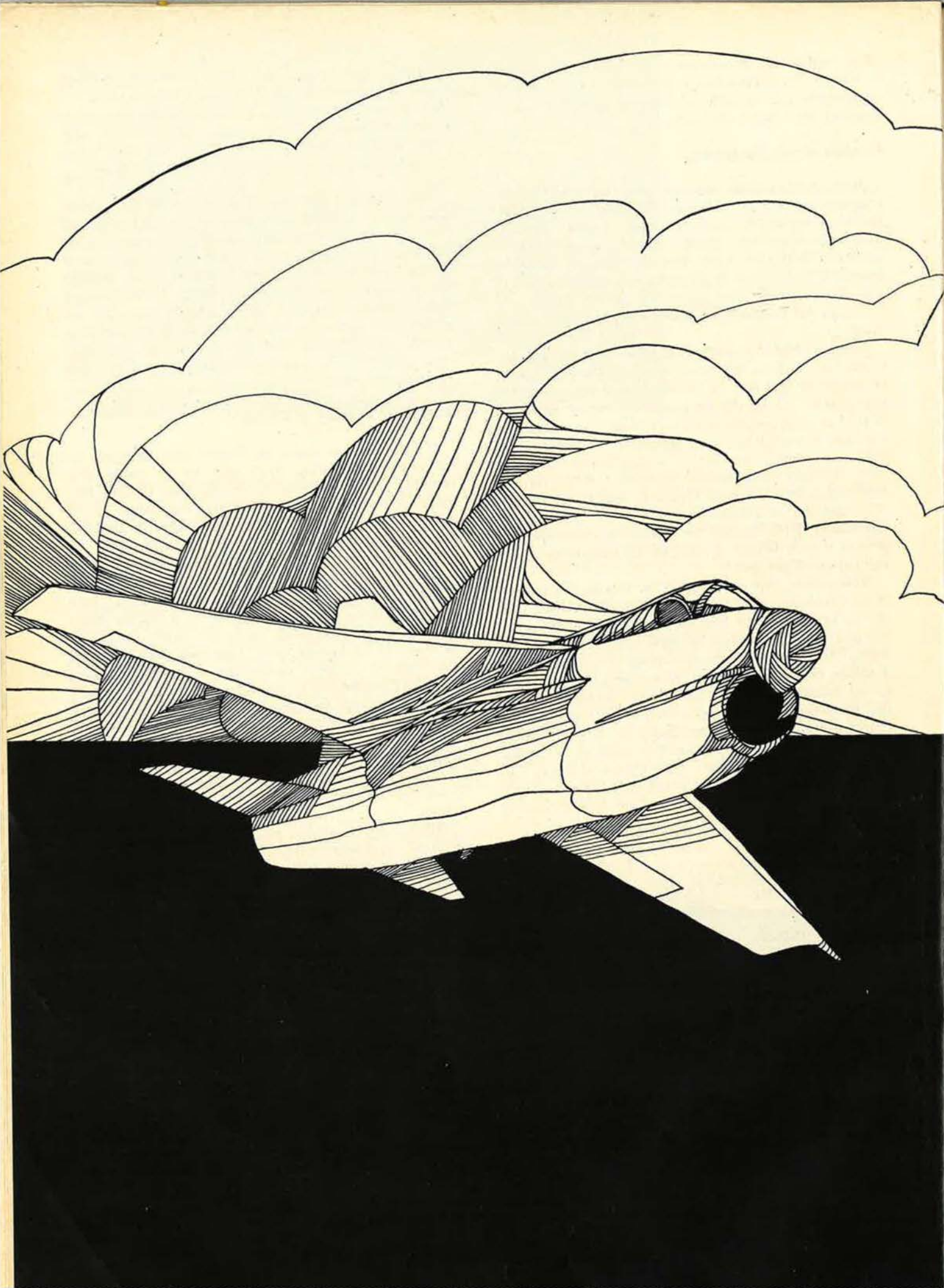
A Quarter Century of Change

Works such as those of Verrier and Sallagar, no matter how irritating they may be to those who shouldered responsibility in World War II, can perform vital services. For one thing, they serve to remind us of the immense chasm that separates the leading airmen of today from those of World War II. Then, with a war to be won and hated enemies to be defeated, the options available were limited only (or at least primarily) by the means available. Today, with the world living under the shadow of a nuclear holocaust, airmen *everywhere* must live under restrictive sanctions of the highest order. That such sanctions exist, that they limit possible capabilities, is an acknowledged fact. To presume (or to suspect, or to worry) that they do not is perhaps the principal fallacy in such analyses as those of Verrier and Sallagar. But, while world conditions and force capabilities *do* change through time, human nature apparently does not. Thus, assuming only for a moment that the worst *could* conceivably occur, such analyses might, if studied, have a salutary effect.

More directly, studies such as those of Verrier and Sallagar, seriously undertaken and carefully worked out, provide both a record of the past and a reminder that if anything is certain about the course of any future conflict it is this: that those in charge of operations will find they have to make decisions that were not foreseen; further, that having made such decisions, there will be some results that were neither intended nor foreseen. Of *that*, the record of the past tells us we can be certain. In no other sense is the history of warfare less ambiguous.—END

Nagasaki—the second atomic target, August 9, 1945. A new era of strategy and of international politics began here.

Maj. David MacIsaac, a distinguished AFROTC graduate of Trinity College, Conn., holds a master's degree from Yale and a Ph.D. from Duke University. He is a member of Phi Beta Kappa, and was a Woodrow Wilson Fellow at Yale. From 1959 to 1961, Major MacIsaac served as a personnel officer in SAC and Sixteenth AF. His articles and reviews have appeared in several publications, including AF/SD *(June '70, "Airman's Bookshelf"). He is now an Associate Professor of History at the USAF Academy.*



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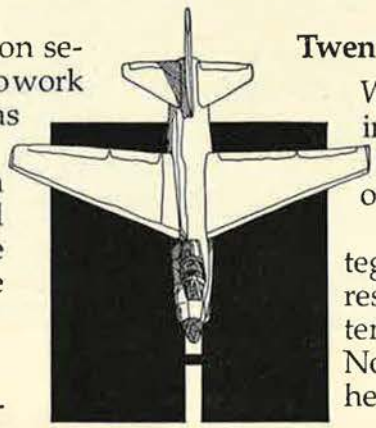

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News and Comment about Air Force People . . .

By Patricia R. Muncy
ASSISTANT FOR MILITARY RELATIONS

Survivor Benefits

The following letter from AFA President George D. Hardy was sent to Rep. Otis G. Pike (D-N.Y.), Chairman of the House Armed Services Committee's Special Subcommittee on Survivor Benefits, on July 23, 1970, stating AFA's position on this vital issue:

Dear Mr. Chairman:

We in the Air Force Association have long felt that Government personnel are not being treated equally in the area of survivor benefits. We feel that the military has been shortchanged. Now that comparability between military and Civil Service pay scales is official Government policy, it is particularly important that survivor benefits for military personnel be brought in line with those available to Civil Service employees.

Attached is a resolution which has been passed by our Association at its national conventions several times over the last few years. The resolution is evidence of the Air Force Association's support for a more adequate survivor benefits program for career personnel.

The Retired Serviceman's Family Protection Plan (RSFPP) has been a failure. Although it has been amended numerous times over the years to improve participation, it has failed to prove attractive to career personnel. We believe the law should be amended so that future retirees have a program which can more properly be called a true survivor benefits program rather than a low-cost term-insurance plan.

We would consider a minimum appropriate plan one that would presume service-connected death for any military member who has completed over twenty years of active service. This would automatically make his survivors eligible for Dependency and Indemnity Compensation (DIC). However, we recognize that DIC is weighted toward the short-term, active-duty personnel and is not always suitable to the income replacement requirements of survivors of career personnel. We, therefore, would chiefly support the concept which has been advanced in these hearings of providing the survivors with a percentage of the retired pay of the career man under a formula similar to that used by Civil Service.

We commend Chairman Rivers for appointing this Subcommittee, and we commend the members of the Subcommittee for the diligent way they have attacked a most complicated and difficult problem. [AFA] stands ready to aid the Subcommittee in any way that it can.

I request that this letter and the accompanying resolution be inserted in the hearings of the Subcommittee.

Sincerely,
GEORGE D. HARDY

Retired Pay Recomputation

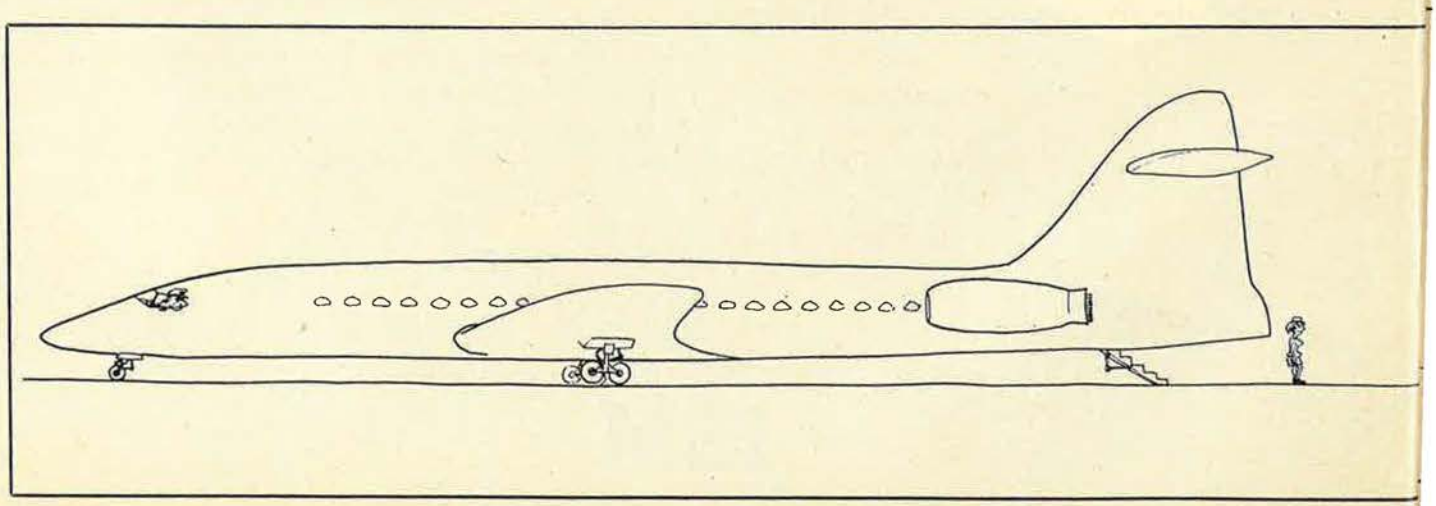
In a related event, the Secretary of Defense's recent "Open Letter to Retired Military Personnel" on the subject of recomputation of retired pay came as no great revelation to AFA. Insiders on the Washington scene have long decried the exorbitant cost of such a move and have predicted the failure of all efforts to remedy this obvious inequity.

As the retired ranks continue growing, however, pressure on the Administration's fiscal policies will continue to increase until what Defense Secretary Laird now considers only "a desirable goal" has become meaningful reality.

The text of Secretary Laird's letter follows:

An Open Letter to Retired Military Personnel

"As Secretary of Defense, I have principal responsibility for advising the President on all matters ranging across the full spectrum of Defense. For this reason, President Nixon has asked that I discuss with you a Defense matter very important to him—recomputation of retired military pay. I welcome this opportunity to explain my views and recommendations on this important matter.



Former Secretary of the Air Force Eugene M. Zuckert, Secretary of the Navy John H. Chafee, and Vice Admiral Thomas F. Connolly, Deputy Chief of Naval Operations (Air), join AFA's Dorothy Flanagan at the Topside Aviation Club's annual "Boss Night" reception honoring Chafee and Connolly. As the group's President, Miss Flanagan was Mistress of Ceremonies for the evening.

"Like the President, I have long recognized that some form of recomputation is a desirable goal. Since this Administration took office, I have had the Department of Defense continuously studying the problems involved and the steps that might be taken to make meaningful adjustments. I am convinced there is a genuine need to treat the retired members of our Armed Forces more equitably—we owe this to the men and women who have devoted their lives to a military career.

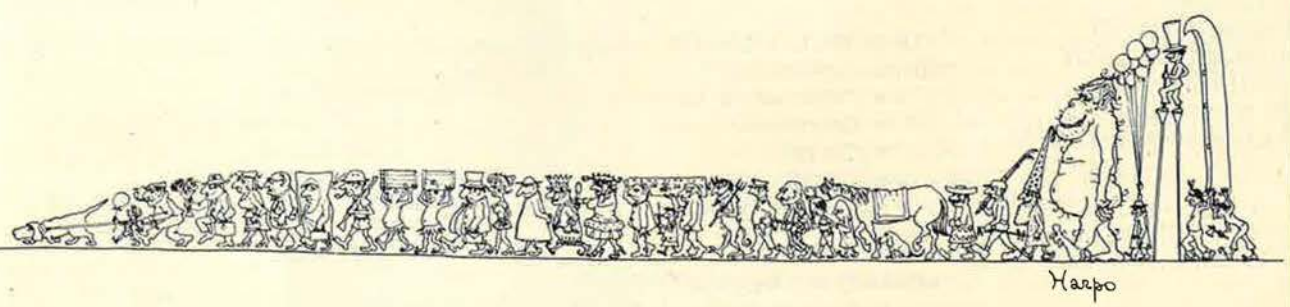
"It is true that there are administrative and legal obstacles in the way. Perhaps more important, the introduction of this change may even become a model for other government retirement systems, whether Federal, State or local. Therefore, we must proceed cautiously to insure that our remedy will be both effective and lasting. I am confident, however, that the administrative and legal obstacles can and will be overcome.

"Unfortunately, there is a much more formidable obstacle in our path that will not be as yielding—at least not in the immediate future. Simply stated, our problem is the financial constraints the Department of Defense must face. We have submitted a rock-bottom budget to the Congress for Fiscal Year 1971 and are presently facing further Congressional reductions. Even more simply stated, the money needed to take this action cannot be made available at this time without crippling other desperately needed Defense programs. For this reason, I am unable to recommend to the President that recomputation of retired military pay be added to the Defense Department budget until these fiscal conditions improve. The Defense Department is the only federal agency that must fund its major retirement program as a part of its budget.

"I realize my position regarding these difficult budget problems may not be understood. I know that each of you feels you are being deprived of income that is rightfully yours. I regret this and truly wish conditions were different. But they are not. And if we are to improve them we must face facts as they are, not as we would wish them to be.

"President Nixon appreciates your many letters and shares your concern. Let me assure you that some form of recomputation of retired pay will continue to be a goal of this Administration and this Department. We all share

(Continued on page 133)



—Reprinted from ATLAS Magazine (August, 1970). From NEWS BLITZ, INC., Rome.

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- Once-a-Week Maid Service
- Sky Lounge
- Restaurant
- Adjacent to Lackland AFB and Wilford Hall Medical Center

ADMISSION REQUIREMENTS:

- Widows and female dependents, minimum age 55 years
- Officers, minimum age 62 (wife's age immaterial)
- Any Air Force widow during her period of adjustment, regardless of age, with or without children, on a temporary basis up to 1 year

the President's earnest hope that we can move forward with it just as soon as the budgetary situation permits."

CAP Cadets Get Survival Training

Fifty-four Civil Air Patrol cadets, representing each state plus Puerto Rico and the District of Columbia, completed a week-long survival course at the Air Force Academy during July. One of CAP's summer activities for qualified cadets, the course included techniques for personal survival in water and in mountainous country, and was conducted for the fifteen- to eighteen-year-old cadets in the mountains adjacent to the Academy and in the cadet pool.

The actual field training was done by Air Force Academy noncommissioned-officer instructors. Activities included shelter construction, fire craft, land navigation, weapons familiarization, communications, food preparation, survival medicine, and improvised equipment. Water-survival training in the cadet pool included parachute landings in water and use of life rafts, Mae Wests, flotation gear, and signaling devices.

The objective of the survival training was twofold. First, the CAP cadets learned how to survive in unfriendly terrain should they ever be forced down in an aircraft or become lost while hunting. Second, they became familiar with the type of shelter, distress panels, and signaling devices a lost pilot might use. This knowledge can be of great value on CAP search-and-rescue missions.

Looking for a Mobilization Assignment?

A recent announcement by the Defense Supply Agency disclosed a continuing requirement for Reserve officers in mobilization positions in procurement, logistics support, contract administration, and data automation.

Mobilization positions in the grades of major, lieutenant colonel, lieutenant commander, and commander are available at Agency activities located throughout the country and at DSA headquarters in the Washington, D.C., metropolitan area.

The Defense Supply Agency provides supply support, logistical services, and contract-administration services to the armed forces. It is jointly staffed by officers of the Army, Navy, Air Force, and Marine Corps. Reservists thus have the opportunity of serving in a joint service command while assigned to DSA.

Mobilization designees are required to perform an annual active-duty tour for training purposes. Assignments with DSA may consist of on-the-job training, career-type schooling, seminar participation, or appropriate special training beneficial to the Reservist in his mobilization specialty.

For further information, write to Director, Defense Supply Agency (Attn: DSAH-MR), Cameron Station, Alexandria, Virginia 22314, or telephone: Area Code 202, 694-6081.

George F. Brennan, chief of the Defense Atomic Support Agency's civilian personnel office, has received the Exceptional Civilian Service Award for his performance during a "difficult period" of base closures and significant budgetary and hiring restrictions affecting the civilian work force. Mr. Brennan is a charter member of AFA.

Air Force Academy lost a dedicated supporter when Richard H. Topper retired on June 30. He headed the Cadet Branch at Headquarters USAF since its establishment in 1954. Here he receives the Decoration for Exceptional Civilian Service from John A. Lang, Jr. (left), USAF Administrative Assistant.

Another Associate Unit for USAFR

On July 24, the Air Force announced plans for the formation of another Air Force Reserve associate unit, at Charleston AFB, S.C.

This month, the 701st Military Airlift Squadron (MAS) (Associate) will be activated and associated with the Military Airlift Command's 437th Military Airlift Wing at Charleston. The 701st will fly the modern C-141 StarLifter and train with first-line support equipment.

The 300th MAS (Associate), now flying C-141s at Charleston, has developed a high level of proficiency in the StarLifter and will convert to the C-5 Galaxy at a future date.

Activation of the 701st MAS will further Air Force goals of modernizing the Air Force Reserve. The unit will be the eleventh associate squadron in the C-141 airlift mission. There is also another associate unit flying C-9A aeromedical evacuation aircraft.

ADC Travel Guide

The Information Office of the Aerospace Defense Command's Fourteenth Aerospace Force, Ent AFB, Colo., is preparing a worldwide travel guide for its members.

The guide, which lists only units of the Fourteenth Aerospace Force, will be similar to commercial counterparts. It is designed for those traveling on official TDY assignments, in an effort to help reduce traveling costs for both the Air Force and the individual.

Coordination with the thirty worldwide units of the Fourteenth appearing in the guide assures a speedy, organized trip and movement with minimum supplies and equipment to accomplish the mission.

The booklet will have an outline of both military and civilian facilities available at stop-off points. Included will be specifics on billeting, transportation, clothing needs, weather, customs regulations, food, and some civilian din-

(Continued on following page)

On the twenty-second anniversary of WAF, Lt. Col. Joyce E. Somers is cited as an outstanding example of women's performance in technical jobs. She is assigned to the Directorate of Operations, Hq. USAF, where she forecasts weather conditions for presidential and VIP flights from Andrews AFB.

ing spots, money conversion, and gifts and mercantile items in the area. Also listed in the travel guide will be historical sites that can be visited during off-duty hours, after the official visit, or while waiting for ground or air transportation.

The guide will double as a planning aid for teams and individuals going to foreign lands and to remote units.

Sounds like a great idea and one that should be welcomed by all Air Force members, military and civilian, who find themselves in the unenviable position of sudden or remote TDY assignments. Let's hope it catches on.

Parting Shots

• Last year was the first aircraft accident-free year attained by the Air Force Reserve. In recognition of this outstanding achievement, it has received the 1969 Air Force Safety Award. Reserve units flew more than 150,000 hours, airlifting more than 23,400 tons of cargo and 46,700 passengers. More than 52,200,000 ton-miles and 27,000,000 passenger-miles were logged.

• According to the VA, almost half (forty-six percent) of the 58,000 men and women who took training under the G.I. Bill last semester while still in uniform were members of the Air Force. Soldiers edged out sailors for second place (twenty-six to twenty percent) and the rest were Marines (six percent) and Coast Guard (two percent).

• In July, we reported on the Defense Department's new computerized job-referral service for military retirees. The Department said that the new service would cover "only a selected group" of about 65,000 persons annually, in the thirty-nine-to-forty-eight age range, "with a wide variety of academic, technical, and managerial skills augmented by considerable formal training." Latest report from DoD indicates about 4,000 persons now are listed in the computer and that 400 to 500 names will be added weekly.

• In March 1969, we carried in this column an announcement of the start of a memorial fund at the Air Force Academy, honoring the late Gen. William S. Stone, former Superintendent. In July of this year, the new William S. Stone Research Laboratory was dedicated by the outgoing Superintendent, Lt. Gen. Thomas S. Moorman, for the vital studies in the cardio-pulmonary field of medicine. A primary aim of the lab is the study of human physiology. The facilities will be used by Academy faculty researchers, senior cadets working on independent study projects, and by Air Force physicians. It is located in Fairchild Hall, the Academy academic building, and is operated by the Department of Life Sciences, which offers cadets a major in Life Sciences, including a premedical or nonpremedical curriculum.

SENIOR STAFF CHANGES

B/G Lew Allen, Jr., from Dir., Office of Space Systems, SAF, Hq. USAF, to Asst. to Dir. of Special Projects, SAF, Los Angeles, Calif. . . . **B/G Chester J. Butcher,** from Cmdr., Task Force Alpha, Nakhon Phanom Airport, Thailand, to Dep. Cmdr., 5th Allied Tactical AF, Vicenza, Italy . . . **Mr. Robert O. Dietz, Jr.,** from P.L. 313 position, Dir., von Kármán Institute for Fluid Dynamics, Brussels, Belgium, to P.L. 313 position, Technical Advisor (Plans), Arnold Engineering Development Center, AFSC, Arnold AF Station, Tenn. . . . **Dr. Carl W. Miller,** from Div. Mgr., Electro-Sciences Dir., Sanders Associates, Inc., Buffalo, N.Y., to P.L. 313 position, Technical Dir. (Electronic Warfare), Dep. for Reconnaissance and Electronic Warfare, ASD, AFSC, Wright-Patterson AFB, Ohio . . . **Mr. Stephen P. Moore,** from Asst., Comptroller, GS-17, to Asst., Financial Management, GS-17, Hq. AFLC, Wright-Patterson AFB, Ohio.

Mr. John M. Myer, from Asst. to Dir. of Maintenance Engineering, to Asst., DCS/Maintenance, GS-17, Hq. AFLC, Wright-Patterson AFB, Ohio . . . **Mr. Jack E. Reynolds,** from Chief, Logistics Systems Div., GS-301-16, Dir., Ops, to Asst., DCS/Distribution, GS-16, Hq. AFLC, Wright-Patterson AFB, Ohio . . . **M/G Felix M. Rogers,** from DCS/Dev. Plans, Hq. AFSC, Andrews AFB, Md., to Sr. Member, UN Command, Military Armistice Commission, Korea . . . **Mr. Aristides Sarris,** from Asst. Dir., Plans and Programs, GS-16, to Asst., Data Automation, GS-16, DCS/Comptroller, Hq. AFLC, Wright-Patterson AFB, Ohio . . . **L/G James T. Stewart,** from DCS/Systems, Hq. AFSC, Andrews AFB, Md., to Cmdr., ASD, Wright-Patterson AFB, Ohio, replacing M/G Lee V. Gossick . . . **Mr. John C. Wren,** from Attorney-Advisor (General), GS-15, to Asst. Gen. Counsel, OSAF, Hq. USAF.

PROMOTIONS: To be **Major General:** Roy M. **Terry.**

RETIREMENTS: B/G Robert A. **Berman;** L/G John S. **Hardy;** B/G Walter R. **Hedrick,** Jr.; B/G Clayton M. **Isaacson;** B/G Edwin L. **Little;** B/G Martin **Menter;** B/G Henry J. **Stehling;** B/G Fred W. **Vetter,** Jr.—END

Maj. Gen. Roy M. Terry was named to the post of Chief of Chaplains, USAF, on August 1. He is a minister of the New York Conference of the United Methodist Church. Except for a brief break following World War II, he has been on active duty since 1942, and had been Deputy Chief of Chaplains since February 1969.

FIVE GREAT AFA INSURANCE PROGRAMS

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Offers equal coverage *at the same low cost* for flying and non-flying personnel. No geographical or hazardous duty restrictions or waiting period. Insurance up to $20,000 *plus* $12,500 accidental death benefit. Cost of insurance has been reduced by dividends for six consecutive years. All Air Force personnel, on active duty, in the National Guard and in the Ready Reserve are eligible to apply.

2 CIVILIAN GROUP LIFE INSURANCE

For non-military members of AFA. $10,000 of protection at exceptionally low cost. Double indemnity for accidental death except when the insured is acting as pilot or crew member of an aircraft. Waiver of premium for disability. Choice of settlement options.

3 FLIGHT PAY INSURANCE

Protects rated personnel on active duty against loss of flight pay through injury or illness. Guaranteed even against pre-existing illnesses after 12 consecutive months in force. Grounded policyholders receive monthly payments (tax free) equal to 80% of flight pay—the equivalent of full government flight pay, which is taxable.

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Offers *all* AFA members worldwide, full-time protection against *all* accidents—*now even including accidents to aircraft pilots and crew members.* Coverage up to $100,000. Two plans: complete, low-cost family protection under the popular Family Plan (including all children under 21), or individual coverage. Includes medical expense benefits, and automatic increases in face value at no extra cost.

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Puts up to $40 a day *cash* in your pocket for every day you or an insured member of your family is hospitalized. *Cash* benefits for up to 365 days. No physical examination required. You use benefits any way you see fit. All AFA members, *active-duty and civilian,* up to Age 60 are eligible to apply.

RETURN THIS COUPON FOR COMPLETE INFORMATION ON ANY OR ALL AFA INSURANCE PLANS

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Insurance Division

1750 Pennsylvania Ave., N.W.
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Address .....

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- ☐ Extra Cash Income Hospital Insurance

9/70

THE UTAH STATE ORGANIZATION . . .

cited for consistent and effective programming that has focused community, state, and national attention on the AFA mission.

An F-4 Phantom tactical jet fighter was recently presented to the Air Force Academy **Cadet Wing** by the **Utah AFA** in ceremonies at the Academy *(see photo on page 27 of the July 1970 issue).*

In his dedicatory address, **Brig. Gen. Robin Olds,** Commandant of Cadets, called the F-4 the "total summation of a pilot's wildest, fondest desire." General Olds is a triple ace and a former F-4 pilot. The aircraft was accepted on behalf of the Cadet Wing by C2C Michael D. McCarty, chairman of the Cadet Heritage Committee.

This particular aircraft, a veteran of many combat hours in Southeast Asia before it received major battle damage, has had everything of value to the Air Force removed and useful items returned to stock at the Ogden Air Materiel Area, which manages the F-4 program for the Air Force. Members of the Utah AFA voluntarily worked more than 1,500 hours in their spare time to restore the wrecked plane, dismantle it, transport it to the Academy, and reassemble it on its permanent pedestal.

Painted in camouflage colors and standard USAF markings—the original tail number, 640799, is emblazoned on the vertical stabilizer—the aircraft looks every inch a first-line fighter. It will be on permanent display at the Academy, to put it in Utah AFA President Harry Cleveland's words, "as a tribute to the men who are attending the institution, who are serving in the Air Force, or who have died in combat." And, we might add, as a tribute to the dedication and devotion of the officers and members of the Utah AFA.

Special guests at the dedication ceremonies included **Gen. John C. Meyer,** Vice Chief of Staff, USAF; **Lt. Gen. Thomas S. Moorman,** Academy Superintendent; **Maj. Gen. Robert H. McCutcheon,** Commander, Ogden Air Materiel Area; **AFA President George D. Hardy; Sanford N. McDonnell,** president of the McDonnell Aircraft Co.; **Brig. Gen. Daniel "Chappie" James, Jr.,** Deputy Assistant Secretary of Defense for Public Affairs; **Brig. Gen. Frank K. Everest, Jr.,** Commander, Air Rescue and Recovery Service (MAC); AFA Rocky Mountain Regional Vice President **Nolan Manfull;** and Colorado AFA President **Richard E. Stanley.**

In recognition of the tireless efforts of the members of the Utah AFA, we are happy to name the **Utah AFA** the "AFA Unit of the Month" for September, and congratulate its officers and members on their sustaining contributions to AFA's mission. And, at the AFA National Convention in Washington, D.C., this month, the Utah AFA will receive an **Exceptional Service Plaque** for this program as the **"Best Single Program"** sponsored by an AFA unit during the period January 1, 1969, through June 30, 1970.

* * *

John F. Loosbrock, Editor and Assistant Publisher of AIR FORCE/SPACE DIGEST, was the keynote speaker at the Tucson, Ariz., Chapter's tenth annual Air Force Appreciation Luncheon, the traditional "kick-off" event for the Aerospace and Arizona Days open house at Davis-Monthan AFB.

In his remarks to the more than 400 civic and military leaders gathered to pay honor to the dedicated personnel of the US Air Force, Mr. Loosbrock said that loose, uninformed criticism of the military has an adverse effect on the solution of various economic, social, and political problems.

"The kind of criticism being leveled at the military today is not the result of a debate. There is no great debate going on at all.

"Instead, preconceived prejudice is thrown out under the guise of intellectual argument. The critics do not talk about the fundamental issue of why we need a military. They ignore the Soviet threat and the reason for military expenditures," he added.

He said further, "We now know the Soviets are ahead in missiles and moving further ahead. And, even with this knowledge, we have politicians, scientists, and educators who say that lead is mythical. How can you arrive at priorities in any issue, foreign or domestic, when you won't face the realities of a dangerous world?

"What we all forget," he said, "is that military spending all comes from federal tax dollars, while spending for things like education and medical care comes largely from other tax sources. Naturally, on the federal budget, defense spending looks large."

Chapter President **William Chandler** presided at the program, and Arizona AFA President **Hugh Stewart** introduced Mr. Loosbrock. The Strategic Air Command Glee Club provided entertainment.

Tucson's "Waiting Wives"—the wives of ten US military men who have been reported missing in action in Vietnam —were special guests at the luncheon.

At the Tucson Chapter's tenth annual Air Force Appreciation Luncheon, Chapter President William Chandler, left, presents John Loosbrock, Editor of AIR FORCE/SPACE DIGEST *and keynote speaker at the luncheon, a copper engraving from Tucson Mayor James Corbett, which designates Mr. Loosbrock an honorary citizen of Tucson (see story above for details).*

Ewing was cited for "outstanding service as a member of the Board of Trustees of the **Aerospace Education Foundation** and for his personal contribution to the mission of

Participants in the Louisiana Air Force Association's recent Convention included, from left to right, Ralph Chaffee, newly elected State Vice President; outgoing State President H. John McGaffigan; Lt. Gen. David Wade, USAF (Ret.), Adjutant-General of Louisiana; and new State President Toulmin Brown.

Bossier-Barksdale Chapter President Ralph Chaffee presided at the luncheon and at the business sessions. Resolutions were adopted supporting President Nixon's policy in Southeast Asia and AFA's efforts in behalf of the POW/MIA situation.

Convention Chairman **Toulmin H. Brown** was elected to succeed State President **H. John McGaffigan.** Other officers elected are: **Ralph Chaffee** and **Lee Lockwood,** Vice Presidents; **Hannah J. Bordelon,** Secretary; and **Dr. Robert Holt,** Treasurer.

Guests included **South Central Regional Vice President Jack T. Gilstrap; Col. Lee Volet,** Commander, 4410th Combat Crew Training Wing, England AFB; **Col. Don Curry,** Inspector General, 2d AF, Barksdale AFB; and **Arkansas AFA President Alexander E. Harris.**

* * *

As part of its effort to support the Junior ROTC in San Francisco high schools, AFA's **San Francisco Chapter** has established a military and aerospace library for the Junior ROTC.

The library was established with books on military and aerospace subjects, donated by Chapter members; the Chapter plans additional donations during the year.

The local press is cooperating in a general publicity campaign to make the public aware of the program and to invite participation by book donations to the library.

(Continued on page 141)

Thomas S. Moorman, Academy Superintendent; **Maj. Gen. Robert H. McCutcheon,** Commander, Ogden Air Materiel Area; **AFA President George D. Hardy; Sanford N. McDonnell,** president of the McDonnell Aircraft Co.; **Brig. Gen. Daniel "Chappie" James, Jr.,** Deputy Assistant Secretary of Defense for Public Affairs; **Brig. Gen. Frank K. Everest, Jr.,** Commander, Air Rescue and Recovery Service (MAC); AFA Rocky Mountain Regional Vice President **Nolan Manfull;** and Colorado AFA President **Richard E. Stanley.**

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The two-day open house at Davis-Monthan drew more than 200,000 persons and featured the **USAF Thunderbirds,** the Army's **Golden Knights,** and North American Rockwell Corp.'s **Bob Hoover,** who demonstrated his flying versatility in his World War II vintage P-51 Mustang and the modern Shrike Commander executive aircraft.

In recognition of this outstanding program and similar programs in the last ten years, the **Tucson Chapter** has been selected to receive a **Special Citation** at the AFA National Convention to be held this month in Washington, D.C.

* * *

The **Louisiana AFA's** 1970 Convention, hosted by the **Monroe Chapter,** was, in every respect, a most successful and effective effort.

The three-day program included a golf tournament, which was won by Arkansas AFA President **Alexander E. Harris;** a reception honoring **Lt. Gen. David Wade,** USAF (Ret.), Louisiana Adjutant-General; a delightful riverboat party aboard the "Twin City Queen"; two business sessions; an awards luncheon; and an opportunity to attend the **Monroe Air Show** at which the **Northeast Louisiana Chapter's** Gen. Claire W. Chennault Memorial Trophy for outstanding airmanship was presented to **Bob Heuer,** an American Airlines captain and the current president of the **International Aerobatic Club.**

In his luncheon address, **Professor Robert C. Snyder,** Chairman of the Department of English and Foreign Languages at the **Louisiana Polytechnic Institute,** warned ". . . that the struggle for freedom and liberty has never been more real. Every single day, the forces of radicalism are gaining strength, converts, adherents, and turncoats whom no one would have believed.

"Recognize and publicize the decorous achievements of youth," he urged. Referring to the "generation gap," he said, "The only generation gap that is extant is the fact that many more have lived longer and know more than some of the so-called know-it-alls who were born yesterday."

During the luncheon program, several Louisiana AFA citations were awarded. The first was posthumously awarded to the late **Robert Ewing, Jr.,** who was Chairman of the Board of the **News-Star-World Publishing Corp.** and the **Shreveport Times** at the time of his recent death. Mr. Ewing was cited for "outstanding service as a member of the Board of Trustees of the **Aerospace Education Foundation** and for his personal contribution to the mission of the Air Force Association." The citation was accepted by Mr. Ewing's daughter, **Mrs. Patricia deBerardinis,** and was presented by General Wade.

Participants in the Louisiana Air Force Association's recent Convention included, from left to right, Ralph Chaffee, newly elected State Vice President; outgoing State President H. John McGaffigan; Lt. Gen. David Wade, USAF (Ret.), Adjutant-General of Louisiana; and new State President Toulmin Brown.

Examining some of the books donated to the military and aerospace library established by the Air Force Association's San Francisco Chapter for the Junior ROTC in the city's high schools, are, from left to right, Col. James H. Farren, USA (Ret.), Senior Army Instructor of the San Francisco ROTC; Cadet Lt. Col. Tom Rose, George Washington High School; Miss Jeannine Stallings and Robert N. Blum, San Francisco Chapter Secretary and Vice President respectively; and Cadet Col. Mark Denekamp, Lowell High School (see text below).

Other awards included presentation of AFA's Silver Medal to AFROTC **Cadet Col. William L. Roberts, II,** a student at Louisiana Tech; a posthumous citation to the late **Az Taylor,** a past president of the **Alexandria Chapter;** and a posthumous citation to the late **Lt. Col. L. E. Snider, Jr.,** USAF (Ret.). **Mrs. Hazel Snider,** Gold Star mother of Colonel Snider and a member of the **Ark-La-Tex Belle Chapter,** accepted the citation.

Former **Louisiana Governor James A. Noe** received an honorary membership in the **Northeast Louisiana Chapter** for "service and generous support over a period of years." The Chapter's Secretary, **Walter E. Kotz,** made the presentation.

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(Continued on page 141)

THIS IS AFA

The Air Force Association is an independent, nonprofit airpower organization with no personal, political, or commercial axes to grind; established January 26, 1946, incorporated February 4, 1946.

Objectives

• The Association provides an organization through which free men may unite to fulfill the responsibilities imposed by the impact of aerospace technology on modern society; to support armed strength adequate to maintain the security and peace of the United States and the free world; to educate themselves and the public at large in the development of adequate aerospace power for the betterment of all mankind; and to help develop friendly relations among free nations, based on respect for the principles of freedom and equal rights for all mankind.

Membership

Active Members: US citizens who support the aims and objectives of the Air Force Association, and who are not on active duty with any branch of the United States armed forces—$7 per year.

Service Members (nonvoting, nonofficeholding); US citizens on extended active duty with any branch of the United States armed forces—$7 per year.

Cadet Members (nonvoting, nonofficeholding): US citizens enrolled as Air Force ROTC Cadets, Civil Air Patrol Cadets, or Cadets of the United States Air Force Academy—$3.50 per year.

Associate Members (nonvoting, nonofficeholding); Non-US citizens who support the aims and objectives of the Air Force Association whose application for membership meets AFA constitutional requirements—$7 per year.

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State Contacts

Following each state name, in parentheses, are the names of the localities in which AFA Chapters are located. Information regarding these Chapters, or any place of AFA's activities within the state, may be obtained from the state contact.

ALABAMA (Auburn, Birmingham, Huntsville, Mobile, Montgomery, Selma): **Dr. Boyd E. Macroy,** 3721 Princeton Rd., Montgomery, Ala. 36111 (phone 293-6871).

ALASKA (Anchorage, Fairbanks, Kenai, Nome): **Gordon Wear,** Box 777, Fairbanks, Alaska 99701 (phone 452-4411).

ARIZONA (Phoenix, Tucson): **Hugh P. Stewart,** 709 Valley Bldg., Tucson, Ariz. 85705 (phone 622-3357).

ARKANSAS (Fort Smith, Little Rock): **Alex E. Harris,** 3700 Cantrell Rd., Apt. 612, Little Rock, Ark. 72202 (phone 664-1915).

CALIFORNIA (Antelope Valley, Burbank, Chico, El Segundo, Fairfield, Fresno, Harbor City, Long Beach, Los Angeles, Monterey, Newport Beach, Norwalk, Novato, Pasadena, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, Santa Barbara, Santa Clara County, Santa Monica, Tahoe City, Vandenberg AFB, Van Nuys, Ventura): **Gene DeVisscher,** 2775 Cottage Way, Sacramento, Calif. 95825 (phone 487-7818).

COLORADO (Boulder, Colorado Springs, Denver, Pueblo): **R. E. Stanley,** 7644 Heath Dr., Colorado Springs, Colo. 80907 (phone 473-3154).

CONNECTICUT (Torrington): **Cecil H. Gardner,** 21 Field Rd., Cos Cob, Conn. 06807 (phone 869-3146).

DELAWARE (Wilmington): **Vito A. Panzarino,** Greater Wilmington Airport, Bldg. 1504, Wilmington, Del. 19720 (phone 328-1208).

DISTRICT OF COLUMBIA (Washington, D. C.): **Robert J. Schissell,** 1700 Pennsylvania Ave., N. W., Washington, D. C. 20006 (phone 223-4430).

FLORIDA (Bartow, Daytona Beach, Fort Lauderdale, Eglin AFB, Gainesville, Homestead, Jacksonville, Miami, Orlando, Panama City, Patrick AFB, Redington Beach, Tampa): **Taylor Drysdale,** 5526 Parkdale Dr., Orlando, Fla. 32809 (phone 855-3632).

GEORGIA (Savannah, St. Simons Island, Valdosta, Warner Robins): **William H. Kelly,** 241 Kensington Dr., Savannah, Ga. 31402 (phone 964-1941).

HAWAII (Honolulu): **John H. Felix,** Suite 2012, 1441 Kapiolani Blvd., Honolulu, Hawaii 96813 (phone 946-8080).

IDAHO (Boise, Burley, Pocatello, Rupert, Twin Falls): **Donald M. Riley,** 6925 Copper Dr., Boise, Idaho 83704 (phone 375-2948).

ILLINOIS (Champaign, Chicago, Elmhurst, La Grange, Park Forest, Peoria): **Ludwig Fahrenwald, III,** 108 N. Ardmore, Villa Park, Ill. 60181 (phone 832-6566).

INDIANA (Indianapolis): **George L. Hufford,** 419 Highland Ave., New Albany, Ind. 47150.

IOWA (Cedar Rapids, Des Moines): **Ric Jorgensen,** 4005 Kingsmen, Des Moines, Iowa 50311 (phone 255-7656).

KANSAS (Wichita): **Don C. Ross,** 10 Linwood, Eastborough, Wichita, Kan. 67201 (phone 686-6409).

LOUISIANA (Alexandria, Baton Rouge, Bossier City, Lafayette, Monroe, New Orleans, Ruston, Shreveport): **Toulmin H. Brown,** 6931 E. Ridge Dr., Shreveport, La. 71105 (phone 853-0293).

MARYLAND (Baltimore): **Henry R. Johnston,** 106 Taplow Rd., Baltimore, Md. 21212 (phone 435-3366).

MASSACHUSETTS (Boston, Florence, Lexington, Northampton, Plymouth, Randolph, Saugus, Taunton, Worcester): **Andrew W. Trushaw, Jr.,** 204 N. Maple St., Florence, Mass. 01060 (phone 584-5327).

MICHIGAN (Battle Creek, Dearborn, Detroit, Kalamazoo, Lansing, Mount Clemens): **Marjorie O. Hunt,** P. O. Box 822, Mount Clemens, Mich. 48043 (phone 463-1528).

MINNESOTA (Duluth, Minneapolis, St. Paul): **Victor Vacanti,** 8941 10th Ave., Minneapolis, Minn. 55420 (phone 888-4240).

MISSISSIPPI (Biloxi, Jackson): **M. E. Castleman,** 5207 Washington Ave., Gulfport, Miss. 39501 (phone 863-6526).

MISSOURI (Kansas City, Springfield, St. Louis): **Rodney G. Horton,** 4314 N. E. 53d St., Kansas City, Mo. 64119 (phone 452-7834).

NEBRASKA (Lincoln, Omaha): **Lloyd Grimm,** P. O. Box 1477, Omaha, Neb. 68101 (phone 553-1812).

NEVADA (Las Vegas): **Barney Rawlings,** 2617 Mason Ave., Las Vegas, Nev. 89102 (phone 735-5111).

NEW HAMPSHIRE (Pease AFB): **R. L. Devoucoux,** 270 McKinley Rd., Portsmouth, N. H. 03801 (phone 624-4011).

NEW JERSEY (Atlantic City, Belleville, Chatham, Fort Monmouth, Jersey City, McGuire AFB, Newark, Paterson, Trenton, Wallington): **James P. Grazioso,** 208 63d St., West New York, N. J. 07093 (phone 867-5272).

NEW MEXICO (Alamogordo, Albuquerque, Roswell): **Pat Sheehan,** P. O. Box 271, Albuquerque, N. M. 87103 (phone 255-7629).

NEW YORK (Binghamton, Buffalo, Elmira, Forest Hills, Freeport, Ithaca, Kew Gardens, Lakewood, Newburgh, New York City, Patchoque, Plattsburgh, Rochester, Rome, Staten Island, Sunnyside, Syracuse, White Plains): **William C. Rapp,** Suite 1400, 1 M&T Plaza, Buffalo, N. Y. 14203 (phone 857-6871).

NORTH CAROLINA (Fayetteville, Raleigh): **Edwin A. Capps,** 4913 Yadkin Dr., Raleigh, N. C. 27609 (phone 829-7196).

OHIO (Akron, Canton, Cincinnati, Cleveland, Columbus, Dayton, Youngstown): **Bernard D. Osborne,** 3046 Tralee Trail, Dayton, Ohio 45430 (phone 255-2581).

OKLAHOMA (Altus, Enid, Oklahoma City, Tulsa): **Ed MacFarland,** Suite 1100, Shell Building, Tulsa, Okla. 74119 (phone 583-1877).

OREGON (Corvallis, Portland): **Robert Ringo,** 605 S. W. Jefferson St., Corvallis, Ore. 97330 (phone 753-4482).

PENNSYLVANIA (Allentown, Ambridge, Erie, Harrisburg, Lewistown, Philadelphia, Pittsburgh, Wayne): **Gilbert E. Petrina,** Box 113, RD #1 Hershey, Pa. 17033 (phone 367-3368).

RHODE ISLAND (Warwick): **Matthew Puchalski,** c/o 143 SOG RIANT, T. F. Green Airport, Warwick, R. I. 02886 (phone 737-2100, ext. 27).

SOUTH CAROLINA (Charleston, Columbia, Myrtle Beach): **James F. Hackler, Jr.,** Box 2065, Myrtle Beach, S. C. 29577 (phone 449-3331).

SOUTH DAKOTA (Sioux Falls): **Don Hedlund,** 2701 W. 24th St., Sioux Falls, S. D. 57105.

TENNESSEE (Memphis, Nashville): **Enoch B. Stephenson,** 4318 Esteswood Dr., Nashville, Tenn. 37215 (phone 244-6400).

TEXAS (Abilene, Amarillo, Austin, Big Spring, Corpus Christi, Dallas, Del Rio, El Paso, Fort Worth, Houston, Lubbock, San Angelo, San Antonio, Sherman, Waco, Wichita Falls): **B. L. Cockrell,** CMR Box 41594, Kelly AFB, Tex. 78241 (phone 925-4408).

UTAH (Bountiful, Brigham City, Clearfield, Hill AFB, Ogden, Salt Lake City, Springville): **Harry L. Cleveland,** 224 N. Jackson Ave., Ogden, Utah 84404 (phone 777-3466).

VERMONT (Burlington): **R. F. Wissinger,** 158th CAM SD. Burlington International Airport, Vt. 05401 (phone 863-4494).

VIRGINIA (Arlington, Danville, Hampton, Lynchburg, Norfolk, Richmond, Roanoke, Staunton): **Richard C. Emrich,** 6416 Noble Dr., McLean, Va. 22201 (phone 962-0710).

WASHINGTON (Bellevue, Port Angeles, Seattle, Spokane, Tacoma): **Clyde Stricker,** P. O. Box 88850, Seattle, Wash. 98188 (phone 534-2396 or 244-8650).

WEST VIRGINIA (Clarksburg): **Nelson Matthews,** 248 E. Main St., Clarksburg, W. Va. 26301 (phone 624-1490).

WISCONSIN (Madison, Milwaukee): **Lyle W. Ganz,** 1536 N. 69th St., Wauwatosa, Wis. 53213 (phone 444-4442).

WYOMING (Cheyenne): **Conley B. Stroud, Jr.,** 6421 Evers Blvd., Cheyenne, Wyo. 82001 (phone 638-9517).

Referring to the program, **Chapter President Arthur Trost** said, "In this day, when ROTC has become the target of dissidents, we welcome this opportunity to demonstrate our faith in the ROTC program. These books will assist the ROTC in its program of citizenship training and will help motivate our high school cadets toward future participation in space-age technological fields."

We congratulate the officers and members of the **San Francisco Chapter** on this excellent program, and extend our best wishes for success.

* * *

In this twenty-fifth anniversary year, it is appropriate for AFA to pay tribute to a sister organization and include a brief history of that organization—the **Polish Air Force Association**—in the "family news" section of our magazine.

At the conclusion of hostilities in Europe in World War II, unable to return to their homeland because of their complete inability to accept the Communist regime established in Poland, the men and women of the Free Polish Air Force dispersed to the far corners of the earth. Gradually these small colonies of Polish AF personnel formed what are now known as the Polish Air Force Associations, in an attempt to initiate a universal organization of men and women who could continue the common bonds of friendship formed during the war years, and to work voluntarily for charitable causes and social and cultural needs of the society in which they live.

Thus, only six weeks after the conclusion of hostilities in Europe, the Association's first wing was formed in London, England, on June 24, 1945. Wings are now active in eight other cities in England, and in Argentina, Africa, Australia, Brazil, Canada, and the United States.

In the United States, the wings are located in the cities of **Buffalo, Chicago, Detroit, Los Angeles, New York,** and **Philadelphia.**

We in AFA congratulate the Polish Air Force Association on its twenty-fifth anniversary and wish it continued success in its charitable endeavors and in efforts to keep alive the ideals of freedom and human dignity in the hope that their homeland, now under the yoke of tyranny, may someday again be free.

During a program sponsored recently by the Greater Pittsburgh Chapter, AFA's Northeast Regional Vice President, Judge John G. Brosky, was promoted to lieutenant colonel in the CAP and assigned to Pennsylvania's CAP Wing as its legal officer. In the photo, Lt. Col. A. A. Milano, right, Wing Commander, pins on the silver leaf as Lt. Edmond J. Gagliardi, left, and Lt. Col. Leonard W. Carr observe the ceremony.

* * *

CROSS COUNTRY . . . Michigan AFA President Marjorie O. Hunt advises us that three copies of AIR FORCE/SPACE DIGEST have been included in a box of materials and documents buried in the cornerstone of the new Macomb County Court House. Supposedly, the box will be opened a century from now. . . . The **Spokane, Wash., Chapter** obtained a surplus F-86 jet fighter from the Maryland Air National Guard and donated the airplane and a

(Continued on following page)

At a recent banquet sponsored by AFA's Front Range Chapter of Denver, Colo., these gentlemen above were honored with memberships in the Colorado Barons, a group of Denver-area AFAers organized to assist in the promotion of aerospace education activities. Shown above, from left to right, are Chapter President Roy Haug; Maj. Gen. D. O. Montieth, Commander, Lowry Technical Training Center; Ed Mack Miller, aviation writer and United Airlines Senior Instructor; AFA President George D. Hardy; Denver Mayor William McNichols; Chapter Vice President Noel Bullock; and Astronaut Wally Schirra.

Lt. Gen. Jay T. Robbins, center, Tactical Air Command Vice Commander, was the featured speaker at a recent meeting of AFA's Alamo, Tex., Chapter. Host for the banquet, held at Lackland AFB, was Maj. Gen. G. B. Greene, Jr., left, Commander, Lackland Military Training Center. Chapter President, Brig. Gen. Dorr E. Newton, Jr., USAF (Ret.), presided.

An aerospace exhibit cosponsored by AFA's South Bay, Calif., Chapter and the Space Science Explorer Post of TRW Systems Group at Redondo Beach was judged "The Best Aerospace Exhibit" in Torrance's Armed Forces Day. Mayor Kenneth Miller, right, presents the trophy to, from left, Walter Lull, Chapter Vice President, and Jeannette Johnson, Secretary.

permanent mounting to the Lakeland Village School for the Mentally Retarded, for use as playground equipment. The J47 engine will be donated to the Spokane Community College for laboratory study. **Clyde Stricker** and **Clarence Miles,** Washington AFA President and Vice President, respectively, participated in presentation ceremonies.

AFA President George D. Hardy recently addressed more than 300 Electronic Systems Division officers at a Commander's Call held in the Officers' Club at Hanscom Field, Mass. That evening, Mr. Hardy was the guest speaker at a joint meeting of the Hanscom and Minuteman Chapters. **New England Regional Vice President Edward Nedder** and **National Director Joseph Assaf** were guests at the meeting.

Much credit is due the **Middle Georgia Chapter** for its efforts in obtaining approval from the University System of Georgia Board of Regents for the creation of a four-year **Robins Resident Center,** through which Robins AFB military and civilian personnel can work toward college degrees. **Chapter President Dr. Dan Callahan** noted that the entire membership of the Chapter "worked to promote this development. . . . We recognize the significance of education in industry, and in the technological world of Robins AFB."

* * *

IN SYMPATHY . . . AFA extends its deepest sympathy to the family of **Walter O. "Spike" Briggs, Jr.,** who died on July 3, 1970. Mr. Briggs, a former president of the Detroit Tigers baseball team and one of the early leaders in AFA's Michigan Wing, was, at the time of his death, a lieutenant colonel in the Air Force Reserve.

* * *

CONGRATULATIONS . . . To **Maj. Gen. Frank A. Bailey,** Commander, Arkansas Air National Guard, on the recent confirmation of his promotion to the rank of major general . . . To **Lt. Col. Stephen Harrison** on his retirement on July 31 after more than twenty-two years of active duty with the Air Force. Colonel Harrison was the keynoter at the opening ceremonies of AFA's 1969 National Convention in Houston, Tex., and was a frequent participant in AFA programs at all levels. He plans to make his home in Waco, Tex.

* * *

COMING EVENTS . . . **Massachusetts AFA Convention,** Hanscom Field, September 11-12 . . . **AFA National Convention and Aerospace Development Briefings and Displays,** Washington, D.C., September 21-24 . . . **Pennsylvania AFA Convention,** Erie, October 9-10 . . . **Michigan AFA Convention,** Detroit, October 16-18 . . . **New Jersey AFA Convention,** Teterboro Airport, October 16-18 . . . **Alabama AFA Convention,** Montgomery, October 16-18 . . . **Florida AFA Convention,** Orlando, November 6-8 . . . **Utah AFA Convention,** Salt Lake City, November 20-21 . . . **Virginia AFA Convention,** Langley AFB, November 21 . . . **Wisconsin AFA Convention,** Milwaukee, November 21.

—By Don Steele

During recent ceremonies in Chicago, AFA National Director Lee Cordell, second from right, and Illinois AFA President Ludwig Fahrenwald, III, right, presented an Illinois AFA Citation to Lt. Col. Joe Moore, third from right, commander and leader of the USAF Thunderbirds, as other members of the team look on.

Robert F. Kennedy Stadium, Washington —site of the Oct. 17 Navy-Air Force game

The Air Force Academy football team won six of 10 games last fall and, with 25 lettermen including All-America wide receiver Ernie Jennings returning in 1970, Coach Ben Martin hopes to improve on that performance this season. Navy fell upon evil times in 1969 but the Midshipmen have plenty of ambition for '70 and a stockpile of new talent from last year's unbeaten Plebe team.

NAVY vs. AIR FORCE / A First for Washington, D.C.

For the first time ever, two service academy football teams will play in our Nation's Capital this fall.

The historic meeting pairs Navy and Air Force in the 50,000-seat Robert F. Kennedy Stadium on Saturday, Oct. 17th. Kickoff is at 2:00 p.m. (EDT).

Pre-game festivities will include a march-on by approximately 600 Cadets from the Air Academy in Colorado Springs and the entire 4,200-man Brigade from Annapolis.

This is the fourth renewal of the young service series that got its start at Baltimore in 1960. Navy won that first game 35-3, but Air Force has taken both of the contests since —15-6 at Colorado Springs in 1966 and 26-20 at Chicago in 1968.

Washington has been a virtual stranger to college football since George Washington University last played in Kennedy Stadium, on November 24, 1966.

Navy made its last previous appearance in the Capital five years ago. The Midshipmen beat Pittsburgh 12-0 and improved their D.C. record to 3-0. In two earlier games, Navy topped George Washington in 1958 and the University of Virginia in 1934.

It will be only the second Washington visit for the Falcons. Air Force was the guest in 1957 when George Washington scored a 20-0 verdict over the visitors, then playing only their second season of varsity football.

"We are pleased to be playing Air Force in what seems like ideal surroundings for a showdown between two service academy teams," Navy athletic director J. O. Coppedge says. "We look for a close, hotly contested battle. The color and excitement that always accompany such a meeting should help to make Navy-Air Force doubly attractive to football fans of all ages and persuasions."

Forzano, Martin Offer Coaching Contrasts

With 13 seasons behind him, Air Force's Ben Martin is the "granddaddy" of service academy football coaches.

On the other end of the spectrum is Rick Forzano of Navy, who will mark his second season as head man of the Midshipmen this fall.

As a player, Ben Martin, who curiously enough attended the Naval Academy, was an All-America end in the mid-1940s.

Rick Forzano's own playing days ended on the Akron, Ohio, sandlots when he suffered a disabling eye injury as a high school sophomore.

Such are the contrasts between the two coaches who will lead Navy and Air Force into this fall's service battle at Washington, D.C.

Martin is looking for his third straight winning season at Colorado Springs, a feat never previously accomplished in Falcon football history. His clubs have been 6-4 and 7-3 the past two campaigns.

At Navy, Forzano is anxious for a strong rebound from last fall's 1-9 disappointment. With 26 holdover lettermen and enough sophomore talent to generate some excitement, Forzano expects the Midshipmen to spring some surprises.

Navy's Rick Forzano

USAF's Ben Martin

Bowl games feature the background of both men.

In 1959, Martin's 9-0-2 Falcons played Texas Christian to a 0-0 standoff in the Cotton Bowl. He took Air Force to the Gator Bowl following a 7-3 campaign in 1963.

Forzano was assistant (of defensive backs) under Wayne Hardin when Navy went to the 1961 Orange and 1963 Cotton Bowls.

(Clip and Mail)

TO: Business Office
Naval Academy Athletic Association
U.S. Naval Academy
Annapolis, Maryland 21401

_____
(PRINT—last name, initials)

I hereby apply for:

_____ Navy-Air Force tickets @ $6.00 ..... $.....
Add 50¢ for Insurance, Postage, Handling ..... $.....
TOTAL $.....

Send Tickets to: **Print Carefully**

Name _____

Street _____

City _____ State _____ Zip _____

(All ticket applications should be accompanied with a certified check or money order.)

AFA'S BOLDEST, NEWEST

EXTRA INCOME

THREE PLANS TO CHOOSE FROM

☐ MEMBER ☐ MEMBER & SPOUSE ☐ ENTIRE FAMILY

WHAT IS AFA EXTRA INCOME HOSPITAL INSURANCE?

For every day you (or members of your family, if you have elected family coverage) are hospitalized AFA sends you money for up to 365 days . . . money you can use as you wish, without restrictions of any kind.

WHO IS ELIGIBLE?

Any United States citizen under the age of 60 who is or becomes a member of the Air Force Association is eligible to apply for AFA Extra Income Hospital Insurance for himself, his spouse, and unmarried children more than 14 days and less than 21 years of age.

HOW ARE BENEFITS PAID?

Once AFA receives verification that hospitalization has taken place, you will receive a benefit check within seven days with additional checks thereafter on a weekly basis upon AFA receiving certification of your continued hospitalization.

FIRST TIME OFFERED TO ACTIVE DUTY MILITARY PERSONNEL

HOW MUCH EXTRA INCOME DO YOU NEED? CHOOSE THE BENEFIT AMOUNT YOU REQUIRE FROM THIS FLEXIBLE GROUP PLAN!

1. You are the key to family finances. How much extra money would your family need if you were hospitalized? Check Plans A-1 and AA-1.

2. Does part of the family income depend on a working spouse? Would a cook, or maid or housekeeper be needed during a wife's hospitalization? How much would this, and other expenses cost? Check Plans A-2 and AA-2.

3. If you have a family, you should consider providing extra income for children's hospitalization. Accidents involving whole families *do* happen, especially with military families living around the world. Check Plans A-3 and AA-3.

And remember: Benefits are paid up to 365 days of hospital confinement for *each* accident or sickness for *each* insured person while the patient is under the care of a legally qualified Doctor of Medicine.

BENEFIT SCHEDULE

PLAN	INDIVIDUAL PLAN MEMBER	LIMITED FAMILY PLAN AND SPOUSE	FULL FAMILY PLAN AND CHILDREN
A	$20/DAY	$15/DAY	$10/DAY
AA	$40/DAY	$30/DAY	$20/DAY

COST SCHEDULE

INDIVIDUAL PLAN — PLAN A-1 [Member: $20 per day]

LIMITED FAMILY PLAN — PLAN A-2 [Member: $20 per day; Spouse: $15 per day]

FULL FAMILY PLAN — PLAN A-3 [Member: $20 per day; Spouse: $15 per day; Children: $10 per day]

Member's Age	Annual	Semi-Annual	Annual	Semi-Annual	Annual	Semi-Annual
Under 40	$ 29.00	$15.50	$ 59.00	$ 30.50	$ 74.00	$ 38.00
40-49	$ 37.00	$19.50	$ 72.00	$ 37.00	$ 86.00	$ 44.00
50-59	$ 53.00	$27.50	$103.00	$ 52.50	$118.00	$ 60.00
60-64	$ 76.00	$39.00	$147.00	$ 74.50	$162.00	$ 82.00

PLAN AA-1 [Member: $40 per day]

PLAN AA-2 [Member: $40 per day; Spouse: $30 per day]

PLAN AA-3 [Member: $40 per day; Spouse: $30 per day; Children: $20 per day]

Member's Age	Annual	Semi-Annual	Annual	Semi-Annual	Annual	Semi-Annual
Under 40	$ 54.00	$28.00	$107.00	$ 54.50	$134.00	$ 68.00
40-49	$ 68.00	$35.00	$132.00	$ 67.00	$159.00	$ 80.50
50-59	$100.00	$51.00	$195.00	$ 98.50	$222.00	$112.00
60-64	$147.00	$74.50	$284.00	$143.00	$312.00	$157.00

WHY DO YOU NEED EXTRA INCOME HOSPITAL INSURANCE?

Hospital costs for Non Military Families are climbing out of sight!

In 1966, according to the American Hospital Association, average *total cost* per hospital admission was $380.39 — *up 412%* in just 20 years.

Average 1966 cost per hospital day, over an average hospitalization of 7.9 days, was $48.15 — a figure which includes only basic costs.

And costs are going higher. Other authorities estimate that average cost per hospital day may reach $100 by 1980.

Would your present hospital benefits begin to cover this cost? Do they even cover today's costs?

Military Families Can Have Severe Money Losses Caused By Hospitalization

Military families as well as civilian families can be financially hurt by the indirect expenses of hospitalization and serious illness.

Even if every cent of direct hospital cost is covered by government benefits (or hospital insurance) there may be hundreds or thousands of dollars in indirect losses. For example:

Loss of income, especially when more than one member of the family works

Extra travel expense (sometimes for long distances) for other family members

Cost of housekeeper or "sitters"

Special diets, sometimes for long periods

Expense of special home care.

AFA EXTRA INCOME HOSPITAL INSURANCE PROVIDES THIS MONEY. BENEFITS ARE PAID DIRECTLY TO YOU — AND YOU USE THIS MONEY TO BEST SUIT YOUR NEEDS.

INSURANCE PROGRAM

HOSPITAL INSURANCE

Pays CASH benefits up to $40 per hospital day for each insured person!

All AFA members — military and civilian — and their families are eligible.

OTHER BENEFITS

Protected AFA members may continue their coverage at the low, group rate to Age 65, or until they become eligible for Medicare, whichever is earlier. Hospitalization for **all** sicknesses and accidents is covered, except for a few standard exceptions listed under "Exclusions."

LIMITATIONS

Hospital confinements separated by less than three months for the same or related conditions will be considered continuations of the same confinement.

Coverage will continue through the life of the master policy unless terminated for whichever of the following reasons occurs first for the protected person: (a) attains age 65; or (b) becomes eligible for Medicare; or (c) AFA membership dues are due and unpaid; or (d) a premium payment is due and unpaid. For dependents, coverage will continue through the life of the master policy unless terminated for whichever of the following reasons occurs first: (a) such dependent ceases to be an eligible dependent; or (b) the protected person's insurance terminates hereunder; or (c) the dependent spouse either attains age 65 or becomes eligible for Medicare; or (d) any required dependent premium payment is due and unpaid.

EXCLUSIONS

The plan does not cover losses resulting from (1) declared or undeclared war or act of war; (2) service in the armed forces of a country *other than the United States;* (3) acts of intentional self destruction or attempted suicide while sane or insane; (4) pregnancy (including childbirth or resulting complications); (5) confinement in any institution primarily operated as a home for the aged or engaged in the care of drug addicts or alcoholics; (6) illnesses for which the insured has received medical treatment or advice or has taken prescribed drugs or medicines within 12 months prior to the effective date of his insurance. Coverage for such pre-existing illnesses will begin after 12 consecutive months during which he is covered under the policy and receives no such medical treatment or advice and takes no such prescribed drugs or medicine; (7) hospital confinement commencing prior to the date the protected person or eligible dependent becomes insured under this policy.

HOW TO APPLY

Fill out the attached application and mail it to AFA with your first premium payment. You may elect to pay premiums either annually or semi-annually.

APPLICATION

AFA EXTRA INCOME HOSPITAL INSURANCE

Underwritten by ***Mutual of Omaha Insurance Co.*** *Omaha, Nebraska*

NAME

ADDRESS

CITY STATE ZIP

DATE OF BIRTH CURRENT AGE HEIGHT WEIGHT SEX

PLAN OF INSURANCE

MEMBER ONLY	MEMBER & SPOUSE	MEMBER SPOUSE & CHILDREN
☐ PLAN A-1	☐ PLAN A-2	☐ PLAN A-3
☐ PLAN AA-1	☐ PLAN AA-2	☐ PLAN AA-3

METHOD OF PAYMENT ☐ Annual ☐ Semi-Annual

This insurance coverage may only be issued to AFA members. Please check the appropriate box:

☐ I am currently an AFA member.

☐ I enclose $7 for annual AFA dues (includes subscription ($6) to to AIR FORCE/SPACE DIGEST).

I enclose my initial premium in the amount of $_____ (Refer to premium table to determine correct premium amount.)

Please complete this section only if you are requesting coverage for dependents (Limited Family or Family Plan) and list only those persons for whom you are requesting coverage.

FULL NAME	RELATIONSHIP TO AFA MEMBER	SEX	DATE OF BIRTH
	WIFE (HUSBAND)		
	child		
	child		
	child		
	child		
	child		
	child		

In applying for this insurance coverage, I understand and agree that:

1. coverage shall become effective on the last day of the calendar month during which my application together with the proper premium amount is mailed to AFA.
2. only hospital confinements commencing after the effective date of insurance are covered, and
3. any condition for which I or any of my eligible dependents received medical treatment or advice or have taken prescribed drugs or medicine within twelve months prior to effective date of the insurance coverage will not be covered until the expiration of twelve consecutive months of insurance coverage without medical treatment or advice or having taken prescribed drugs or medicine for such condition.

DATE SIGNATURE

Application must be accompanied by check or money order. **Send remittance to:**

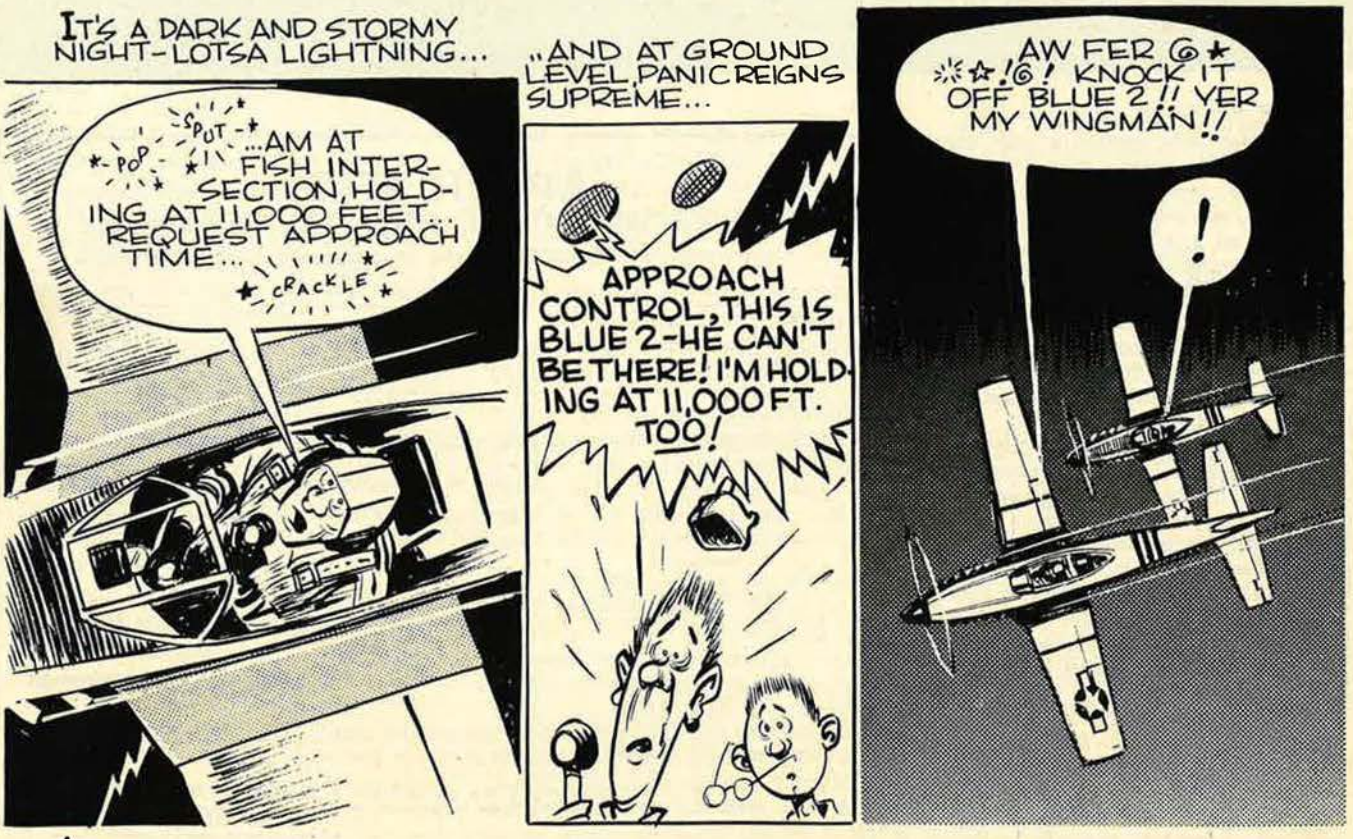
INSURANCE DIVISION, AFA, 1750 PENNSYLVANIA AVE., N.W., WASHINGTON, D.C. 20006

Form 2332MGC App. 9-70

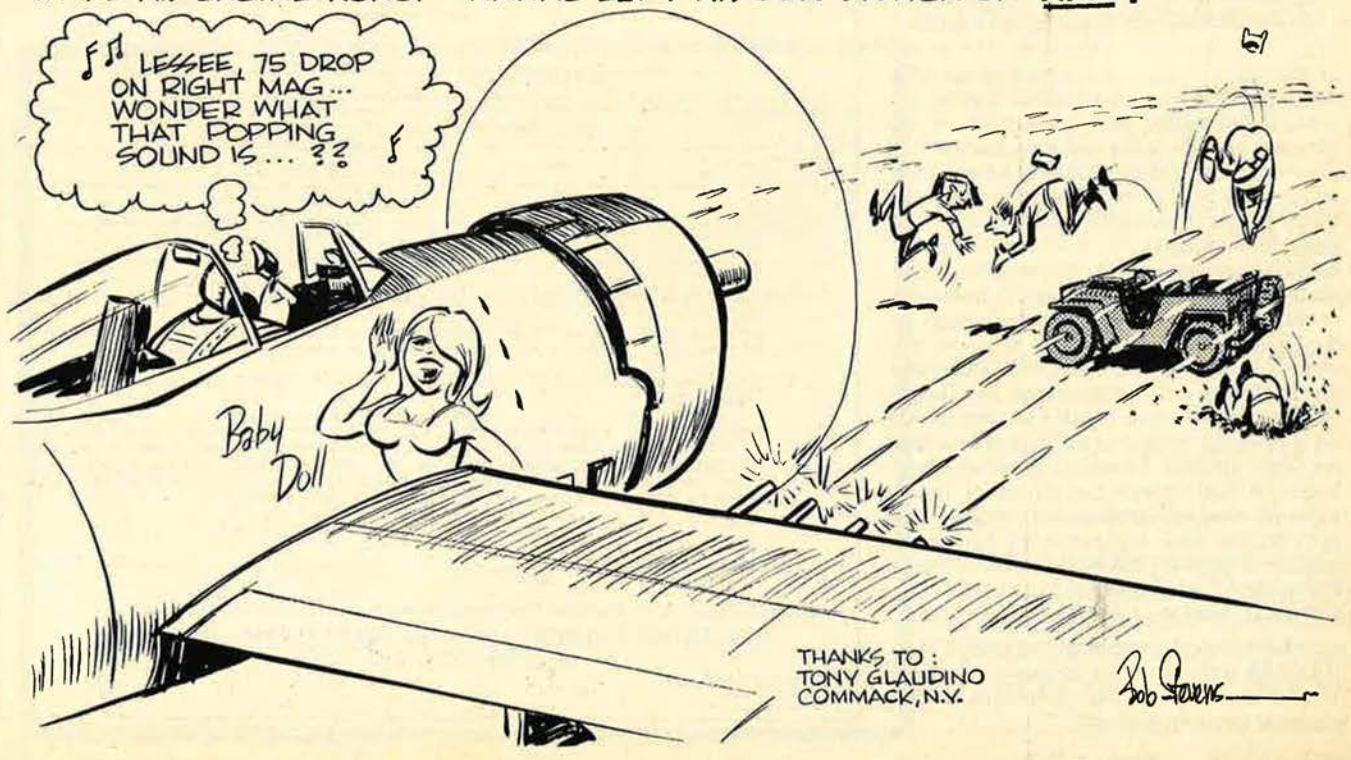
Bob Stevens'

"There I was..."

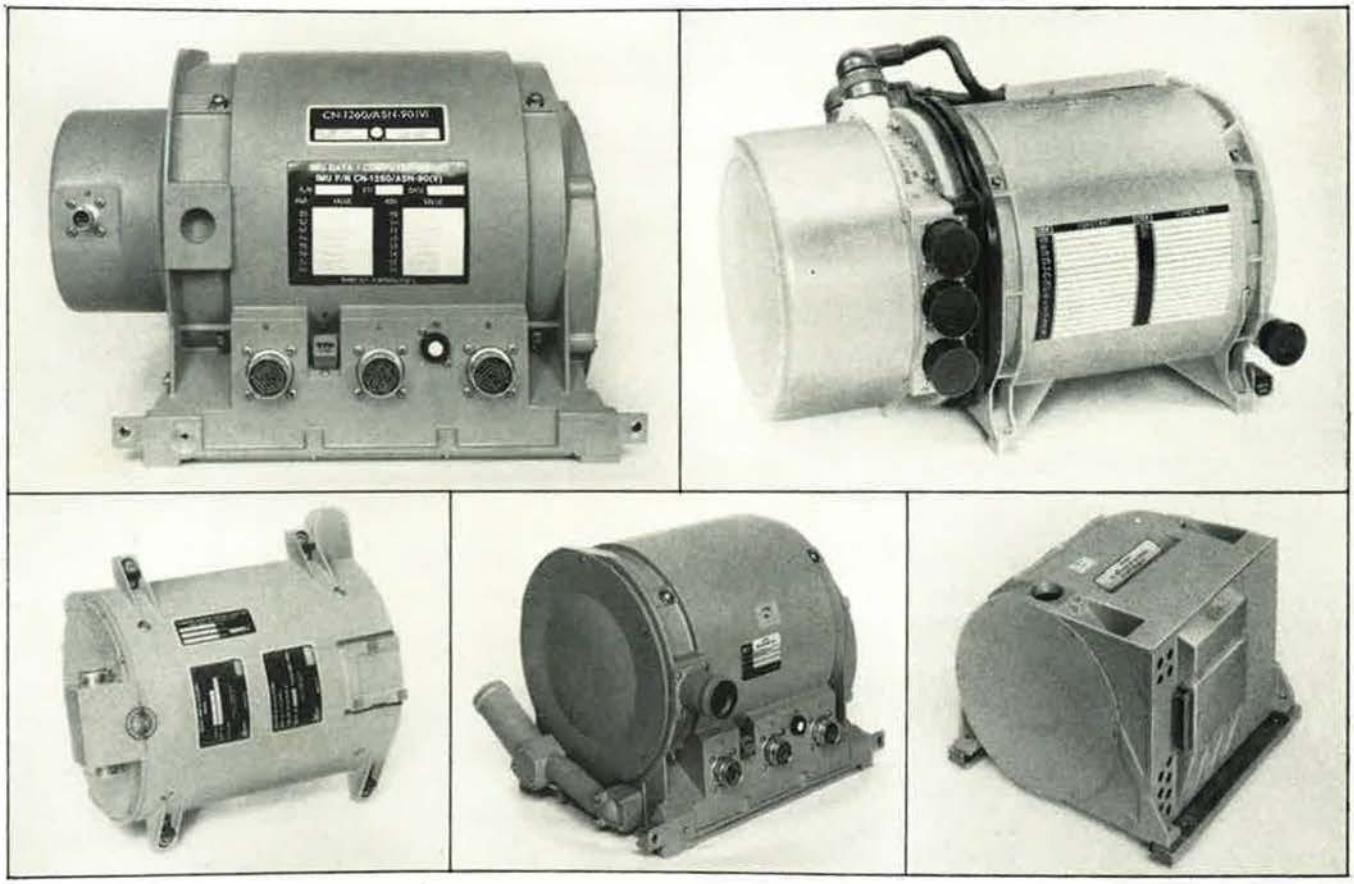
We trained and we trained and we trained, and we knew the gadgets and the gimmicks cold. Or that's what we thought when we got our wings. But somehow, in the cold reality of flight, not everything came up roses . . .



AND THEN THERE'S THE CLOWN WHO PULLS BACK THE STICKGRIP TO MAKE HIS ENGINE RUNUP--HAVING LEFT HIS GUN SWITCH ON '**ARM**'.



Don't gamble on "paper" inertial systems.



Today's surest bet in inertial systems is Kearfott's KT-70 series.

Over 500 of these systems have been delivered and are operational. They have brought to the services an unprecedented high order of performance—in terms of function, reliability and low cost of acquisition and ownership.

These systems employ sensor technologies that are a generation ahead of competing systems. And they have recorded an unmatched history of documented successes.

When you're ready to choose an inertial system, choose one you know will work. One that's already working for the A-7D/E, P-3C, F-105, SRAM, and soon for the L-1011. A Kearfott KT-70 system.

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