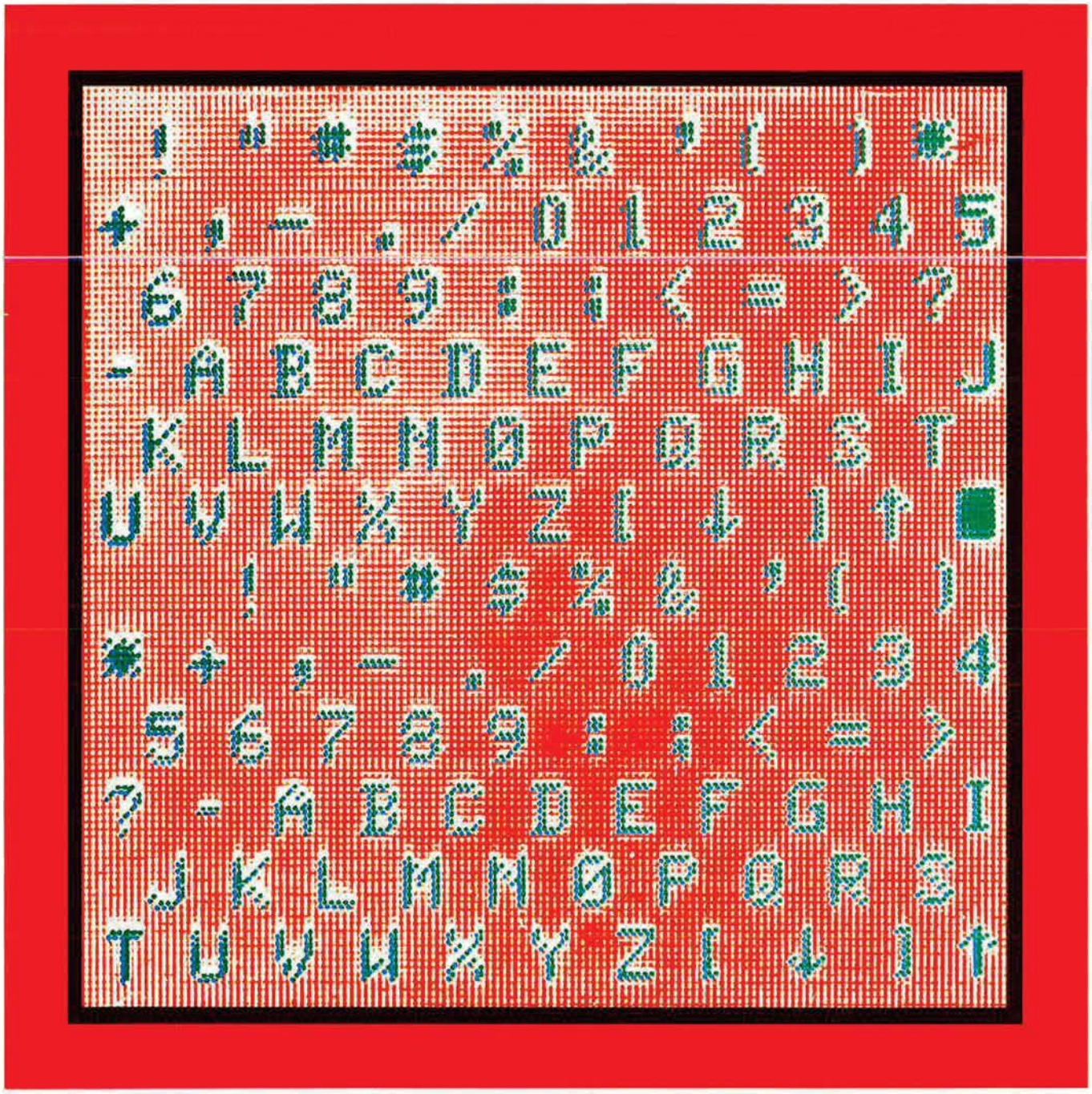
JULY 1973/$1

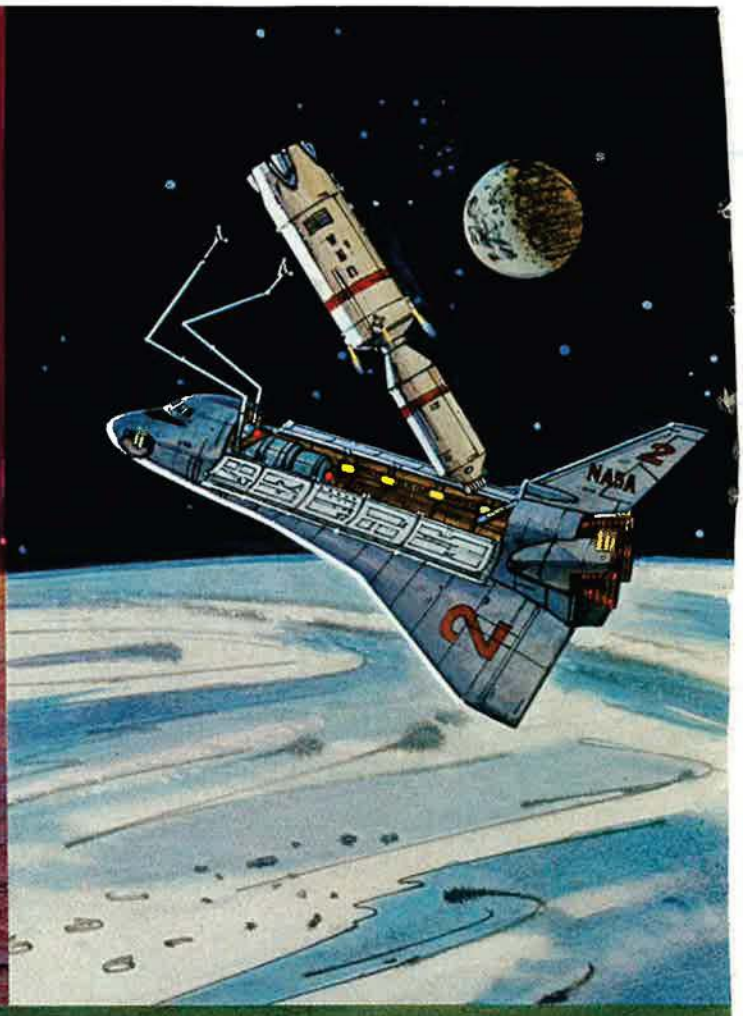
# AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE



## Tomorrow's Electronic Air Force




# America's economy spacecraft.

Space Shuttle, America's first re-usable space vehicle, will put eminent scientists in a unique position. Working in a "shirtsleeve" environment, they'll examine the Earth from an orbital vantage point.

The knowledge gained will enable us to take important strides in ecology—towards balanced management of land, water, and air resources. We'll see what makes crops fail. And what makes them flourish. We'll investigate the weather to improve forecasting, forewarn against potential disasters.

Thanks to Space Shuttle, we can look forward to meaningful advances in communications, medicine, materials technology, and manufacturing techniques.

Space Shuttle promises all of this because it is a workhorse, designed to be used in countless ways. It'll lift off from Earth like a rocket, fly in orbit like a spacecraft, land like an airplane, and can be readied for re-launch in approximately two weeks time.

When you think about Space Shuttle, consider it from a practical standpoint. The advantages are all down-to-earth.

Garrett AiResearch has supplied super-critical cryogenic supply systems for most of the U.S. manned spacecraft programs, as well as specialized cryogenic systems for many military and commercial aircraft. Total in-house capability exists for design, development, test and production for the Space Shuttle power reactant storage distribution system.

GARRETT

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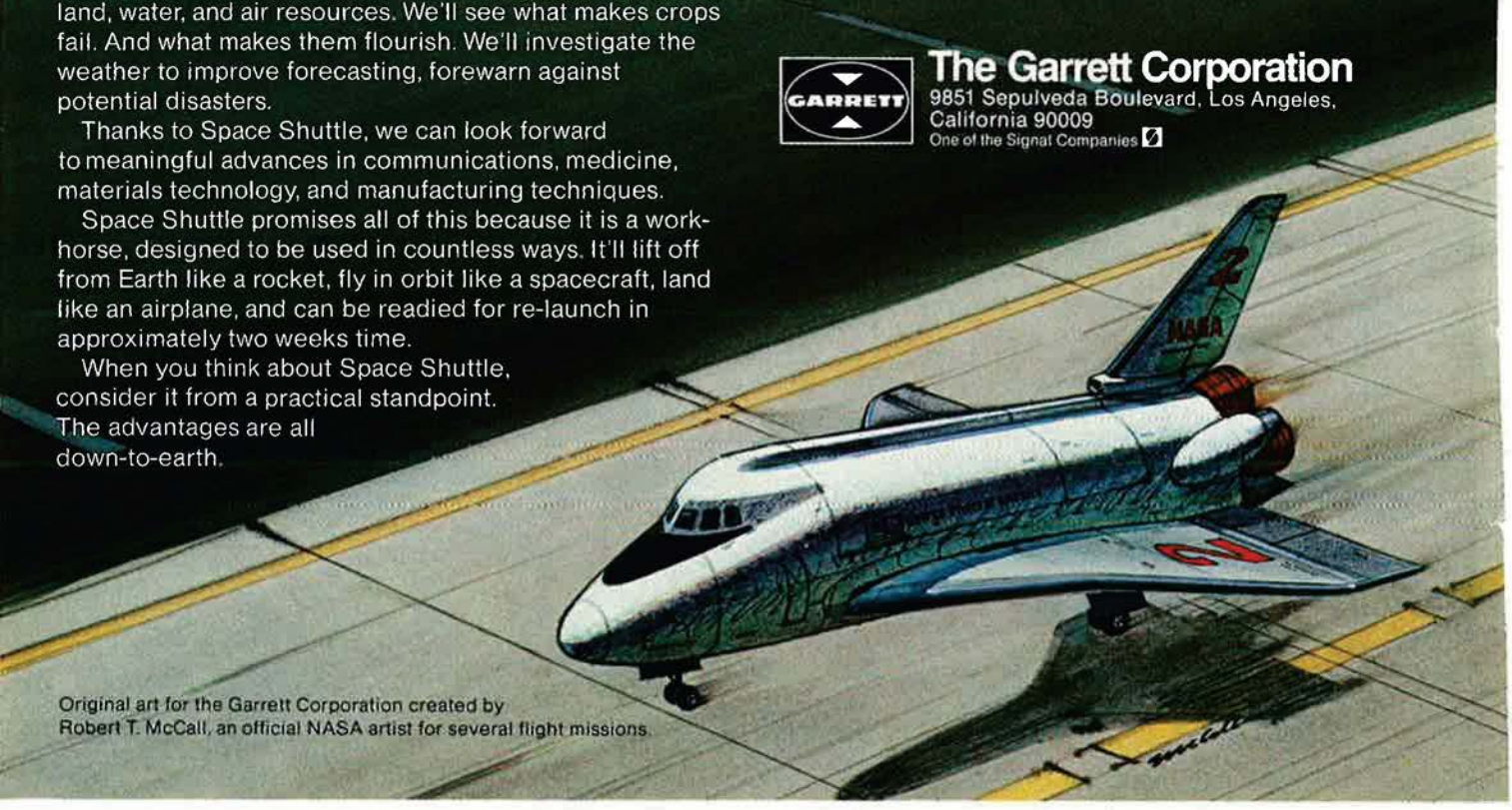
9851 Sepulveda Boulevard, Los Angeles, California 90009
One of the Signal Companies




Original art for the Garrett Corporation created by Robert T. McCall, an official NASA artist for several flight missions.

# A lot of people owe their lives to Hercules.

When earthquakes turned Managua, Nicaragua, from a city into rubble, Hercules was in the air within two hours with tons of plasma and medical supplies.

Famine struck the nation of Chad in Central Africa. Hercules struck back with 500 tons of food. Landing where planes aren't supposed to land, like clearings as short as 2100 feet. Even rough dirt fields too tough for other planes, weren't too tough for Hercules to land on.

Or unload from. With huge doors in the rear and its own loading ramp, generators and water purification systems were easily unloaded in Guam, after Typhoon Karen paralyzed the island.

If you're beginning to think Hercules is as much a maiden of mercy as a muscleman of cargo, you're right.

It brought iron lungs to Japan to fight polio. It brought 25 tons of insecticide to Morocco to fight locusts.

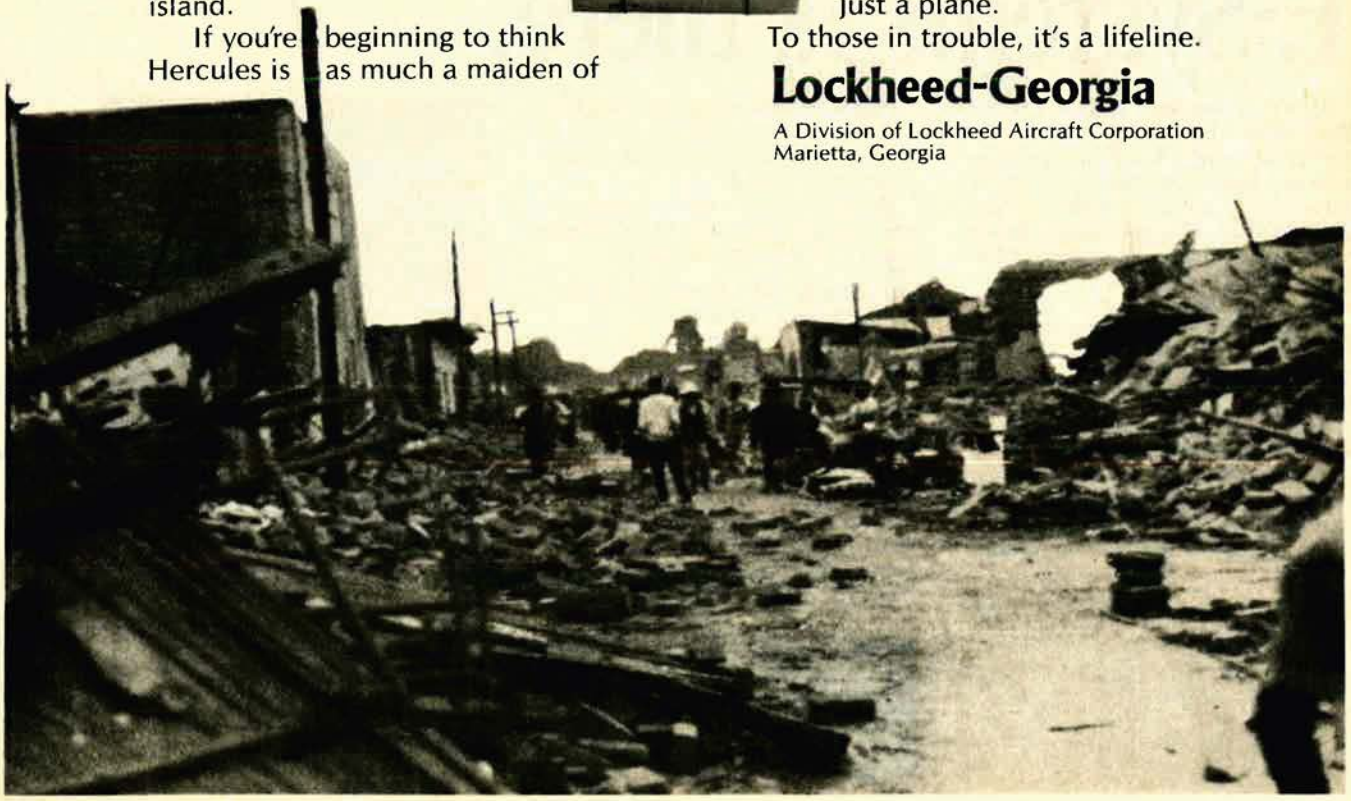
It's been all over the world helping to save lives. That's one big reason thirty nations own more than 1200 Hercules. Now, thirty nations can face an emergency knowing there's a way to help those in need.

Today, Hercules continues to roll off the Lockheed-Georgia assembly line, featuring new innovations within its forty-five different models.

To some, Hercules is just a plane.
To those in trouble, it's a lifeline.

**Lockheed-Georgia**

A Division of Lockheed Aircraft Corporation
Marietta, Georgia



# When you see China on live TV in your living room,

# E-Systems is there.

When President Nixon visited the People's Republic of China, you saw and heard him on live television. This coverage was made possible by an E-Systems antenna in Shanghai relaying signals home via communications satellite high over the Pacific Ocean.

Our antenna became the first permanent communications link of its kind between China and the Western World. And to keep the signals coming, E-Systems has contracts for three larger antennas in Peking and Shanghai.

E-Systems, the world's leading supplier of large diameter commercial satellite communication earth station antennas, completed installations last year in Belgium, Greece and Israel. This year, we're continuing work on similar projects all over the world.

But giant earth station antennas are only one example of E-Systems multi-faceted capabilities in:

- Intelligence and Reconnaissance
- Command and Control
- Electronic Warfare
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AIR FORCE MAGAZINE
PUBLISHED BY THE AIR FORCE ASSOCIATION

VOLUME 56, NUMBER 7

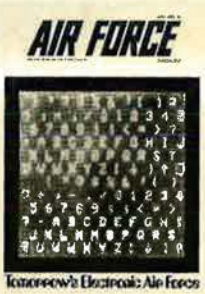
JULY 1973

## THIS MONTH



### THIS MONTH'S COVER . . .

*The plasma panel is symbolic of advances in electronics, discussed in the special section beginning on p. 38, which affect USAF operations and also help determine tomorrow's strategy.*

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# ECM-beyond the black box, a new systems challenge.


Electronic countermeasures.

No longer a business of adding incremental black boxes.

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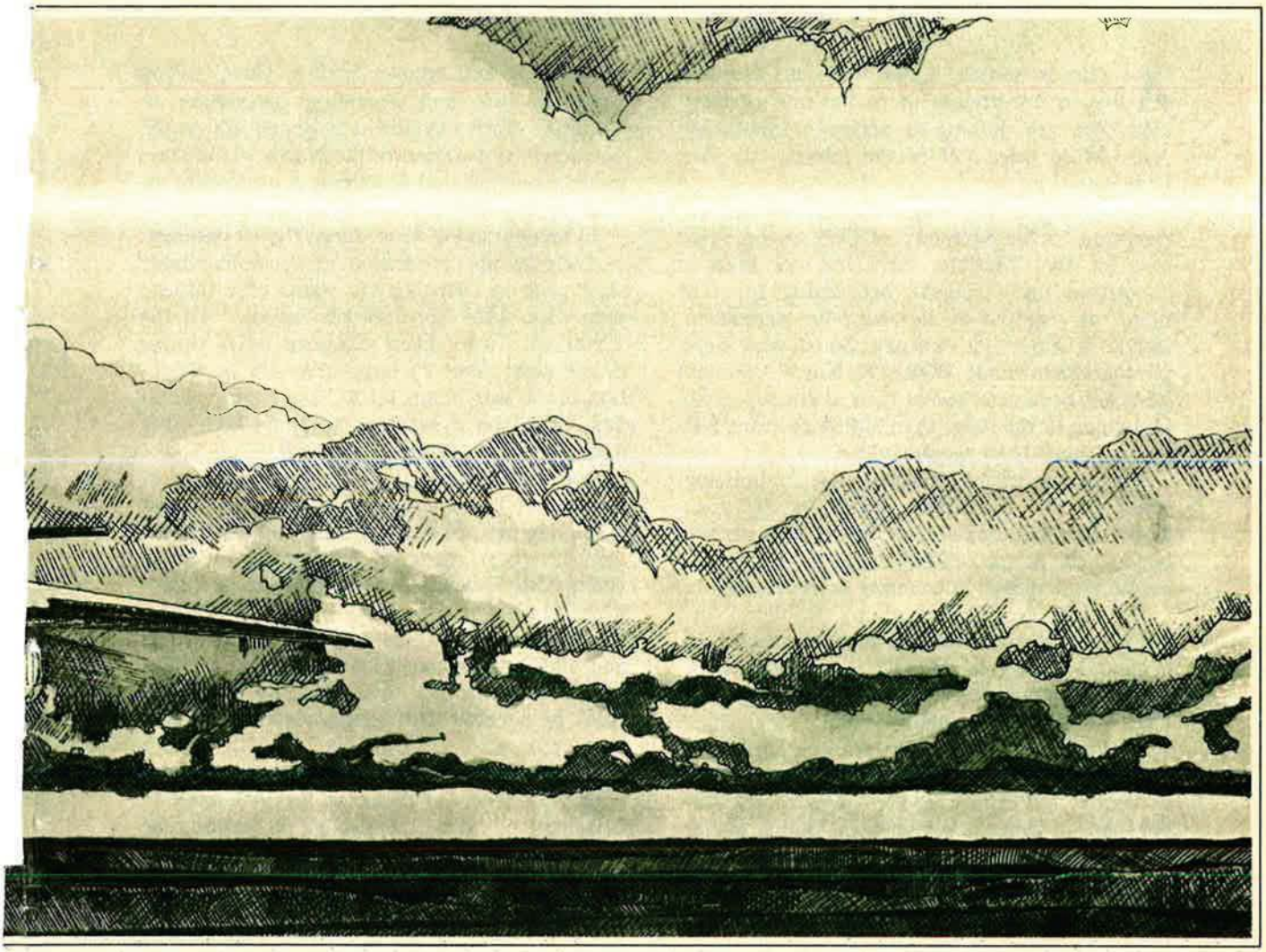


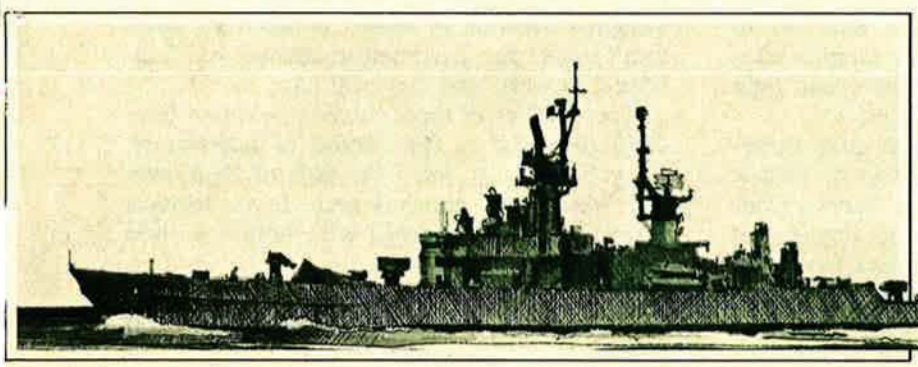
☐ A new, proven technology specifically tailored to integrated ECM systems . . . lens-array multibeam technology.

It permits small, low-cost components to operate in parallel to produce more performance within target cost.

And, the lens-array is adaptable to future requirements by simply adding inventory components to the basic structure.

We are presently applying this new technology to meet the needs of tomorrow's air and naval forces, both strategic and tactical.

Just as we have met systems needs in the past, so we are meeting the new ECM system challenge of today. For further information write Raytheon Company, 141 Spring Street, Lexington, Massachusetts 02173.



RAYTHEON

## An Editorial

# THE MISSING IN ACTION

**By John L. Frisbee**
EXECUTIVE EDITOR, AIR FORCE MAGAZINE

As THIS is written, 1,284 American families live in uncertainty as to the fate of their men who are missing in action in Southeast Asia. More than half of the missing are Air Force men.

According to Dr. Roger E. Shields, Special Assistant to the Secretary of Defense on Prisoner of War Matters, there has not been a "complete and accurate accounting for our men," as required by the cease-fire agreement signed in Paris last January. Some who were photographed while POWs in North Vietnam have not been returned or their status reported. Only nine of the more than 300 Americans lost in Laos have been accounted for.

The overwhelming majority of the missing probably are dead. But some may survive. Thus, there remains a desperate, cruelly elusive hope in the minds of MIA families. A full, accurate, and speedy accounting is imperative.

But that is only part of the problem. Another part is the recovery of the remains of those who died in Hanoi's prisons or were killed in action. North Vietnam pledged at Paris to help in this undertaking.

To investigate the circumstances surrounding the loss of those who probably were killed in combat and to recover their remains, the Department of Defense has set up a Joint Casualty Resolution Center (JCRC) at Nakhon Phanom in northeastern Thailand. Under normal conditions, the task of the JCRC teams would be staggering. Most of the missing were involved in air crashes. There are at least 1,000 crash sites, many in jungle areas that are booby-trapped and strewn with unexploded bombs and shells.

Conditions are, however, far from normal. About ninety percent of the crash sites are in areas controlled by North Vietnam or the Communist organizations it supports elsewhere is Southeast Asia. Fighting still goes on in some of these places. So far, six months after the cease-fire, the JCRC teams have had little success in getting to any of the sites.

The Vietnam MIA situation is quite different from that following World War II. In that war, our opponents observed the Geneva Convention, admittedly with varying degrees of compliance. POWs were accounted for much more accurately than has been the case in Vietnam. Germany and Japan, defeated and occupied, were cooperative in helping account for the missing and recover bodies. Now, getting complete lists and obtaining permission to comb the crash sites is totally dependent on the voluntary cooperation of the North Vietnamese and their associated Communist organizations. That cooperation has not been forthcoming.

In recognition of these facts, the Department of Defense has proceeded at a commendably slow pace in changing the status of a missing man from MIA to "killed in action." Of the 2,400 who have been classified MIA during nearly eight years of large-scale US participation in the war, some 1,100 have been reclassified, based on eyewitness accounts and other incontrovertible evidence of death.

But the customary presumptive finding of death after a man has been missing for a year and a day has not been generally applied. Some men have been carried in MIA status for many years. Only seventy-nine status changes have taken place since January. In this, we believe the Department of Defense has acted wisely and with proper consideration for the families of the missing. We urge that the remaining cases be handled with similar deliberation and thoroughness.

In obtaining North Vietnam's compliance with those terms of the cease-fire that relate to prisoners of war and missing in action, the President's bargaining chips grow fewer and smaller with the passage of time. Surely, North Vietnam's awareness of public concern for the fate of the missing and for the prolonged anguish of their families will add some value to his remaining chips. For our part, we will keep track of events and report on them in our "MIA/POW Action Report" so long as significant information is forthcoming.

The work of the League of Families and other responsible organizations in keeping the MIA situation before the public, and the League's function of liaison between the MIA families and the government, deserve our continued support, and they will have it.

The families of those missing in action have lived too long in their limbo of uncertainty. They deserve to know the fate of their men and, where that fate has been death, to have their loved ones returned with honor to their native land.

We owe to these families the same debt that we owed to the POWs and their families. That debt must not go unpaid. ■


L735M

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*John H. Aughey.*

# SRAM.
# 400 missiles to the U.S. Air Force.
# And every one on time.

Boeing turned over the first Short Range Attack Missile to the Air Force on March 1, 1972.

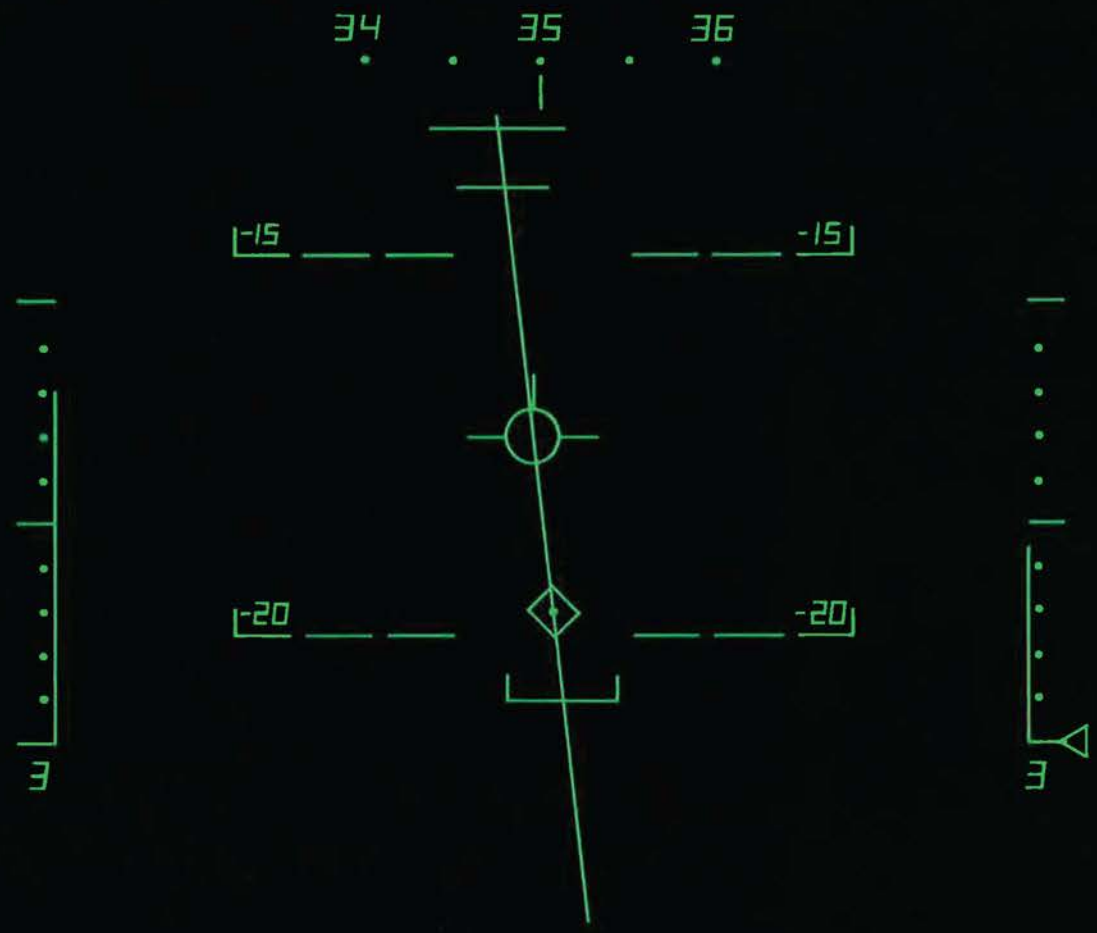
Fifteen months later the Air Force had received more than 400 SRAMs. Every one of the missiles has been completed on or ahead of schedule. And Boeing is now targeting production schedules to meet the authorized order of 1500 missiles.

During the 1971-72 contract period alone, Boeing underruns saved the government $15.8 million.

Teamwork is making this project work so well. Much of the success is also attributable to the professional guidance the U.S. Air Force Aeronautical Systems Division gave our engineers.

SRAM is just one example of being on time. Our most consistent on-time record is 11 straight years with Minuteman. Our latest Minuteman assignment came in $4,515,000 under cost target.

BOEING




# The A-7 makes ground movement after dark a nightmare.

In service, the devastating accuracy of this aircraft is being applied to an increasing number of night missions.

The A-7 is equipped with the most advanced navigation weapon delivery systems in service. The Head-Up Display, shown above, gives the pilot eye-level information required for weapons delivery.

An improved Doppler, inertial platform, forward looking radar, projected map display and computer supply integrated data for pinpoint navigation and attack.

With its superior navigation and weapons capability, today's A-7 continues to deliver a wide variety of mixed ordnance on target with better than 10-mil accuracy.

So when the A-7 prowls at night, enemy ground movement plans go up in smoke.

VOUGHT SYSTEMS DIVISION
LTV AEROSPACE CORPORATION

# Airmail

**May Bouquets**

*Gentlemen:* I would like to tell you how much I appreciate receiving your excellent AIR FORCE Magazine each month, and I congratulate you on such a first-rate publication. It always contains matters of outstanding interest, most of which are unobtainable elsewhere.

I am glad to have this enjoyable way of maintaining contacts with the United States Air Force with which I have so many nostalgic memories over the years—not least flying with the United States Eighth Air Force during WW II.

Sir Peter G. Masefield
Surrey, England

*Gentlemen:* I've just finished going over your splendid May issue. As always, it is excellent in every respect, already a valuable reference item.

Especially is this so in the USAF Almanac "Facts and Figures" section. Someone must have spent hours in compiling it. Until now, all that information has never been available in one place. What a service you have done to future writers in Air Force history, and how I wish you had done it ten years ago!

As a member of AFROTC now, I attended my first Arnold Air Society/Angel Flight Conclave—the one in Salt Lake City. AFA did a great job in supporting AFROTC, and all of us are grateful for it. . . .

Lt. Col. John H. Scrivner, Jr.
Professor of Aerospace Studies
AFROTC Det. 630
Kent State University
Kent, Ohio

*Gentlemen:* I was ignorant of the circumstances recounted in your May editorial ["Public Opinion and the POWs," p. 6], an example of my boundless ignorance. It's a beautiful story, a wonderful contribution. Even a distant alumnus can feel a touch of pride.

Frederic M. Philips
Director, Editorial Services
Martin Marietta Corp.
New York, N. Y.

• *Mr. Philips was an Associate Editor of* AIR FORCE *Magazine from 1959 to 1961.*—THE EDITORS

**And Boos**

*Gentlemen:* The May Almanac issue of AIR FORCE is a keeper. The editors have far surpassed previous efforts, and recognition is in order for a job well done. It'll serve as an excellent compendium for us.

We did find two errors of fact. On page 127, in the "Gallery of USAF Weapons" section, the text describing the AC-130E gunship lists LTV Aerospace Corporation as the contractor. This work was performed by our Greenville (Texas) Division, *i.e.,* the Greenville Division of E-Systems, Inc.

And, on page 128, the OV-10A Bronco description states that aircraft have been modified by LTV Electrosystems. About a year ago, LTV Electrosystems became E-Systems.

We'd appreciate a correction.

John Kumpf
Corporate Director, Public Relations
E-Systems, Inc.
Dallas, Tex.

*Gentlemen:* Every year since 1969 I have been waiting to find an updated gross weight listed in your data on the C-141. In 1969, the gross weight of the C-141 was changed from 318,000 to 325,000 pounds. This latest figure is still the most current.

Capt. Robert L. Gore
Chief, Office of Information
Hq. 354th Tactical Fighter Wing (TAC)
Myrtle Beach AFB, S. C.

*Gentlemen:* This is the issue that I look forward to annually. However, being an Airborne Missile Maintenance Officer, I was a little disappointed in not seeing the ADM-20C (Quail) missile listed with the other strategic missiles. The Quail, in conjunction with the Hound Dog, is still very much in the SAC inventory.

Secondly, the AGM-28 shown on page 139 is not an AGM-28B, as noted in the article, but an AGM-28A. This can be determined from the age of the picture. It has been years since we've had the fiberglass radome on the pylon astrotracker and the red-tailed version. In fact, all AGM-28B models are now camouflaged to blend in with the carrier aircraft. The A-model missiles are at Davis-Monthan AFB, Ariz., in the "boneyard."

Enjoyed your magazine as always. A very informative issue.

Capt. Herman N. Elston
Offutt AFB, Neb.

*Gentlemen:* I've just read the current edition of AIR FORCE Magazine (May 1973), and I draw your attention to "Gallery of USAF Weapons," page 125.

Under the F-101B Voodoo, you state, "Armament: three AIM-4D Falcon air-to-air missiles carried internally, and two AIR-2A Genie nuclear-warhead unguided rockets under fuselage."

I've logged 1,000 hours in the F-101B Voodoo, and, when our crews preflighted the bird, we found *two* AIM-4D Falcons mounted *externally on rails* and two AIR-2A Genies mounted *internally.*

Has the Air National Guard modified the aircraft, or have you?

George Denardo
Camarillo, Calif.

*Gentlemen:* I just can't resist! There must be sixteen zillion pictures of USAF T-33s and maybe sixteen of the F-94Bs, but somebody found one of the sixteen.

Having spent a good deal of time in the "Canoe for Two," I can recall its appearance. It didn't have speed-brakes on the tip tanks as the special model shown on page 137 of the great annual issue (May 1973).

A T-Bird is a T-Bird is a T-Bird!

Maj. D. W. Hutten, USAFR
St. Louis, Mo.

• *Thanks much to our sharp-eyed readers. We're always ready and willing to bring our records up to date.*—THE EDITORS

**Spotlight on ADC**

*Gentlemen:* I enjoyed reading the recent articles on the Aerospace Defense Command in your fine magazine.

The stories entitled "The TRIAD . . . Plus 'One' " [by Col. Sheldon I. Godkin, November '72 issue], and "Dissimilar Aerial Combat Tactics"

# Airmail

[by Capt. Donald D. Carson, March '73 issue], clearly illustrate the complex character of our mission; and, more importantly, they highlight the urgent ADC requirements for the near future.

The onrush of competitive technology, coupled with diminishing force levels, rising costs, and an aging equipment inventory, demands continued upgrading and programmed modernization of the US air defense system. Your magazine has done much over the years to recognize and publicize this vital national security requirement. It is this kind of responsive journalism that will keep ADC a viable and potent defense force.

I very much appreciate your interest and continuing support of the aerospace defense mission.

Lt. Gen. Thomas K. McGehee
Commander
Hq. Aerospace Defense Command
Ent AFB, Colo.

**Air Force Art Collection**

*Gentlemen:* Your coverage of Air Force art in the May issue of AIR FORCE Magazine was again outstanding and very much appreciated by all concerned here in SAFOI.

In paying tribute to the artists who participate in the program (page 61), you inadvertently omitted mentioning The Society of Illustrators of Los Angeles and The Society of Illustrators of San Francisco, who have participated in the Art Program since 1960 and 1961 respectively. This will be particularly noticeable to the artists since the paintings reproduced in the May issue are all by West Coast artists.

Again, thanks for all your past support of the Air Force Art Program. . . .

Lt. Col. Russell A. Turner, II
Chief, Art and Museum Branch
Community Relations Division
SAFOI
Washington, D. C.

• *In introducing the portfolio of art in the May Almanac issue, we quoted from former Secretary of the Air Force Harold Brown's remarks of October 8, 1965, to The Society of Illustrators of New York. It was not our intention to overlook The Society of Illustrators of Los Angeles or The Society of Illustrators of San Francisco. To all three societies, the nation owes a debt of gratitude for their portrayals, through the Air Force Art Collection, of an important segment of the life of this country. We wish to thank Colonel Turner for calling the apparent oversight to the attention of our readers, and again to thank the artists of all three societies for their generous support of the Air Force Art Collection.*—THE EDITORS

**POW Issue Opinion**

*Gentlemen:* Referring to your editorial, "Public Opinion and the POWs," in the May issue, it may very well be true that Mr. Louis Stockstill is, as you maintain, an astute and experienced writer on military affairs. However, a professional and objective study of the entire POW matter leads to a conclusion that Mr. Stockstill's astuteness in military affairs may not have survived the transition to political affairs. For, not just in its ultimate stages but from the very beginning, the entire POW issue was a political affair. As, really, was the Vietnamese War (or should one say the Second Indochina War?) itself.

The very real concern of Ambassador Averill Harriman regarding overpublicization of the POW dilemma was shared by many professionals in political warfare; men, that is, who could view the problem dispassionately and objectively and without the emotional overtones that were the hallmark of Mr. Stockstill's writings. Sadly enough, it has probably never occurred to Mr. Stockstill that, by publishing such inflammatory articles, calculated to arouse and inflame as well as mobilize public opinion, he could have been confirming that which Hanoi had merely conjectured: that the US Administration, pressured and constrained by its constituents, would eventually come to concede to Hanoi's terms in order to recover its prisoners of war.

The temporary embarrassment to Hanoi by the publication of torture and mistreatment stories—and in matters of torture and mistreatment of POWs and others, are we entirely without guilt?—was more than offset by the trend such stories accelerated to get our prisoners back, *i.e.,* abjure victory and end the war, at all costs.

Oh well, the national security of the United States was not really at stake in this war. But I shudder to think of a future war in which it may be. And in which, reverting to the precedent created in this most recent war, we have now become identified as a nation that can be depended upon to settle for something less than victory in order to recover captured military personnel. Never mind national objectives, forget the dead and wounded, dismiss the staggering costs—just let us get our POWs back.

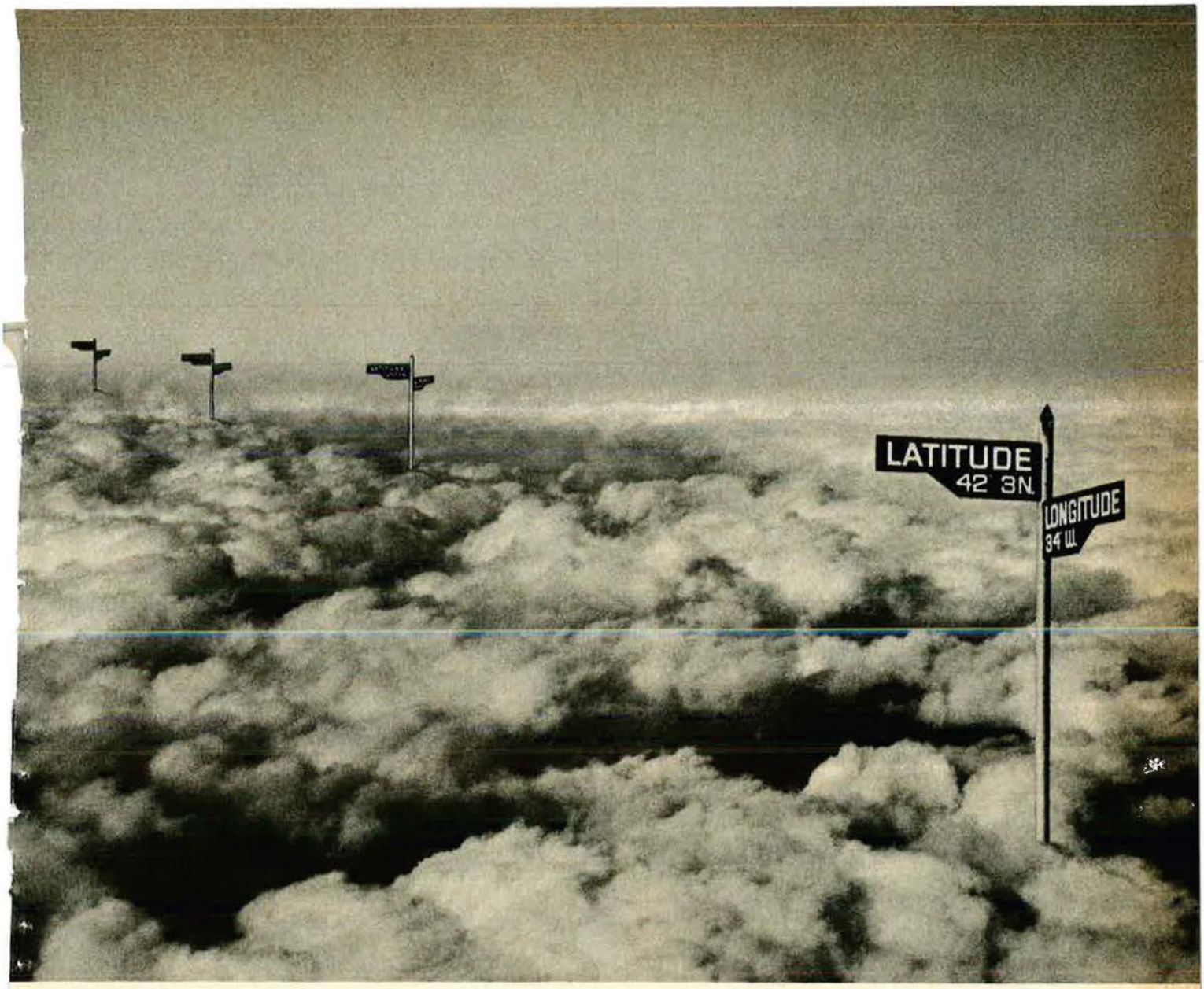
You were perfectly right when you said that the Stockstill article "literally made history." It did. But so also did its consequences. Such as the concessions made by the US in Paris. And the precedent that was thus created.

Maj. Keith D. Young, USAF (Ret.)
Coronado, Calif.

• *We are publishing Major Young's letter as an interesting point of view, though not one with which we are in general agreement. Louis Stockstill's article did not change Administration policy, but rather was the first widely read reflection of a change that had taken place already. Stockstill's purpose was not to "get our prisoners back . . . at all costs," but rather to obtain better treatment for the POWs as required by the Geneva Conventions. Could any civilized nation do less for its military men? Finally, since Vietnam was not a threat to US security, there never was any possibility that the US would use the degree of force necessary to achieve "victory" in the traditional sense. We do not believe that similar conditions would obtain if the security and vital interests of the US were directly threatened.*—THE EDITORS

**Robert *Who?***

*Gentlemen:* David Halberstam's current best seller, *The Best and the Brightest* [reviewed by Gen. T. R. Milton in "Airman's Bookshelf," April '73 issue], on page 228, gives Robert McNamara (as a junior Air Force officer) complete credit for the WW II B-29 program: (quoting) "Putting all the infinitely complicated pieces together, doing program analysis, doing operations analysis, digesting masses of facts . . . making sure that the planes and crews were readied at roughly the same time. Since this was before the age of computers he had to work it all out by himself. He was the intelligence bank of the project, and he held the operations together, kept its timing right, kept it all on schedule. It was an awesome performance for a man not yet thirty."




# We got Omega off the ground.

Omega is a new way of telling where you are.

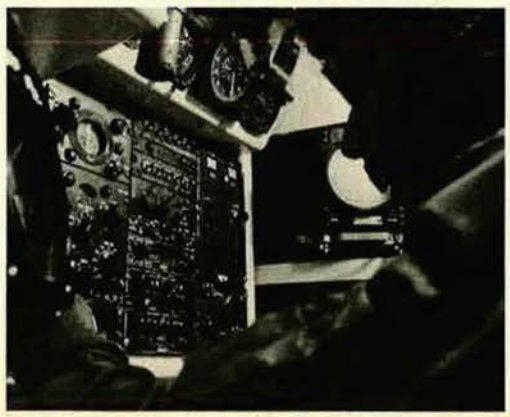
It's an electronic navigator. Works any time. Day or night. Without stars. But best of all it tells your position, anywhere on earth, within a mile or less. Uncanny!

Northrop developed the first Omega receivers for U.S. Navy ships. These receivers listen to low frequency radio signals beamed throughout the world from a network of eight stations now being completed. Omega compares signals from all stations received and pinpoints the location. So practical, civilian ships are equipping with Omega, too.

The Navy didn't stop there. They've installed Omega aboard attack submarines finding their way in the ocean depths. Its low frequency signals pass where others fail.

The flying Navy is now being Omega-navigated, too. Our equipment will go aboard the new C-9B logistics transport aircraft.

Once it got off the ground, Omega also proved its mettle to the U.S. Air Force. Soon, new "early-warning" aircraft...AWACS...will have Northrop navigation and guidance systems.

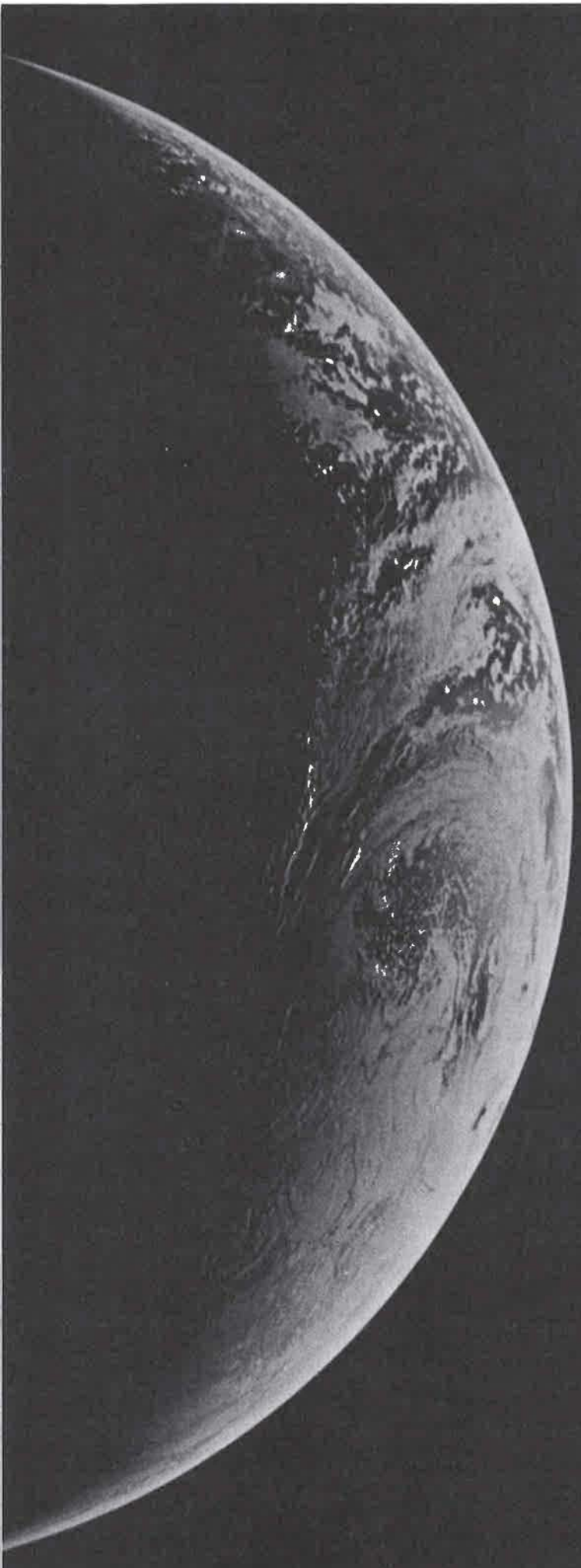


*Omega aboard an AWRS C-130 Hercules.*

And, Omega is flexible. For example, we've combined it with a Northrop inertial navigation system in the USAF's Airborne Weather Reconnaissance System...AWRS...to provide the accuracy required for tracking severe weather fronts.

The word Omega means the end. But the way people keep finding new uses for it, we think it's just the beginning.

**NORTHROP**



It is 1953. People who know what is going on are alarmed. For the first time atomic weapons have been joined to rockets. Enemies suddenly have a new and startling access to the free world — the vast, unguarded corridor of space. To help deter the use of this gigantic passageway, the Air Force develops Minuteman.

Now it is 1973. The corridor has not been used. TRW Systems Group is proud to have been so closely associated with the Air Force in the origin, development and deployment of Minuteman. Because of its presence, space is still a peaceful place.

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# Airmail

Where does this information (and verbiage) come from?

Although I served throughout WW II at Wright Field (except for the last three months in command of a very heavy group in the Pacific) in the Production Division's and the Experimental Division's Bombardment (Aircraft) Branches, as Chief, in turn, of both—where all B-29 design, development, and production matters were directed from the Air Force to the contractor(s) developing and producing these airplanes—I *never* heard this McNamara's name mentioned during WW II.

Seen from where I worked, Gen. Oliver Echols in Hq. AAF and, at Wright Field, Gen. Frank Carroll and Col. (later General) Donald Putt gave Air Force planning and direction to the design and development (Experimental Division) phases of this aircraft. Col. Jake Harman, Lt. Col. Roy Gustafson, and Lt. Col. Ed Nabell handled the transition to and the production phase (Production Division)—the latter under my direction. Product development continued throughout production. Equipment development and production were managed by parallel Wright Field laboratories and offices. One, most ably handling engine production, was headed by Lt. Col. Burt McNamara (not Bob).

Somewhat late in the program a "Statistical Control" room appeared at Wright Field. Here, production schedules and related data for the many aircraft programs were posted on walls in colored charts and tables. Similar data was kept in the Pentagon (Whiz Kids?). At Wright Field, this room was good for briefing and impressing visiting firemen. It was for the control of statistics, not for the control of operations. The Bombardment Branch (not being digit-freaks, nor in the numbers racket) did only note, not use, this facility. For the B-29 and the many other bombardment-type aircraft, data for this "Stat-Control" room was obtained from the Wright Field Bombardment (Aircraft) Branch or from the contractor(s) concerned. The B-29 aircraft monthly production schedules could be kept on one or two 8½″ × 11″ sheets, revised periodically.

After WW II, someone told me that Bob McNamara had served on Gen. Curtis LeMay's B-29 staff in Kharagpur, India, in a junior capacity. Although I worked for a month there with this staff on the many materiel and service problems of these early operational aircraft, I did not hear his name mentioned while there. Nor had I heard it mentioned by my boss, Gen. K. B. Wolfe, who had previously commanded these India/China operations and the organization and training of the 58th Wing that was involved; and who commanded the Production Division at Wright Field throughout WW II except for this B-29 command in India and for the last month or two when he assumed command of the Fifth Air Force in the Pacific. As is known, Generals Wolfe and LeMay were the only two top B-29 commanders of aircraft engaged in combat missions.

This direct knowledge covers B-29 design, development, test, production, modification, and combat operations. Other senior Pentagon Air Staff officers in Materiel and in Operations were involved in responsible positions, including Col. (later General) Ben Funk and Col. Kenny Gibson.

Is it then alleged that McNamara is credited with B-29 training, or plant construction? Or what? Did the combat units not plan and accomplish their crew training as these groups were created in continental US? Did not the Corps of Engineers handle all plant construction?

Who is responsible for the misinformation put out by Halberstam?

Frank Cook
Palm Desert, Calif.

**WW II Underground Leader**

*Gentlemen:* Mr. L. A. "Bert" Poels, from Sittard, Holland, is spending two and a half months in this country trying to locate airmen he sheltered and helped escape during WW II. He saved more than 100 American and Allied flyers and was decorated by General Eisenhower.

Mr. Poel's first book will be published in the Netherlands next year. He is now assembling material for a book he wishes to have published in the US. He expects to be in this country from June 2 to August 15, and while in Detroit he will be entertained by the Air Force Escape & Evasion Society.

The following (with WW II addresses) are some of the airmen that Mr. Poels has not been able to contact:

Harold D. Onylet, of Colorado Springs, Colo.; T/Sgt. Dickinson, Riverside, Ill.; Frank E. Garafalo, Philadelphia, Pa.; Robert Cleveland, Sapulpa (or Tulsa), Okla.; Edgar M. Taylor, Williamston, N. C.; Thomas S. Geary, Woodhaven, L. I., N. Y., or Newport, Ky.; Harry Cooper, Sacramento, Calif.; George Schilligo, Roscoe (or Paradiso), Calif.; John Alexanian, New York, N. Y.; and 2d Lt. Herbert E. Taylor, Teaneck, N. J., or Bruin, Pa., who was married to Ellen Jane Taylor from Coshocton, Ohio.

Anyone having any information on these men, please contact

Ralph K. Patton, President
Air Force Escape & Evasion Society
1424 Dorchester Rd.
Birmingham, Mich. 48008

**Lewis Machine Gun**

*Gentlemen:* I am writing a book about the Lewis machine gun and its inventor, Col. Isaac N. Lewis. The weapon was used very extensively as a flexible machine gun during World War I and into the 1930s. Indeed, it even saw some use during WW II.

Yet, few pictures and stories exist on this weapon. I would very much like to hear from readers who might have anecdotes, accounts, stories, and, especially, photographs of the Lewis gun or its inventor.

All letters will be answered promptly.

Prof. J. David Truby
Indiana University of Pennsylvania
Indiana, Pa. 15701

## UNIT REUNIONS

**Tuskegee Airmen**

The East Coast Chapter of Tuskegee Airmen will host a reunion at the Sheraton-Park Hotel, Washington, D. C., August 10–12, 1973. All former members of the 99th Fighter Squadron, 332d Fighter Group, 447th Bomber Group (M), and the tenant units are invited to attend. Former members are also encouraged to loan or donate any materials that may be of interest. For details and newsletter, contact

Lt. Col. John J. Suggs, USAF (Ret.)
P. O. Box 24026
Washington, D. C. 20024

**42d Bomb Sqdn. (H)**

The 42d Bombardment Squadron (H) will hold a reunion in Fort Worth, Tex., September 1–2, 1973. Former members and friends are invited. Write to

Ben Matlick
6509 Wilton Dr.
Fort Worth, Tex. 76133
or
Chris Sunderman
Rt. 1, Box 184
Aledo, Tex. 76008

# Airpower in the News

**By Claude Witze**
SENIOR EDITOR, AIR FORCE MAGAZINE

## Overflow from Watergate

Washington, D. C., June 1

As reported here a month ago, the effluvium of the Watergate affair won't go away, and there are a number of people who fear the long-term effect of the scandal on our government. Sen. Barry Goldwater is one of them, and he has spoken out, urging the Nixon Administration, of which he has been a supporter, to get on with business. There is an uneasiness, these days, even in the Pentagon. The Department of Defense is pretty remote from the focus of those TV cameras in the Old Senate Office Building and the frequently unwholesome cast of characters put on the screen. But the impact is inescapable. The new Secretary of Defense, Elliot L. Richardson, has been snatched from his desk to serve as Attorney General.

When he left the Pentagon, Mr. Richardson had some words to say to the press corps that were not widely publicized, being pushed out of the paper by Senator Ervin's news-making inquiry. Mr. Richardson, who achieved more than a vestige of respect in his three-month term of office, confessed that "a kind of sleaziness has infected the ways in which things have been done." He could see that it has infected departments and agencies of the government, not excluding Justice, to which he was going or, presumably, Defense, from which he was departing. He did not name others, but they obviously include the FBI, the Central Intelligence Agency, the State Department, and the Securities and Exchange Commission.

Modestly, the press did not report at all what he said about the press. He said he had developed great admiration and respect for the Pentagon press regulars. He does not know why it is, but "the quality of coverage of this department [Defense] is higher than any government agency I've worked for. The reporting is straight, accurate, and informed, and by no means supine. You call us where you think we ought to be called, and you are effective critics, as well as commentators."

Compared with other federal departments, it is impossible to tell whether there is less sleaziness in the Pentagon than elsewhere. But it certainly is a fact that reporters on that beat spend more time looking for it than their confreres elsewhere in town. And they know sleaziness when they see it. For this reason it may be significant that there has been a minimum of "news analysis" or "interpretive reporting" stimulated by Watergate from the Pentagon. After all, the Commandant of the Marine Corps, Gen. Robert Cushman, and Lt. Gen. Vernon A. Walters, of the Army, were dragged into the affair by virtue of having served as deputy directors of CIA. J. Fred Buzhardt, the Pentagon's top lawyer, was drafted to serve at the White House as the President's counsel. And, at the top of the list, there is the removal of the Army's Vice Chief of Staff, Gen. Alexander Haig, to what is called an "interim" appointment as White House staff coordinator. Only the Haig selection has resulted in substantial comment. That one has been denounced on Capitol Hill and even got Ralph Nader stirred up.

General Haig's situation is peculiar. Generals Cushman and Walters filled a designated military slot at CIA, although the wisdom of having the man who fills this job in uniform at all can and should be debated. General Haig, on the other hand, has been put into a political job, and it is a shift that is causing serious concern in the entire military organization. It is a safe bet that, without the patronage of Richard M. Nixon, General Haig today would not have four stars on his shoulder. He was a colonel three years before he became a full general. He never has commanded a division, has almost no combat experience, and reportedly was not the choice of the Army Chief of Staff—Gen. Creighton W. Abrams—for the number-two Army job. One newspaper reported that Haig's meteoric rise has made some enemies for him in the Army. This probably is an overstatement. The issue has been best expressed by retired Army Gen. Matthew B. Ridgway, himself Chief of Staff about twenty years ago, who contends military officers take an oath of allegiance to the Constitution, not to any man. If this is distorted, General Ridgway contends, moral and ethical codes are involved. He fears an erosion of public confidence in the integrity of military men who advise the President *(see p. 31)*. Most sophisticated military officers would agree with General Ridgway.

*(On June 6, the White House announced that General Haig will retire from active duty and will remain on the President's staff, in his present position, as a civilian.—The Editors.)*

As of two weeks ago, there were seven vacancies in the Pentagon secretariat that are filled by presidential appointment. That is seven out of thirty-three jobs. There were seven men serving in the secretariat with the modification "acting" inserted before their titles. The Air Force itself has an Acting Secretary, Dr. John L. McLucas, who has taken the seat vacated by Dr. Robert C. Seamans, Jr., after announcing he plans to leave. Also in the Air Force, Lewis E. Turner is Acting Assistant Secretary for Installations and Logistics, and Rufus L. Crockett is listed as Acting Deputy Assistant Secretary for Installations. Probably more critical is the lack of a Secretary of Defense at this writing. The deputy, a newcomer from Texas, named William P. Clements, Jr., is serving while James R. Schlesinger awaits confirmation by the Senate. There is no comptroller—Don R. Brazier is acting in that capacity—although Terence E. McClary of Massachusetts has been nominated for the job. Both the Army and the Navy are equally decimated.

Only yesterday, Sen. Edward J. Gurney, a Repub-

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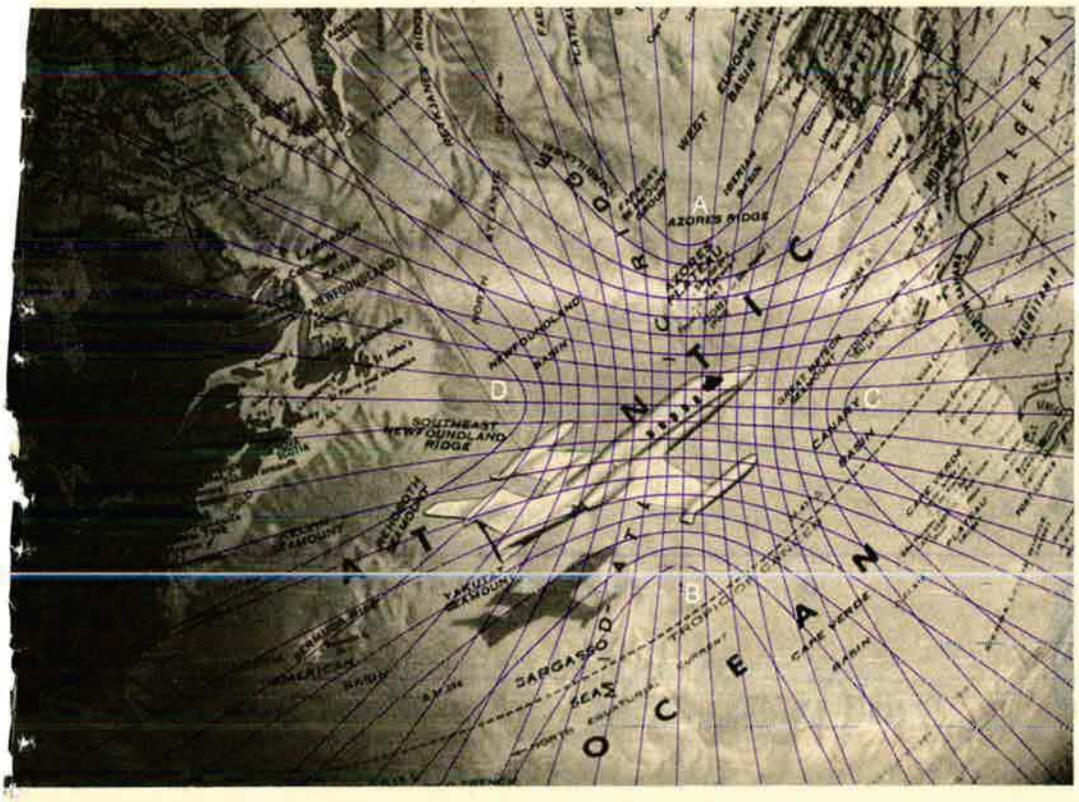


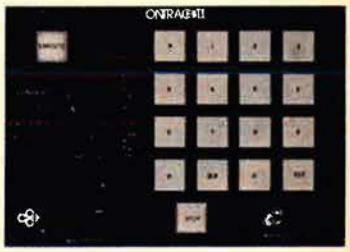


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SPERRY UNIVAC

## Airpower in the News

lican member of the committee investigating Watergate, declared the government is crippled and will remain so until Watergate is resolved. Both he and Senator Goldwater indicate the list of empty Pentagon desks can be duplicated in other departments. Orr Kelly, of the Washington *Star-News,* one of the reporters Mr. Richardson spoke of with favor, has pointed out that the secretarial changes now going on in the Defense Department are more significant than the ones that took place after Mr. Nixon was elected and took over in 1969. There were a lot of holdovers at that time. The only one now remaining is Dr. John S. Foster, Jr., the Director of Defense Research and Engineering. He says he is leaving, and his replacement has been named as Dr. Malcolm Currie, a newcomer. Rumors persist, both in the Pentagon and on Capitol Hill, that Dr. Foster may accept appointment as Secretary of the Air Force, following in the career pattern set by Harold Brown and, before that, by Donald A. Quarles.

The impact of all this, as already suggested, is felt on Capitol Hill and other places. Late yesterday, the Senate voted, 63 to 19, to cut off funds for the air activity in Cambodia, and elsewhere in that part of the world. Now the House and Senate, apparently of a mind, will go in conference, and the outcome may not be cheered at the White House.

At the moment, President Nixon is on his way home from Iceland, where he has conferred with French President Pompidou. It is a first step into what the White House wants to call the "year of Europe." It would seem that détente is riding high, still on the stallions that carried Mr. Nixon to Moscow and Peking last year. Leonid I. Brezhnev, the Soviet leader, is expected to arrive in Washington, D. C., later this month, after having declared in Bonn, less than two weeks ago, that Russia has decided "to implement a radical turn toward détente and peace" in Europe.

According to one dispatch, Mr. Brezhnev told a German TV audience that he had to overcome a lot of opposition at home before he could begin a new era of friendly relations with former enemies. It sounded a bit like a new chorus for songs about the Spirit of Camp David or the Spirit of Glassboro, N. J. At least it provides a clue to what Brezhnev will tell Nixon. What Nixon can tell Brezhnev, in view of the domestic political and administrative situation, is something only fools would predict.

Among the many, many things left out of the newspapers during the Watergate extravaganza was any report on a hearing into "Negotiation and Statecraft" held by the Permanent Subcommittee on Investigations of the Senate Committee on Government Operations. The Chairman is Henry M. Jackson. The witness was Walter Laqueur, director of the Institute of Contemporary History and Wiener Library in London, England, and a professor at the University of Tel Aviv, Israel.

Professor Laqueur's message was that the Russians have a different interpretation of détente and peaceful coexistence than we do in the West. Many of us believe, for example, that relations will be improved by "bridge-building." Lyndon Johnson was one of them. He said the gulf between the nations can be crossed with "increased trade of ideas, of visitors, and of humanitarian aid." Sen. William Fulbright, chairman of the Foreign Relations Committee, speaks of the same concept.

"The concept is altogether admirable, but the Soviet Union has always reacted violently against it," Professor Laqueur says. "Bridge-building, according to one Soviet author, 'is the old poisonous brew now being poured into freshly labeled bottles.' It is an 'imperialist trick' designed 'to undermine the dictatorship of the proletariat and the Communist Party's leading role under the slogan of democratization.' However, despite the fact that innumerable Soviet spokesmen and writers have stated countless times in the course of many years that they regard bridge-building as a deliberate provocation, well-meaning Westerners to this day propagate this concept."

The United States, the Professor says, is not a friendly power or potential ally in Soviet eyes. On the subject of trade, he pointed out that American business expected a boom in the Russian market after World War II. There was no boom, and "the publicity given to trade with the Soviet Union is in inverse ratio to the amount of trade done."

The same thing is true in the cultural area. Student exchanges have been discussed for almost fifteen years. The number of Soviet students in the US is

*Elliot L. Richardson, at a news conference during his short term as Secretary of Defense, had high praise for press coverage of DoD. In the aftermath of Watergate, he subsequently moved to the post of Attorney General, being replaced at Defense by James R. Schlesinger (see profile beginning on p. 22).*

about twenty-five. We have many more from Luxembourg.

In the military sphere, Professor Laqueur says Russia knows there has been a shift in the balance of power and that the trend will continue. "The USSR," he declared, "wants to be in the position in which it will be the dominant power in Europe and the Middle East and in Southeast Asia."

Dealing with such a protagonist is not easy. To do so, in the midst of the rubble created by Watergate and a misunderstanding of what détente means in Russian, could be perilous. ■

# The Wayward Press

Last April 17, a columnist for the Chicago *Sun-Times,* whose name is Ray Howard, came up with an essay in which he tried to prove that food today is a bargain. He did this by listing a lot of misinformation about military procurement.

Mr. Howard says, for example, that when you pay your income taxes, al most all the money goes to the Pentagon and then "quickly disappears among General Dynamics, Grumman, Lockheed, Litton, and other distinguished members of the Fortune 500." He says this is what happened to more than $496 billion in the seven years between 1965 and 1971.

Well, the Defense Department, which ought to know, says that the total spent for procurement, research, development, test, and evaluation, in those seven years, was $182.2 billion. And the corporations mentioned by Mr. Howard didn't get all that, by a long shot.

Mr. Howard says, "Litton Industries said they would build us some assault helicopters for only $133 million apiece." Litton Industries are not in the business of manufacturing helicopters and never have bid on a helicopter contract.

Mr. Howard says, "Lockheed promised us the C-5A cargo plane for a mere $28 million. Now they say they cannot complete the contract for less than $62 million a plane." About a month before Mr. Howard's column appeared, the Air Force released an estimate that the first eighty-one aircraft would cost $54.4 million each. The General Accounting Office came up with the figure of $54.6 million. If you leave out the cost of design and development, the estimated cost of the eighty-first airplane, by itself, is $23.4 million, including government-furnished equipment (GFE).

Mr. Howard says, "Tests show that the plane [C-5A] won't fly fifty percent of the time." In use, the C-5A has a departure rate—it goes on schedule—of seventy-five percent. More than ninety-five percent of the C-5As dispatched complete their mission. This figure exceeds the contract requirement.

Mr. Howard says the Army's Cheyenne helicopter "wouldn't even have the courtesy to fly." Figures available from March of 1972 show the aircraft had, at that time, completed 2,660 flights and was in the air 1,550 hours. Courtesy had nothing to do with it.

Mr. Howard wrote that the F-111, built by General Dynamics, "tends to kill more of our pilots than the enemy." The F-111 has the best safety record of any of the Century series aircraft—and that includes fatalities. The F-111 has now flown about 270,000 hours. The safety record of the F-111 surpasses that of the F-100, F-102, F-104, F-105, F-106, F-4, and A-7 aircraft. In Southeast Asia, six aircraft were lost in more than 4,000 sorties. That is a loss rate of 0.15 of a single percentage.

Mr. Howard says the F-111 "had to be grounded for four years." The aircraft has been grounded for short periods of time, as have almost all airplanes. The total of groundings for the F-111 does not remotely approach four years.

It is the subject of inflation that brings journalist Howard to balancing bombers against beefsteak. He contends, seriously, that most defense spending goes into inflation. He says the price of food went up 25.4 percent between 1965 and 1971 and contends the parallel figure for military buying is 56.7 percent. He is simply wrong. A Pentagon study last summer showed that the procurement of Fiscal 1964, recalculated at Fiscal 1973 prices, showed an inflationary increase of 33.5 percent.

The proprietors of the Chicago *Sun-Times,* who have and exercise a constitutional right to print misinformation about the defense budget from the typewriter of Ray Howard, could have added an interesting fact from their own record. Between 1965 and 1973, the price of the Sunday edition of their paper went from a quarter to forty cents. That is an increase of sixty percent, which surely does make food look like a bargain, as Mr. Howard would say, if the editors would let him.

* * *

Walter Cronkite, the esteemed CBS news broadcaster, now says he is sorry he used the word "conspiracy" to describe what he views as a Nixon Administration effort to discredit the press. However, he adds now, "I still feel that this is basically what has taken place: a well-directed campaign against the press, agreed upon in secret by members of the Administration. I can't see how it's possible to have such an orchestrated, coordinated campaign without some prior plan and agreement—which really comes out to be a conspiracy."

This forensic exercise appears in the June issue of *Playboy* magazine, where the TV star was interviewed at length. At one point, Mr. Cronkite was asked how he felt about criticism of "The Selling of the Pentagon," the highly controversial CBS documentary of 1971. Did he think the charges of editorial bias and unfair editing were justified? His reply is worth inserting in the record:

"I think some of it was justified. I'm not a great defender of some of the editorial techniques used in 'The Selling of the Pentagon.' I'm talking partly of rearranging the sequence of a military officer's conversation so that his remarks were taken out of context.

"I also think there was some emphasis on some aspects of Pentagon public relations that was kind of a bum rap. I think the firepower display and the touring exhibits are perfectly acceptable as Pentagon PR. I think the Pentagon ought to be showing the public what it's got and what we're buying for our money. How else is the public going to know?

"But the government was nitpicking in an effort to destroy the general theme and the impression given by 'The Selling of the Pentagon,' which was fully justified." That theme, he added, was that the Pentagon is trying to keep the public "sold on a big military establishment."

So, the end justifies the means, even when the means involves unethical journalism and the end is fully erroneous. Somehow, this has a chilling effect, as Dr. Frank Stanton would say, on the listeners.

*The top civilian job in the nation's defense establishment is now occupied by a tough and outspoken political realist. The new Secretary of Defense possesses a strong background in economics, extensive experience in the complexities of federal bureaucracies, and—perhaps most important—firsthand knowledge of defense problems. He believes that DoD is unique among governmental departments, in that the pressures shaping its spending policies are generated from within . . .*

# JAMES R. SCHLESINGER

## NEW SECRETARY OF DEFENSE

**By Claude Witze**
SENIOR EDITOR, AIR FORCE MAGAZINE

IT WOULD not be difficult to argue that James R. Schlesinger comes to his job as Secretary of Defense with better credentials for the post than any of his eleven predecessors. And that roster of eleven includes four men (Forrestal, Johnson, Lovett, and Gates) with previous experience in the civilian secretariat; one former Army Chief of Staff (Marshall); and one veteran of the House Armed Services Committee (Laird). Three more former Secretaries were giants of industry (Wilson, McElroy, and McNamara); and one (Clifford) was a lawyer credited in large part with authorship of the 1947 law that created the Department of Defense. The most recent, of course, was Elliot Richardson, the Boston Brahmin and attorney, who has been moved to the Justice Department after only three months in the Pentagon.

The surface facts about Dr. Schlesinger are, by this time, widely known. At forty-four, he is the youngest man ever chosen for the post. He is the only candidate, so far, with a doctorate. It is in economics, from Harvard, dated 1956. Harvard also gave him a bachelor's degree in 1950 and a master's in 1952. At the outset of his career, Dr. Schlesinger was an Associate Professor of Economics at the University of Virginia and, for a time, a consultant to the Naval War College at Newport, R. I. In 1960, he wrote a book on *The Political Economy of National Security*.

In 1963, Dr. Schlesinger went to the RAND Corp. and stayed until 1969. He was director of strategic studies at RAND and specialized in strategic analysis with special reference to nuclear weaponry. From RAND, he went to the old Bureau of the Budget in 1969 as Assistant Director, and served as Acting Director during the transition of BoB into the present Office of Management and Budget (OMB). At OMB, he was responsible for "budget and management activities associated with national security and international programs," according to his official biography. In real terms, this means he was OMB's monitor of defense spending. It is during this period that he is reputed to have told an Air Force officer to "cut out that Pentagon baloney. Just give me the facts." It is

*At forty-four, Dr. Schlesinger is the youngest Secretary of Defense named to that post, and the only doctorate holder.*

*Dr. John L. McLucas is Acting Air Force Secretary. Previously Under Secretary, he replaced Dr. Robert C. Seamans, Jr.*

known that some military men, since moved to higher positions, viewed Dr. Schlesinger as an adversary when he was at OMB. One report says he cut $6 billion from the Pentagon budget in the first year of the Nixon Administration. If this is true, it was done before any figures were made public.

Since his stint at OMB, Dr. Schlesinger has been Chairman of the Atomic Energy Commission (AEC), for about one and a half years, and Director of the Central Intelligence Agency (CIA), for about three months. He brought about extensive changes in both organizations.

While he was still at AEC, Dr. Schlesinger made a speech, from which this quote now is being repeated as significant:

"I am firmly persuaded that the time has come, if it has not already passed, to call a halt to the self-defeating game of cutting defense outlays. . . . It is an illusion to believe that we can maintain defense forces adequate for our treaty obligations to, say, NATO and Japan, with sharp curtailment in defense expenditures supposedly directed only to waste and duplication."

The words only scratch the surface. In his years at RAND, and since, Dr. Schlesinger has shown many times that he is his own wordsmith. He has a talented insight into the weaknesses of bureaucracy, with particular emphasis on the inevitable clash between the kind of facts used by systems analysts and those of political realists.

During the McNamara years, carrying over from the Kennedy into the Johnson Administration, systems analysis rode high in the Pentagon. There was serious talk of extending the concept into other departments of the government. Dr. Schlesinger was one of the experts asked for an opinion. He told the Subcommittee on National Security of the Senate Committee on Government Operations, headed by Sen. Henry M. Jackson, that he had "two and a half cheers for systems analysis." In a paper on "Uses and Abuses of Analysis," prepared for Senator Jackson in the spring of 1968, Dr. Schlesinger was critical of the old system and critical of systems analysis. He was conscious of waste: "The volume of government resources that may be lavished on the care and feeding of white elephants is simply staggering." And: "There is little doubt that analysis has been oversold . . . analyses vary substantially in quality. Each should be taken with a large grain of salt."

For the genuine background of these, and other equally important Schlesinger concepts, it is necessary to go back to his studies at the RAND Corp. We have some of them at hand, dated 1965, 1966, and 1967. It is possible, indeed probable, that the nominee for Secretary of Defense has changed his mind on these items, but they are worth mention now.

In 1965, he reviewed a book by Jerome Wiesner, a scientific guru of the Kennedy Administration, called *Where Science and Politics Meet*. Wiesner was a major force behind the Partial Test Ban Treaty and the Arms Control and Disarmament Agency. He resisted, as Dr. Schlesinger points out, efforts to preserve the strategic superiority of the US, as well as programs for civil or ballistic missile defense. His opinion of Wiesner is that the man suffers from "what can most charitably be described as cultural impoverishment." On the subject of arms control, he finds the Cambridge professor, now president of MIT, following a "theology" that not only rests on faith, but provides a "theodicy, standards of good and evil, and the means to salvation." One paper in the book

was coauthored by Dr. Wiesner and Dr. Herbert York, himself once chief of Defense Research and Engineering and later an executive of the Federation of American Scientists. Of this effort, Dr. Schlesinger had the opinion, in 1965, that "the Department of Defense would be derelict in its responsibilities if it were to follow the advice of Wiesner and York." His concluding paragraph said: "Men like Drs. Wiesner and York, who have held high public office, have a special obligation imposed upon them scrupulously to avoid misinforming the public. But, in this presentation, they are open to the charge of having misrepresented the technical data so as to leave the impression that weapon development is now more or less static and militarily marginal. Quite regrettably, this is just not so."

Also in 1965, there was a paper on *The Changing Environment for Systems Analysis*. This study is a detailed examination of the myriad of uncertainties that military men know are part of war in an age of complex technology. It is not enough, Dr. Schlesinger argues, to genuflect toward these unknowns and then make a decision. We have to cover the bets as best we can. He pleads for a "wide-ranging, austerely conducted R&D program, in which it is fully recognized that many successful developments will not lead to procurement." And, he adds: "Although the chief way of building flexibility into the future force structure should be an R&D program, which provides a rich menu, we ought not to neglect the possibility of building flexibility into individual systems. In a continuously changing strategic environment, it must be kept in mind that the choice of a weapon system does not simply optimize—it also constrains the choice of future strategy."

In early 1966, Dr. Schlesinger examined *Organizational Structures and Planning*. It was a close look at the Defense Department under Secretary McNamara. He said the McNamara effort at centrally controlled planning "must be regarded as one of the major planning experiments of all time." He raised the interesting comparison of a Cook's tour with the Lewis and Clark expedition. The first is based on the assumption that the future is certain. Lewis and Clark knew there would be forks in the road, that choices would have to be made. In DoD, Dr. Schlesinger wrote, one of the goals must be to "hold down the goof rate." But, more important, we must hold down the "aggregate costs of goofs." He found the McNamara regime made just as many errors as its predecessors. Writing in 1966, he thought waste had been pruned, "ruthlessly." Many critics do not agree, but they have the advantage of genuine hindsight.

In view of today's atmosphere and the Nixon Administration stress under which Dr. Schlesinger is being moved to the Pentagon, a 1967 report on *Systems Analysis and the Political Process* assumes significance. It is an examination of systems analysis "as it functions in a highly politicized environment." Dr. Schlesinger here seems to have concluded that Secretary McNamara neglected an important factor in decision-making. Costs, technologies, and payoffs, all of which can be fed into a computer, are not the only factors. There is politics, the author says, and here "one is engaged in mobilizing support by words and by actions over a wide range of ill-defined issues. The ultimate criterion will remain the psychological and voting responses of the general electorate and of important pressure groups." In this arena, "cost-benefit criteria"—it was called cost-effectiveness in 1967—is only "irregularly" ground into the process.

In this connection, he cites the political instincts of Lyndon Johnson. He said the President had repeatedly "extracted political gain through the announcement, during the low-cost initial stages, of new programs—before the costs have been thought through or the bills presented for payment. Though this be the political replica of what the analyst decries as foot-in-the-door techniques, few political leaders will be restrained by such an observation. Politics is geared to the hopes of the voters rather than to the calculation of the cost accountant. In politics, one is almost driven to overstate the benefits and understate the costs of controversial programs."

Dr. Schlesinger concludes that the 1956 law requiring the presentation of five-year cost estimates for new programs "is a dead letter." Says he: "It has been ignored, not because it is undesirable, but because it expresses a pious hope but disregards the underlying realities of political life." In a prophetic sentence, he wrote that it takes major political courage to shut down obsolete or redundant military bases. Mr. Richardson displayed that courage not many weeks ago, and Dr. Schlesinger may have to bite the same bullet.

In this same paper, the new Secretary of Defense declares, more than once, that, as Secretary, he has the authority to impose his will on the armed services. It was given to him in the Defense Reorganization Act of 1958. Such power does not exist for other department secretaries in the government. This means, he says, that the other departments cannot decide, internally, how to allocate funds. This has to come from above, where political pressures are more difficult to resist.

This is the point that seems to ensure an interesting encounter between Dr. Schlesinger and the Pentagon bureaucracy. The pressures, as he sees it, are internal. And he is the boss. ■

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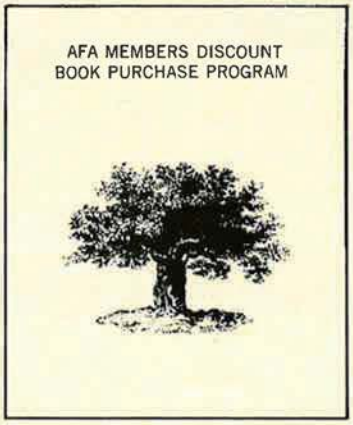


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# Aerospace World

*News, Views & Comments*

**By William P. Schlitz**

ASSISTANT MANAGING EDITOR, AIR FORCE MAGAZINE

Washington, D. C., June 4

By the time this issue of AIR FORCE Magazine is in the hands of its readers, the three-man crew of the first Skylab mission is expected to have returned safely from their sophisticated research center orbiting 270 miles from earth.

At this writing, all was well with the three Navy men aboard the craft—Capt. Charles Conrad, Jr., Cmdr. Joseph P. Kerwin, and Cmdr. Paul J. Weitz.

They had, for the most part, overcome the difficulties presented by Skylab's earlier equipment failure and expected to complete their planned twenty-eight-day mission.

A series of scientific experiments was intended, including some space research never before possible. One chore that would continue through the length of their stay was the collection of data to determine the effects on man of long-duration weightlessness during protracted spaceflight, a vital consideration for the future. This program—which includes blood sampling, monitoring vital organs, etc.—had been assigned as their primary mission.

If the mission is not hindered by further detriments, two important conclusions may be at hand:

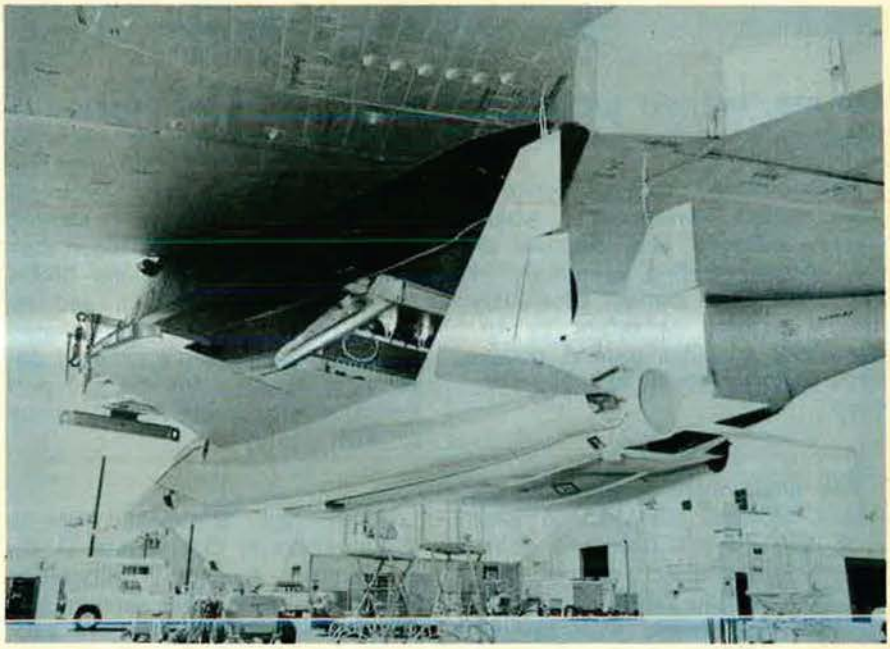
- Equipment failures—even major ones—of orbiting spacecraft can be overcome. Such failures needn't necessarily mean scrubbed missions.
- Astronauts can endure—even prevail—for long periods in the weightlessness of space, a thesis the first Skylab crew set out to test (the sunshield failure gave them an added challenge because of the higher-than-expected temperatures aboard Skylab).

*With its familiar "cobra-on-an-orange-crate" look, a Soviet supersonic transport similar to this was to be a star of the recent Paris Air Show. Instead, during an exhibition flight on June 4, the TU-144 came apart in midair and, burning, exploded with devastating effect on a French village below. The death toll, including the crew, reached fourteen.*

*Goussainville, about six miles from the air-show site at Le Bourget Airport, resembled a bombed-out town of World War II. Here, rescue workers ascertain casualties and damage. The tragedy marked another major setback for Soviet aerospace. It was the sixth Soviet airliner crash in ten months, and followed several significant failures in space for the USSR.*

—Wide World Photos

*This scale model of the Air Force's new F-15 high-performance fighter is mated to a B-52 launch aircraft preliminary to a unique series of tests. Launched from the B-52, the model will be guided using Remotely Piloted Research Vehicle techniques, and, data then gathered, will land via parachute.*



*Maj. Gen. James L. Price, Commander of the 21st NORAD Region, died on May 15 when the F-106 he was flying crashed after being hit by lightning. The aircraft was the third F-106 based at Griffiss AFB, N. Y., to crash in as many months. The accidents are being investigated.*

In any event, the Skylab drama did much to perk up flagging public interest in manned spaceflight (the technical excellence of the Apollo program was to some extent self-defeating in terms of public relations; it made the flights look routine).

One question to be answered is the effect that the initial Skylab failure will have on the two remaining manned missions.

☆

Maj. Gen. James L. Price, Commander of the 21st Air Division and the 21st NORAD Region, was killed on May 15 when lightning struck the F-106 Delta Dart he was flying and it exploded. He was fifty-two.

General Price, commanding air units responsible for the defense of most of the US and Canadian northeast, had just taken off in a storm from Griffiss AFB, N. Y., on a routine training flight when the accident occurred. Wreckage from the all-weather interceptor fell over a wide area. No other casualties were reported.

The crash is being investigated. It was the third loss of a Griffiss-based F-106 in three months.

Brig. Gen. G. Ross Truemner of the Canadian Armed Forces assumed command of the NORAD region upon General Price's death.


*The F-106 Delta Dart, under a shadow because of the crashes at Griffiss AFB (see text, this page), claimed laurels recently for a rather unusual mercy flight performed by Capt. James Altemose of Minot AFB, N. D. (see below).*

In a more fortunate story involving an F-106, the aircraft was instrumental in the recent completion of a rather unusual mercy mission.

When a pair of donated human eyes became available in New York City, Maj. (Dr.) Ned Reinstein of Minot AFB, N. D., wanted them quickly for cornea transplants in two patients.

A Delta Dart piloted by Capt. James Altemose of ADC's 5th Fighter-Interceptor Squadron at Minot was selected to fly a round trip to McGuire AFB, N. J., to acquire the sight-giving cargo.

"This same procedure had been successful twice in the past," said Dr. Reinstein, an Air Force ophthalmologist with highly developed skills in transplant operations.

Captain Altemose received priority treatment in his flight to and from McGuire, where his precious package had been flown by Coast Guard helicopter.

The Captain took off at just about 4:00 p.m. the day of his flight and was back on the ground at Minot at 9:45 that evening. He spent only a half hour on the ground refueling at McGuire.

Beneficiaries of the donated eyes were Capt. James Hurst of White-

man AFB, Mo., and Mrs. Mildred Handy, wife of a technical sergeant stationed at Minot.

Both suffered from an eye disease called keratoconus, which causes thinning and disorder of the cornea, ending ultimately in blindness. Each patient previously had a cornea transplant by Dr. Reinstein, and the second operations restored health to their other eyes.

☆

The deployment of Short Range Attack Missiles (SRAMs) to SAC B-52 and FB-111 bases is going forward with dispatch, according to the Boeing Co., prime contractor of the supersonic air-to-ground missile.

So smoothly has the program gone thus far that the company plans to reduce the number of employees working with USAF in activating SRAM-equipped squadrons.

Under Boeing supervision, airmen have been trained to check and maintain the missiles, to conduct field-level repairs, and to prepare the SRAMs for missions. Current plans call for 1,500 SRAMs to be produced; they'll arm seventeen B-52 squadrons and two FB-111 squadrons.

According to Boeing, it has saved USAF $15.8 million during the course of the program in 1971 and 1972. The contract totaled $450 million in those years.

The American Ordnance Association has awarded Clinton A. Wilkinson this year's Harvey C. Knowles Award for his management of Boeing's SRAM program as "having made a major technical contribution to national armament progress." When Mr. Wilkinson took over in the late 1960s, the SRAM program was in trouble, and he revitalized it. He has been placed in charge of Boeing's division developing avionics for the B-1 and the Subsonic Cruise Armed Decoy (SCAD).

☆

NASA has established at its headquarters in Washington, D. C., a General Aviation Technology Office to help in the design and development of safer, more productive, and superior general aviation aircraft in the US.

It has been ascertained that the stall/spin category of accidents is the primary cause of thirty-five percent of all general-aviation fatalities. NASA will undertake comprehensive research to provide aerodynamic design factors to eliminate this cause of death.

Among new designs NASA is studying is a light, single-engine aircraft that is equipped with aerodynamic spoilers that apparently make easier and more precise landings possible. Airfoil shapes that will lead to higher lift-to-drag ratios, "more docile stall characteristics," and lighter structural weight are also ongoing projects, NASA said.

Noise-reduction techniques are being considered, the agency noted, as are the design of "crashworthy structures."

Roger L. Winblade, a much-decorated Air National Guard pilot who was recalled to active duty and flew more than 200 combat missions in Vietnam, has been named to manage the office. He first joined NASA in 1960.

☆

The boundaries of Air Force capabilities are constantly being expanded by its scientists, at work in labs or in the field *(see "Toward New Horizons in USAF Weapons" elsewhere in this issue)*. Following is word on several of their more esoteric projects:

This summer, the familiar phrase, "Gear down and locked," will be superseded by "Bag down and inflated" as a specially equipped Canadian C-115 Buffalo (US designation C-8) transport prepares to land in tests to prove the use of the Air Cushion Landing System (ACLS) on a large, multiengine aircraft.

*For the first time, a large, multiengine aircraft—this Canadian Buffalo—is undergoing tests utilizing the Air Cushion Landing System.*

The ACLS test-flight program will be sponsored jointly by the US Air Force Flight Dynamics Lab and the Canadian Department of Industry,

—Wide World Photos

*In the Mekong Delta, a member of the US Joint Casualty Resolution Center uses a metal detector to locate a helicopter that crashed in 1969. As has become apparent, the task of determining the status of the 1,284 Americans missing throughout SEA presents a host of problems (see editorial on p. 6).*

*At Pentagon ceremonies on May 31, USAF's Jeanne M. Holm was promoted to major general. Here, she is shown suited up for an orientation flight aboard a SAC FB-111.*

Trade and Commerce. For this project, the aircraft has been extensively modified.

"When inflated, the air cushion trunk resembles an elongated elastic doughnut attached to the bottom of the aircraft fuselage," a program officer explained. Escaping air forms a cushion of pressure that keeps the trunk clear of the surface. It is hoped that the "surface" could include grass, unprepared rough ground, and even snow and water, as well as paved surfaces.

In another area of endeavor—space communications—the Air Force is forging ahead with development of a sun-powered laser. The Air Force Avionics Lab, Wright-Patterson AFB, Ohio, is experimenting with a series of lenses and mirrors that collect and focus rays from the sun, stimulating material in the laser to produce light beams. If feasible, this long-life "sun-pumped" device would transmit data, TV images, voice, and other related communications on a par with current solid-state lasers.

As a less exotic matter, the Air Force Systems Command's Electronic Systems Division, Hanscom Field, Mass., is developing a super-compact "ground-to-air radio for use by tactical ground controllers to guide and direct air support aircraft to nearby targets," an official said.

The new radio will be of use in communicating with the aircraft of allied nations that use VHF/AM frequencies. "Most USAF ground-to-air radios are FM and cannot do the job," the official said.

The new AN/PRC-85, as it is designated, will weigh less than nine pounds and permit the use of 1,920 different frequencies in the 108- to 156-Mhz band.

☆

A singular ceremony took place at the Polish-American Shrine in Doylestown, Pa., on Memorial Day —the day Americans have set aside to honor other Americans who have died in war.

The story actually began in 1919, when the Bolsheviks were fighting to take over Poland, newly liberated at the end of World War I. A group of seventeen American pilots then in France decided to help out. During the aerial combat that followed, four Americans were killed and then-Col. Meriam C. Cooper *(see June '73 issue, p. 13)* was captured and narrowly escaped death when he showed his Red captors his scarred hands, burned in World War I combat, to indicate he was "one with the workers."

In World War II, many Poles flew and fought on the Allies' side and then could not or did not wish to return home when the USSR annexed a portion of Poland, including the city of Lwow, home of many of them. (While defending Lwow against the Bolsheviks, some 400 of the town's children were killed in action.)

Many of those Poles who could not go home settled in the US. (One group they formed—the Polish Air Force Association—has been informally associated with AFA ever since.)

So, on Memorial Day 1973, an organization of Poles born in Lwow dedicated a memorial to the Americans of the Kosciuszko Squadron and the fallen children of Lwow.

☆

The Air Force is out to recruit 1,300 of its most sought-after volunteers in Fiscal 1974—German shepherd dogs.

To sign up the dogs, USAF is offering a pretty hefty inducement package: guaranteed training, modern kennels, personal attention, and the chance to serve their country in a meaningful manner, such as fighting crime.

The USAF trains and procures dogs for an expanding variety of law-enforcement work, including the Treasury Department's narcotics-detection program and FAA's air-

# Aerospace World

port bomb-detection efforts. The dogs are acquired from all over the US, with some donated and others purchased. The dogs need not be pedigreed, but should have German shepherd characteristics. The canine recruits must be between one and three years old, weigh at least sixty pounds, and stand twenty-three or more inches at the shoulder. Females must have been spayed.

If you think your shepherd would enjoy a lifetime career of service, write to Department of Defense Dog Center (SAAMA), Lackland AFB, Tex. 78236.

One such crime-stopper was the star of a minor production staged at the Pentagon early in May.

Wolf, a three-year-old patrol and marijuana-detection specialist, was put through his paces for the benefit of newsmen. He retrieved packets of the narcotic hidden in several places and returned them to his handler, TSgt. William T. Vernon, kennel-master at Hq. TAC, Langley AFB, Va.

The demonstration was in connection with the Air Force's immediate requirement to recruit 100 dogs.

*Wolf, a canine specialist in detecting marijuana, is guided by TSgt. William T. Vernon of Hq. TAC during a recent Pentagon demonstration to publicize USAF's dog recruitment.*

☆

Speaking of narcotics, there is some optimistic news concerning their use by returned Vietnam veterans.

In the survey called "A Followup of Vietnam Drug Users," it was determined "that while almost thirty-five percent of the sample of high-risk Army enlisted men in the study tried heroin in some form at least once during their one-year tour in Vietnam, only 9.5 percent had used narcotics of any kind in the eight to twelve months since their return, and only two percent were using narcotics at the time of interview. Most important," the report went on, "only 1.3 percent [compared to 1.2 percent among the civilian population in the same age group] have continued to use

*Deputy Secretary of Defense William P. Clements, right, swears in new Army Secretary Howard H. Callaway. Mrs. Callaway holps hold Bible. For a report on the new Secretary of Defense, James R. Schlesinger, see article beginning on p. 22.*

# A CODE OF LOYALTY

**By Gen. Matthew B. Ridgway, USA (Ret.)**

*In the New York Times of May 29, 1973, retired US Army Gen. Matthew B. Ridgway discussed the sensitive question of the locus of an officer's loyalty under our system of government. This is an issue that US military men never have had to face squarely, and, we trust, will not have to face. Nevertheless, it is of such importance that we believe General Ridgway's comments deserve wide attention.* —*THE EDITORS*

PITTSBURGH—In addressing the Massachusetts Legislature in July, 1951, after his return from the Far East, General of the Army Douglas MacArthur drew a distinction, as he then seemed to view it, between the loyalty and obedience owed by a soldier to his Commander in Chief and the loyalty owed "to country and Constitution."

"I find in existence," he stated, "a new and heretofore unknown and dangerous concept that the members of the armed forces owe their primary allegiance and loyalty to those who temporarily exercise the authority of the executive branch of the Government, rather than to the country and its Constitution they are sworn to defend. No proposition could be more dangerous."

With this no right-minded American citizen could disagree.

But a year earlier, in July, 1950, when he had been appointed United Nations Commander by President Truman, General MacArthur had radioed the President: "I can only repeat the pledge of my complete personal loyalty to you." It is difficult to reconcile these opposing views.

Our Constitution makes no mention that any officer of any of our armed forces, or of the civil Government, be sworn to personal loyalty to any individual person. It designates the President as Commander in Chief of the armed forces, and provides that he shall appoint, by and with the advice and consent of the Senate, all officers in these services. The commission received by each officer directs that he shall obey the orders of the President, or of his successor in office. The Constitution in no way demands or requires a loyalty oath to the President as a person. Precisely the same obligations bind the civilian officers of our national Government by the oath each takes upon assuming office.

Now, this same issue has surfaced in the deplorable aftermath of the Watergate affair.

■

Surely we cannot have forgotten the tragedies flowing from the blind loyalty sworn to the person of an individual by the civil and military authorities of prewar Germany and Japan. Certainly these misguided concepts of loyalty remain vividly in my memory.

While commanding general of the United States Airborne Corps in the Ruhr Pocket operation of mid-April 1945, in my front the troops of German Army Group B, under Field Marshal Walther von Model, were in a hopeless situation and their further resistance could only result in needless slaughter.

With the prior approval of my own army commander, Lieut. Gen. C. H. Hodges, I sent my aide, Maj. Frank M. Brandstetter, under a flag of truce to Model's headquarters with this message:

"Neither history nor the military profession records any nobler character, any more brilliant master of warfare, any more dutiful subordinate of the state, than the American General, Robert E. Lee. Eighty years ago this month, his loyal command reduced in numbers, stripped of its means of effective fighting and completely surrounded by overwhelming forces, he chose an honorable capitulation.

"This same choice is now yours. In the light of a soldier's honor, for the reputation of the German officer corps, for the sake of your nation's future, lay down your arms at once. The German lives you will save are sorely needed to restore your people to their proper place in society. The German cities you will preserve are irreplaceable necessities for your people's welfare."

His chief of staff, Col. Schultz-Madler, brought me the reply. Model could not consider any surrender proposal. He was bound by a personal oath to Hitler to fight to the end. Operations continued. The unfortunate field marshal committed suicide. His troops surrendered.

The fate of Field Marshal Rommel was not dissimilar.

While I was serving as Supreme Commander for the Allied Powers in Tokyo in the early nineteen-fifties, the Japanese Premier, Mr. Yoshida, and I had long conversations, initiated by him, as to how best to guard against any rebirth of militarism in the officer corps. It was then being reconstituted in the Japanese Self-Defense Forces.

Two years later when serving as Army Chief of Staff, Chancellor Adenauer, then on an official visit to Washington, sought answers to the same questions Yoshida and I had discussed earlier.

In both these cases, I clearly remember that I stressed strongly that the oath our officers take is to the Constitution, and to the agencies and offices it has created, not to the person of any individual. The oath administered to the civil authorities of our national Government is essentially the same.

It seems to me that this fundamental issue, which in our country at least, so deeply involves the moral and ethical codes which guide the vast majority of our citizens, requires much more public scrutiny and discussion much more frequently than it is receiving, and from all segments of our society, including the top echelons of our government. The erosion of the public's confidence in the integrity of those advisers on whom the President relies must be halted and then reversed.

■

# Fitness Report 7/73

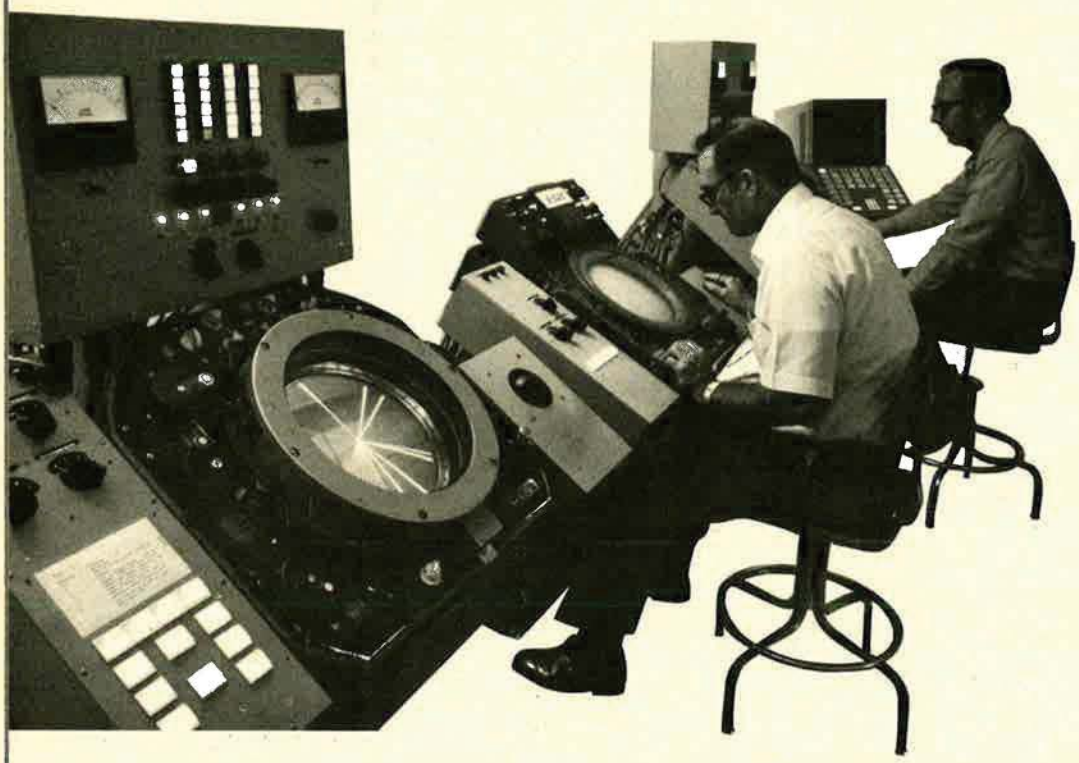
Calspan, formerly Cornell Aeronautical Laboratory, Inc., today continues its long-standing R&D support of the Air Force's electronic warfare program.

Drawing upon diverse technologies and versatile facilities, current efforts include:

- Analysis and simulation of manned and unmanned aircraft penetration aids and air defense systems, including evaluation of countermeasures against advanced defensive threats;
- Technical support to the SCAD System Program Office in the development of an airborne decoy system;
- Technical support to the B-1 System Program Office, including analysis and integration of avionics sub-systems;
- Research on advanced automatic terrain following and terrain avoidance techniques for low altitude penetration;
- Research and development in monopulse radar techniques, radar detection and discrimination, and radar reflectivity measurements.

Central to much of this work is the unique REDCAP real time electromagnetic simulator. Developed under joint Air Force/Calspan funds, REDCAP operates at radar frequencies and allows realistic simulation of multiple penetration, multiple penetration aids and multiple threat situations. Manned command and control elements are included. The recent addition of manned interceptor pilot stations further expands its capabilities to provide valid low-cost evaluation of radar, early warning and penetration aid systems, concepts and procedures.

Having changed its name from Cornell Aeronautical Laboratory and converting to for-profit operation in November, 1972, Calspan carries on a 27-year tradition of advanced R&D from an independent viewpoint. Its work for the Air Force continues in many areas of aerodynamics, avionics and electronics, computer sciences and flight dynamics.



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## Aerospace World

narcotics to the point where they felt drug dependent at any time . . . since their return."

Four federal agencies jointly sponsored the survey, which revealed, among other things relating to divorce rates and crime, that about half of the men who admitted severe dependence on heroin while in Vietnam were able to withdraw themselves from the drug without help before leaving Vietnam and haven't returned to dependence.

☆

**NEWS NOTES—CMSgt. Robert I. Boyle,** thirty-eight, has been named the Air Force Reserve's **top enlisted man.** The first senior airman adviser to the Air Reserve commander will serve a two-year active-duty assignment at Air Reserve Headquarters, Robins AFB, Ga. He previously served as an aircraft maintenance superintendent at Hq. Eastern Air Force Reserve Region, Dobbins AFB, Ga.

And Air Reserve's **303d Aerospace Rescue and Recovery Squadron,** March AFB, Calif., won ARRS's **Worldwide Pararescue Aerial Delivery competition** held at Hill AFB, Utah, in May. The unit, converted to the HC-130 only last August, outclassed active-duty HC-130 crews in three accuracy events—para-jumping, free-fall supply drops, and parabundle supply drops, Also, the 303d's **SSgt. Terry O. Johnstone** won Best Parajumper Award, while


*Air Reserve's top enlisted man is CMSgt. Robert I. Boyle, with family. Clockwise from front right, Jeffrey, 9; Kristi, 2; Jayne, 8; Robyn, 15; and Mrs. Boyle. Not present for photo was son Ricki, 14.*

another Reservist, **TSgt. Robert B. Williamson,** took second place.

**Col. James E. Hildebrandt** has been named **Deputy System Program Director** to Maj. Gen. Douglas T. Nelson in the **B-1 strategic bomber** development program at Aeronautical Systems Division, Wright-Patterson AFB, Ohio. Colonel Hildebrandt formerly headed the A-X System Program Office at Wright-Patterson.

Air Reserve tactical airlift units will compete with TAC and ANG in the **1973 Tactical Airlift Competition** set for August 18–22 at Pope AFB, N. C. Participating aircraft will include the C-130, C-123, and C-7. ■

## Index to Advertisers

# Airman's Bookshelf

## The Restraining Hand

*War and Politics,* by Bernard Brodie. Macmillan, New York, N. Y., 1973. 514 pages with index. $8.95.

The dean of civilian strategists, Bernard Brodie, has written a book with one overriding theme: the political goals of war should far outweigh the military considerations involved in fighting that war. His first three chapters are a review of the application, and, more importantly, the nonapplication of this axiom of Clausewitz. Korea was the first case in recent American history where the political aspects of a conflict were allowed to predominate, even at the cost of a supreme blunder in halting the offensive of 1951.

Mr. Brodie's comments on the Vietnam War do not appear to be overly illuminating. In his terms, we failed because we were there in the first place; the political meanings and results of US intervention were clearly not understood, nor were they worth the military costs.

In Chapters 6 and 7, Brodie moves further afield by discussing mankind's changing views of war and by attempting to disprove some of the more popular theories on the causes of war. While extremely interesting by themselves, these chapters seem at best tangential to his central theme. In Chapter 8, Brodie returns to his theme through a discussion of "vital national interests," how these interests are chosen, and what constitutes national security in today's world.

In many respects, Mr. Brodie's last two chapters are the real substance of his book. One major subtheme is that nuclear weapons are sufficient to deter wars in which vital US interests are involved. The maintenance of conventional forces does nothing to enhance this deterrent and is counterproductive due to cost and the uses to which these forces might be put (as in Vietnam).

According to Mr. Brodie, professional military men do not make particularly good strategists (although Clausewitz was a professional officer), primarily because they are attuned to "winning" a war and are not concerned with why wars are fought. Expertise in military matters does not help a man become a good strategist. In fact, Brodie believes the officer's training and expertise actually prevent him from becoming a strategist. Tight civilian control is, therefore, absolutely essential if the use of force is to accomplish its political, strategic objectives.

To this reviewer (a young professional and therefore perhaps not sophisticated enough to understand Mr. Brodie's reasoning), it would seem Mr. Brodie has created a paradox. The two biggest "blunders" of the recent American military past (halting the 1951 offensive in Korea and the intervention in Vietnam) were political decisions made by civilians. The strategy used in Vietnam, that of controlled escalation, was a strategy designed by the civilian strategists and was controlled, enforced, and, to a large extent, implemented by civilians. While a blundering general can always be fired, how does a blundering senior civilian official get fired? If this paradox exists, who, then, should be the strategist in our society? Brodie seems to indicate that the nongovernment civilian thinker should fill this role.

This book is extremely thought-provoking, and should be read by professional military men aspiring to high command or staff positions. It is not, however, Brodie's best or most important book.

*—Reviewed by Capt. Donald J. Alberts, Department of Political Science, United States Air Force Academy.*

## Airpower vs. Seapower

*Nazi Victory, Crete 1941,* by David A. Thomas. Stein and Day, New York, N. Y., 1972. 224 pages with appendix, bibliography, and illustrations. $8.95.

Although the author's main subject is the battle for Crete in 1941, which was indeed a Nazi victory, almost half of the book is devoted to background topics, such as the British evacuation of Greece and Allied convoy operations in the Mediterranean during the early months of 1941. The work is descriptive rather than analytical, and Thomas lacks a thesis. His main objective is to reconstruct in detail the series of naval operations in and about the waters of Greece and Crete during the six-week period from April 22 to June 1, 1941.

The battle for Crete falls into two phases, as far as the British were concerned. Phase one consisted of defense: the prevention of seaborne landings. Phase two was escape: the evacuation of British and Allied troops to Egypt. Each phase required a large number of warships operating hundreds of miles from their base with little or no fighter protection against the relentless attacks of the Luftwaffe. The emphasis throughout the book is placed on the contest between German airpower and British seapower. The battle depicted was similar to many other naval operations, including the Arctic convoys.

Although using secondary sources, the author has made sufficient use of ship logs, personal memoirs, and war records to present a very detailed and dramatic account. The organization and literary style of this book bear striking resemblance to David Irving's *The Destruction of Convoy PQ. 17.*

One of the most significant aspects of all the naval activity during the period under review was the complete absence of an opposing fleet. Mr. Thomas presents an excellent investigation of the resolute decision by the Italian *Supermarina* to avoid naval combat, while enjoying—at least on paper—superiority over the opposing fleet. One of the greatest strengths of this book is its concern with the individual's role in battle. The author does a superb job of contrasting heroic acts with personal anguish and the cruel burden of decision-making.

This book does have its faults. Except for a few references to "Operation Barbarossa," the author largely ignores the rest of World War II and its effect on the battle

for Crete. Events directly influencing the struggle are sometimes overlooked. For example, the author makes no mention of the fact that Force "H" (stationed at Gibraltar) was not available for help during the crucial phase of the battle for Crete, because it was being used in conjunction with the Home Fleet to locate the German battleship *Bismarck*, which was at large in the Atlantic.

Most important, the book is not a balanced picture of the conflict. The British Navy, and especially Adm. Sir Andrew Cunningham, Commander in Chief of the Mediterranean Fleet, receive much more attention than the German Luftwaffe or its leaders. The German paratroop operations and land battles on the island of Crete are only briefly mentioned, so that a complete portrait of the battle is not presented. Finally, the author only devotes a few comments in his preface to the importance of Crete in the subsequent course of the war.

Despite its weaknesses, the book remains a useful source of information. It is suggested reading for anyone interested in the Mediterranean naval operations of the British or in the continuing debate on airpower vs. seapower.

*—Reviewed by Cadet First Class Marc Van Ells, US Air Force Academy.*

## CIA Again

*The Secret Team,* by L. Fletcher Prouty. Prentice Hall, New York, N. Y., 1973. 496 pages. $8.95.

This book contends that the Central Intelligence Agency (CIA) has become the nucleus of a widespread organization which includes representatives both in and outside government and military circles. The "Secret Team's" intent is to combat communism, and, today, in an almost automatic response to intelligence reports, it launches large-scale operations which may or may not serve long-range US interests. When things go wrong, as in the U-2 incident, the resulting disruption requires years of patchwork on US policy.

The title implies a worldwide conspiracy, and the book hints at dark doings. (Did CIA arrange for the leak of the Pentagon papers to bolster its own image?) What emerges in these pages is more an unfortunate combination of bureaucratic blundering, empire building, and the preoccupation some people have with swashbuckling adventure.

The author attempts to document his argument that an expanding intelligence community has created a self-perpetuating cycle of intelligence input and operational response, but, in at least one instance, the facts have eluded him. Former Defense Secretary Melvin R. Laird would be surprised to read Mr. Prouty's assertion on page 149 that the Defense Department's case for the Air Force B-1 strategic bomber rests on intelligence reports of a new Soviet strategic bomber—presumably Backfire. In fact, neither former Defense Secretary Laird nor any authoritative official of DoD has premised the need for the B-1 on the existence of Backfire or any other Soviet bomber.

Involvement in large-scale, paramilitary operations came about as CIA grew, but was not the original purpose of the Agency, explains Mr. Prouty. The law which established the CIA during Truman's Administration states that the agency was created to "coordinate the intelligence activities of the several government departments and agencies in the interest of national security." Writing in a newspaper column in 1963, former President Truman noted with concern that CIA already had become "an operational and at times a policy-making arm of the government."

For a reader not fascinated with housekeeping details, the book includes too much material about CIA's complicated relationships with other agencies. Access to the funds and resources of other agencies and military services gave the new agency its start and helped maintain security for necessary covert arrangements. These conditions also permitted an unwarranted expansion of clandestine operations, the book indicates.

The author, a former Air Force briefing officer who served as Pentagon liaison with CIA, suggests that intelligence briefings are used to formulate policy. The obscure fellows who write reports and do the briefings can "sharpen the scenarios" that steer the thinking and decision-making of busy policymakers.

Sometimes briefings are at cross purposes with operations. In 1954, National Intelligence Estimates—with CIA input—disparaged Ngo Dinh Diem, while the Saigon Military Mission, which included a clandestine CIA team, supported him. Asks the author, "What did the CIA expect President Eisenhower and John Foster Dulles to believe?"

Occasionally, serious operational mistakes are turned to one's advantage. When Robert Kennedy attended Board of Inquiry hearings after the Bay of Pigs fiasco, he heard numerous witnesses detail Gen. Maxwell Taylor's new military plan for "flexible response." The Kennedy Administration emerged from the hearings suspicious of CIA, but convinced that friendly, anti-Communist governments might be supporters through counterinsurgency, a favorite CIA concept.

Poor organization and careless editing flaw the book. Statements are repeated in similar or identical language in succeeding chapters and even within the same chapter, indicating piecemeal proofreading, perhaps by several editors. More thorough editing would have eliminated minor but annoying inaccuracies such as the reference to President Kennedy's home in *West* Palm Beach, rather than Palm Beach.

*—Reviewed by Marjorie Usamer, Deputy Director, Publications Division, HUD.*

## Looking Ahead

*The Military and American Society,* edited by Adam Yarmolinsky. A series of essays appearing in the March 1973 issue of "The Annals of the American Academy of Political and Social Science," 3937 Chestnut St., Philadelphia, Pa. 19104. 268 pages. Price for nonmembers of the Academy, $3.00 paperback; $4.00 clothbound.

As its title implies, the purpose of "Airman's Bookshelf" is to report on books that may be of interest to our readers. Occasionally, a publication that is not a book but promises valuable and instructive reading comes to our attention. Such is the March 1973 issue of "The Annals of the American Academy of Political and Social Science." The major part of this issue of the journal is devoted to a discussion of where the US military has been, and where—in the varied opinions of the writers whose essays appear here—it should be going.

## Airman's Bookshelf

Not all of the opinions expressed in the fourteen essays that comprise this discussion of "The Military and American Society" will be welcomed, or even agreed to, by most of our readers. Nevertheless, these are the opinions of serious students of defense affairs, all of whom recognize the continued need for strong armed forces. There is praise for the military, to be sure, but also constructive criticism, much of it directed not to the military per se, but at the institutional framework within which military forces operate in our society.

Some inkling of the scope and quality of these essays may be gleaned from a listing of several titles and authors: "After Containment: The Functions of the Military Establishment," by Samuel P. Huntington; "The Governance of the Military," by Sidney Hyman; "The Social Demography of the All-Volunteer Armed Forces," by Morris Janowitz; "Military Research and Development: Implications for the Civil Sector," by Davis B. Bobrow; "Contemporary Professionalism and Future Military Leadership," by Edwin A. Deagle, Jr. Others who have contributed essays are Graham T. Allison, Robert S. Benson, Bernard Udis, Emile Beniot, Edward R. Fried, Charles C. Moskos, Jr., Nancy Goldman, Amos A. Jordan and William J. Taylor, and Albert D. Biderman.

—J.L.F.

### The Burma Campaign

*Wingate in Peace and War*, by Maj. Gen. Derek Tulloch. Macdonald and Co., Ltd., London, England, 1972. 300 pages with appendices, notes, and index. £3.25.

The author, who served as Wingate's Chief of Staff in Burma, recalls the judgment by Winston Churchill after a first meeting with Orde Wingate in 1943: ". . . I felt myself in the presence of a man of the highest quality. It was his genius of leadership which inspired all who served under him. Here indeed is a name which deserves lasting honor." He uses it as a text for this warmly stated defense of the blazing-eyed zealot who, in Burma during 1943 and '44, demonstrated the slashing potency of a new concept of mobile jungle warfare based upon airlift and wholly dependent upon air supply.

Wingate was so certain of his causes and so consumed by the fires of earnestness that he had no inclination to soothe or conciliate those with whom he had to work. He was, on occasion, contemptuous of others, unperturbed by the enmities he aroused. His triumphs and his tragedies inevitably bring to mind the struggles of two other military giants, Chennault and Stilwell; each appears, if only briefly, in this book.

Author Tulloch reads the record and finds impressive evidence as to the rightness of the man, as do others we will note presently. On the opposite side are those contrary-minded about Wingate, among them Lord Louis Mountbatten. The British military historian, General Kirby, also is less than kind.

If this were entirely a defense of a British general, told by his Chief of Staff, it could merit a paragraph at most. But it is much more, the bulk of it pertinent to the continuing American thought about the uses of airpower. It was the 1st Air Commando Force, organized and led by a pair of famed and daring American pilots, Philip Cochran and John Alison, that provided the support Wingate employed in his attempt at aerial envelopment of the Japanese in Northern Burma. Wingate called the Long Range Penetration Groups "Chindits," his way of anglicizing the Burmese name for the lion.

In a foreword, Alison writes about how Churchill asked Roosevelt for the American air support Wingate sought. In an appendix, Alison tells of the organization, training, and workings of the Commandos, including their succor to guerrilla casualties in the field: "A man who was wounded in the middle of Burma could count on being picked up sometime during the day, taken by L-5 to a central collection point, and out that evening by a C-47." There, too, he gives details about the air crash that cost Wingate his life.

Of Wingate the man and the soldier, Alison observes, he "was our champion. His qualities of leadership, his personal courage and strategic guidance made him a commodity which we handled with special care." The esteem in which others held the man was also high, as these two fragments suggest: By Gen. Renya Mutaguchi, whose XV Japanese Army Wingate so savagely harassed, "I have a great admiration for General Wingate. . . . From this campaign [of his] I learned a great lesson. . . ." And by Field Marshal Viscount Wavell, his commander in the first phases of the Chindit ventures: "I have better cause than anyone to recognize his genius and to be grateful for it."

*—Reviewed by Walter T. Bonney, former Director of Information for NASA, and later for Aerospace Corp.*

### New Books in Brief

*Airships*, by Robert Jackson. A history of dirigibles, Zeppelins, blimps, and other lighter-than-air craft, *Airships* is the story of the earliest successful form of flying craft, from their origins in the late eighteenth century to their eclipse by the modern airplane during the years between the two world wars. At first only an imperfect novelty, the airship developed into a machine capable of extraordinary feats of exploration and combat. Doubleday, New York, N. Y., 1973. 277 pages with bibliography and index. $6.95.

*Armoured Fighting Vehicles in Profile, Volume 4* of *American AFVs of World War II*, edited by Duncan Crow. Covers the development, production, and use of American armored fighting vehicles from 1919 through World War II—on to the Korean War and the US tanks of the 1950s. The final section, "United States Armored Organization," is a detailed account of the US Army's armored organizations from the formation of the US Tank Corps in 1918 until the ROAD (Reorganization Objective Army Divisions) plan was completed in 1964. Doubleday, 1972. 303 pages with indexes. $18.95.

*Disarmament: Negotiations and Treaties, 1946–1971*, Keesing's Research Report 7. Following World War II, governments negotiated both within the framework of the United Nations Organization and in bilateral talks to find means of reducing the likelihood of armed clashes. These efforts, from the first

attempt to ban nuclear tests to the partial test-ban treaties of 1963–1970 and the Strategic Arms Limitation Talks begun in 1969, are recorded in this book. Charles Scribner's Sons, New York, N. Y., 1972. 385 pages with index. $10.00.

*Escape and Evasion,* by Jimmy W. Kilbourne. Seventeen true-adventure stories of airmen and air-rescue missions in World Wars I and II, Korea, and Southeast Asia. The stories also serve to demonstrate the techniques, principles, and tactics taught in the specific training programs throughout the world today. The author, a USAF lieutenant colonel, is currently assigned to the NATO Defense College in Rome, Italy. He took part in several of the rescue efforts described in his book. A part of the Air Force Academy Series. Macmillan, New York, N. Y., 1973. 165 pages with bibliography. $5.95.

*First Across! The U.S. Navy's Transatlantic Flight of 1919,* by Richard K. Smith. Here are the complete details of how the US Navy, as a result of efforts to meet a novel requirement of antisubmarine warfare, coincidentally opened up a new era in world aviation. On May 27, 1919, the four-engine flying boat NC-4 completed a twenty-day flight from Newfoundland to Portugal. The author has used photographs, cartoons, and even advertisements of the era to help describe the entire operation, the planning, the men and their aircraft, and the primitive radio communication and method of air navigation. Naval Institute Press, Annapolis, Md., 1973. 279 pages with appendices, notes, sources, and index. $10.00.

*Getting Published,* by David St. John Thomas and Hubert Bermont. This book contains a wealth of valuable advice both for those who have a book in their heads but not yet on paper and those who already have done some writing. Among other things, the authors cover the mechanics of writing, choice of publisher, literary agents, contracts, and reference works. Mr. Thomas is managing director of one of Britain's leading publishing houses, and Mr. Bermont a book consultant in Washington, D. C. Fleet Press Corp., 156 Fifth Ave., New York, N. Y. 10010, 1973. 188 pages with index. $6.95.

*Japan's World War II Balloon Bomb Attacks on North America,* by Robert C. Mikesh. Number 9 in a series of *Smithsonian Annals of Flight.* The author, a retired Air Force major and avid historian of Japanese aviation, has prepared a definitive study on Japan's bold experiment with balloon bombs *(see also* AIR FORCE *Magazine, April '68, p. 158).* Of the more than 9,000 bomb-bearing balloons released by Japan, nearly 1,000 reached the North American continent. Some still-lethal antipersonnel bombs are likely hidden in wilderness areas of the US western states, Canada, or Alaska, the author points out. Though the balloon weapon was militarily insignificant, it was an interesting and ingenious concept and, in a sense, heralded today's ICBMs as an intercontinental threat. Smithsonian Institution Press (US Government Printing Office, Washington, D. C. 20402), 1973. 85 pages with epilogue, bibliography, and index. $1.50 paperbound.

*Into the Cauldron,* by John J. Peterson. A review of the deployment of the National Guard in the civil disorders that erupted after the assassination of Dr. Martin Luther King, Jr., in April 1968. The opening chapter gives the events leading up to and concluding the disorders in the cities of Washington, D. C., Chicago, Detroit, Memphis, Wilmington, Kansas City, Cincinnati, Pittsburgh, and others. The remaining chapters focus in on the violence on the streets of Baltimore, Md., during that week in April to typify the experiences of all Guardsmen. Clavier House, Clinton, Md., 1973. 220 pages. $1.95 paperback.

*The Military Indoctrination of Soviet Youth,* by Leon Gouré. A leading authority on Soviet affairs describes current Soviet programs under which, in direct contrast to the spirit of détente, "a whole generation of youth is being raised in an atmosphere of fear and hatred for the Western democratic countries, and imbued with the need for constant preparedness for an apparently inevitable conflict." National Strategy Information Center, 130 E. 67th St., New York, N. Y. 10021, 1973. 75 pages with bibliography. $1.00 paperbound.

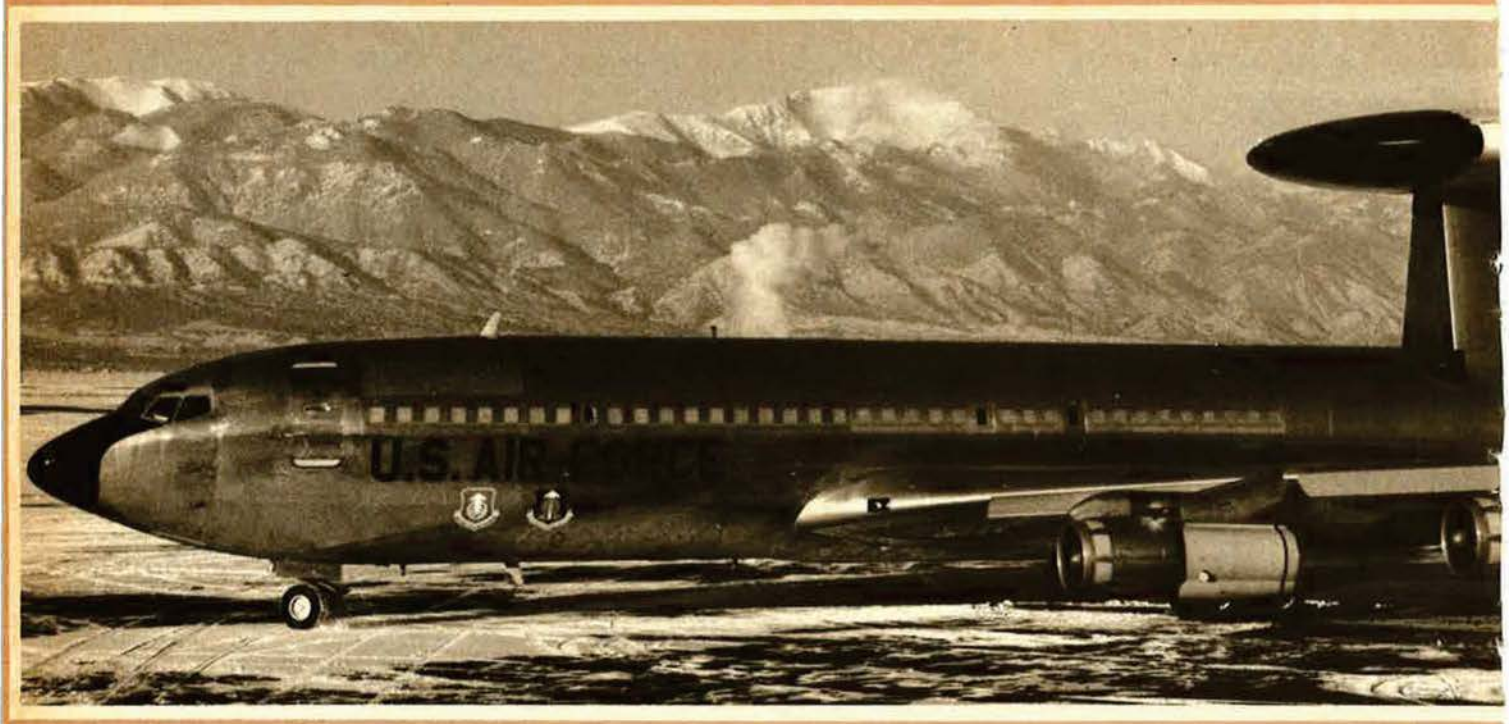
*The Observer's Book of Aircraft,* compiled by William Green. This pocket guide, now in its twenty-second annual edition, provides concise details of and concentrates on those aircraft currently in production, under test, or expected to fly during the current year. Illustrated by photographs and general-arrangement silhouette drawings. Frederick Warne, New York, N. Y., 1973. 287 pages with index. 50 pence or about $1.50.

*The Tarnished Shield: A Report on Today's Army,* by Col. George Walton, USA (Ret.). Colonel Walton has investigated the changing historical relationship between Americans and their Army and explains why he feels that there has been a serious breakdown of the military as an institution, with possible grave consequences to both national defense and the internal security of the United States. He examines the Vietnam War, My Lai, the Green Berets, and Army "snooping," and discusses the draft, the Reserve, and what he believes are the dangers of a volunteer Army. Dodd, Mead, New York, N. Y., 1973. 274 pages with notes and bibliography. $7.95.

*War Comes to Long An: Revolutionary Conflict in a Vietnamese Province,* by Jeffrey Race. An intensive study, partly historical and partly theoretical, of the victory in a single province in Vietnam of a revolutionary social movement, guided by the Communist party. Starting with the temporary division of the country in 1954, the author uses in-depth interviews with both Diem regime officials and their Communist counterparts to describe the changing perceptions, strategies, and situations of the two opposing leaderships. The author has spent more than four years in Vietnam, Laos, and Thailand studying revolutionary movements in Southeast Asia. He also served as an adviser with the US Army in Vietnam and speaks Vietnamese fluently. University of California Press, Berkeley, Calif., 1972. 299 pages with appendices, glossary, and index. $11.95.

Two recent releases in Ballantine's Illustrated History of the Violent Century Series are: *Pacific Victory,* by Paul Kennedy; and *Rotterdam: Invasion of Holland,* by Wilhelmina Steenbeek. Ballantine Books, New York, N. Y., 1973. Each volume 160 pages. $1.00.

—By Catherine Bratz




# THE ELECTRONIC AIR FORCE

*National strategy and command control and communications are intertwined by a cause-and-effect relationship that, although of crucial importance to national defense, is not fully understood by most people. Because of the vast improvements in technology during the past decade, command and control now permits the implementation of nuclear strategies that were unthinkable ten years ago . . .*

# THE COMMAND AND CONTROL REVOLUTION

**By Maj. Gen. Lee M. Paschall, USAF**

COMMAND control and communications ($C^3$) are assuming a greater importance in defense affairs than ever before. These functions account for almost ten percent of the proposed Air Force budget for Fiscal Year 1974. Although this is a substantial amount of money—on the order of $2 billion—it must be remembered that the capabilities of our $C^3$ systems have a direct bearing on determining what kind of national strategy is technically feasible. The relationship between command control and communications and national strategy, and the contributions of $C^3$ to national strategy, need to be better understood.

Command and control is an absolutely essential element of today's national strategy, which covers the full range of conflict from minor contingencies to general war. Fundamental to that strategy is the ability to deter general nuclear war, but with a "no-first-strike" policy. We must be able to ride out an attack and have sufficient strategic power

*The E-3A AWACS, one link in the complex of C³ systems that makes possible a more flexible use of USAF's aerospace power.*



left to cause unacceptable losses to the enemy. A recent addition to national strategy is the provision for a range of strategic options that will allow the President to choose a response appropriate to the level or nature of the enemy's attack. Secondly, we must be able to control contingency situations in order to prevent escalation to dangerous levels.

Both President Kennedy and President Nixon have sought a wider range of strategic options and tighter central control of nuclear-capable forces. President Nixon, in particular, has emphasized the need for flexible response and has specifically rejected the launch-on-warning philosophy—a strategy under which we would launch our strategic missiles and bombers upon warning that an attack on the US was under way.

In 1961, President Kennedy, in a message to Congress, indicated that his basic defense policies would place ". . . new emphasis on improved command and control—more flexible, more selective, more deliberate, better protected, and under ultimate civilian authority at all times." Ten years later, President Nixon said it this way:

> We must ensure that we have the forces and procedures that provide us with alternatives appropriate to the nature and level of the provocation. This means having the plans and command and control capabilities necessary to enable us to select and carry out the appropriate response without necessarily having to resort to massive destruction.

He reemphasized this point in 1972 by saying:

> No President should be left with only one strategic course of action, particularly that of ordering the mass destruction of enemy civilians and facilities. We must be able to respond at levels appropriate to the situation.

Each of these Presidential statements stimulated a surge of activity, which will be described later, in the evolution of command and control systems.

Those who advocate launch on warning are described by Dr. Fred Charles Iklé, who is now Director of the Arms Control and Disarmament Agency, in the January 1973 issue of *Foreign Affairs,* as follows:

> Various influential people have urged that the United States adopt procedures to launch its missile force upon receipt of a warning that a Soviet surprise attack is on the way. Senator Fulbright, for example, recommended in 1969 that our missiles should be launched "immediately" upon warning of a Soviet attack "without any fiddling around about it, even without asking the computer what to do," even if the warning indicated a "light attack." Other American senators and government advisors have also advocated that, in the event our forces become more vulnerable, we adopt a policy of launching our missiles on warning.

There are also those who are concerned that concepts contemplating less than an overwhelming nuclear response are dangerous in that they weaken the deterrent posture.

## DESIGN C³ TO FIT STRATEGY

Fortunately, the technologist who bears responsibility for designing C³ systems does not have to make those difficult strategic choices. However, he must exercise extreme care to ensure that design of the C³ system does not inadvertently foreclose a particular strategy.

Whether one talks about "assured," "finite," or "realistic" deterrence is relatively unimportant in

*Maj. Gen. Lee M. Paschall is Director, Command Control and Communications, Hq. United States Air Force. A native of Sterling, Colo., General Paschall was commissioned a second lieutenant, Infantry, in 1942 and assigned to communications duties in the United States and the European Theater of Operations during World War II. Employed as a communications engineer with the Colorado National Guard after the war, General Paschall was recalled during the Korean War. His subsequent Air Force career has been almost exclusively in the field of communications and included assignment to the Defense Communications Agency. In August 1968, he was named Deputy Director of Command Control and Communications, Hq. USAF, and promoted to his present post three years later.*

its effect on the command and control posture as long as a no-first-strike philosophy is retained. On the other hand, whether one chooses flexible response or "spasm" response (launch on warning) makes a great deal of difference to the command and control system.

A flexible-response strategy in a general war situation requires a $C^3$ structure consisting of highly reliable warning systems, including some level of attack-assessment capability, survivability of $C^3$ components equal to that of the weapons themselves, rather extensive communications containing an almost invulnerable hard-core "execute and report back" capability, and considerable data-processing capacity.

The most difficult questions in structuring such a system are how much survivability and how much attack-assessment capability is required to assure the National Command Authorities (NCA) that the command and control system can continue to provide the critical information required to allow deliberate selection of an option and to assure controlled execution of that option.

The $C^3$ structure needed to support a launch-on-warning strategy is a much simpler task. It must possess absolutely unequivocal warning systems and less survivable, but very rapid, execution communications. Much of today's activity is designed to reduce the vulnerability of our command and control structure so as to ensure that a flexible-response strategy can be supported.

There have been so many examples of close control of nonnuclear operations in recent years—air operations in SEA and the Cuban missile crisis, for example—that further comment here is unnecessary. Nevertheless, there are two changes under way in the $C^3$ national strategy equation that should be mentioned. One is the Nixon Doctrine requiring that we aid our allies, but ensure that they assume a larger role in their own defense. Its principal effect on $C^3$ is to require that the communications systems of the United States and its allies be interconnected to a much greater extent than now is the case. Thus, today, we are sharing military communications satellites and taking other steps to ensure that the Defense Communications System and the developing NATO Integrated Communications System can be interconnected.

A second change stems from the new Worldwide Military Command and Control System (WWMCCS) requirement that the NCA be able to communicate through the Chairman, Joint Chiefs of Staff, directly to the executing commander in a time-sensitive situation. Thus, the new WWMCCS concept requires procedural and electrical compatibility between "tactical" and "strategic" communications systems. In the past, we have too often treated these as though they were completely separate entities.

## THE EVOLUTION OF $C^3$

A quick résumé of $C^3$ activity over the past dozen years may help to put today's efforts in proper perspective. At the beginning of the 1960s, a committee examining command and control concluded that the capabilities of our weapon systems had outstripped our ability to command and control them. As President Kennedy had stated, our nuclear monopoly had ended, and we had to consider how to survive a first strike and to execute a controlled retaliatory response. Survivable command centers and rapid, redundant means of communications were being acquired, with SAC and ADC leading the way.

By the mid-1960s, we had learned several hard lessons. $C^3$ systems could not be acquired like weapon systems. They had to evolve with direct and continuing user participation. The Air Force learned that command control and communications are inseparable. Many of the glowing promises about what computers would do for us fell afoul the software (computer programming) problem, and some disillusionment set in.

In particular, defining information needs proved exceptionally difficult, and the easier course of asking for everything that might be needed was taken far too often. Modern computers and communications make this much too easy to do. Too much information flowing in the command and control system causes great congestion, even in an undamaged communications system. An even greater danger is that too much detail can confuse the decision-maker and waste time at a critical juncture. Despite these dangers, reducing or eliminating once validated information requirements continues to be exceptionally difficult.

A series of incidents occurred in the late 1960s that led to considerable congressional criticism and some soul-searching within DoD. The Pike Subcommittee, investigating the capture of the *Pueblo* and the shooting down of an EC-121 by the North Koreans in 1968, reported that:

> The inquiry reveals the existence of a vast and complex military structure capable of acquiring almost infinite amounts of information but with a demonstrated inability in these two instances to relay this information in a timely and comprehensible fashion to those charged with the responsibility for making decisions.

In 1970, a special subcommittee, chaired by Congressman Mollohan of the House Armed Services Committee, conducted a further investigation of DoD's worldwide communications. In a forerunner of things to come, Deputy Secretary of Defense David Packard testified before that subcommittee as follows:

> The entire communications capability must be integrated to provide the headquarters command and control people with knowledge of the situation and performance of all the military forces of the United States and *permit the headquarters to direct forces wherever they may be and under whatever command they may be* [emphasis added].

## MODERNIZING THE WWMCCS

Mr. Packard is most noted for the impact he had on program management within DoD; but perhaps the long-term effect on military operations will be his strong personal interest in military command and control and its supporting communications. That interest led directly to the issuance of a new charter for the WWMCCS.

There are major differences between the WWMCCS as defined in 1962, and the WWMCCS of 1972. Now, the primary function of the WWMCCS is to support the National Command Authorities. The importance of the National Military Command System (a command center in the Pentagon, an alternate, and the National Emergency Airborne Command Post) is emphasized by making it the priority component of the WWMCCS. The command and control systems of the Unified and Specified Commands, or of their components, and the management systems of the military departments must provide priority support to the national center in addition to supporting their own missions. Although communications are normally through the military command line, there must be a capability to communicate directly to the forces involved in crises or those responsible for executing the Single Integrated Operational Plan (SIOP).

## CHANGES NEEDED

There will be numerous procedural and electronic changes needed to ensure that the automatic data-processing (ADP) systems and the communications links to the Unified and Specified Commands, their components, and the service command and control systems are interfaced with the National Military Command System in a way that will allow information and commands to flow through and to points within each command. Thus, WWMCCS is being changed from a rather loosely knit confederation to a system whose central purpose is to support the NCA.

WWMCCS is too often thought of as an ADP update program. Efforts to modernize and standardize computer hardware and software are important, but there are other needs of greater importance, particularly to be compatible with a flexible-response strategy. For example, deciding what the information flow patterns and the information needs ought to be, particularly in a damaged network, is very important. However, proper coupling of the command centers, warning systems, computers, and weapons is vital.

DoD's historical interest in providing communications systems designed to provide the most economical means for moving bulk communications has shifted to strong emphasis on communications required for command and control. Reliability, survivability, and communications security have become the most important design criteria.

Recent technical advances in secure voice communications satellites and data-compression techniques appear to make possible a $C^3$ posture that can meet these criteria. At the same time, these advances allow us to design a system that can satisfy both the very difficult needs of a flexible-response nuclear strategy as well as the less-demanding command and control requirements of launch-on-warning, nonnuclear, and contingency operations.

There is, therefore, a cause-and-effect relationship between command control and communications capabilities and military strategy. The effect of strategy on a $C^3$ posture is relatively easy to see. What is perhaps less clear is the fact that today's electronic technology makes possible strategies, such as flexible response, in a way no one thought possible a decade ago.

This relationship makes it imperative that we be careful not to let our optimism about what technology is theoretically capable of doing lead us into strategies whose demands on technology exceed practical realities. Conversely, we must exercise great care not to design $C^3$ systems that might inadvertently constrain national strategy. In short, development of national strategy and its $C^3$ support must be a continuing, iterative process, with emphasis on realistic exploitation of technology to improve strategic flexibility. ■

*A sun-powered laser device under development by the Air Force Avionics Lab, Wright-Patterson AFB, Ohio. ". . . there will be some ground-to-space and satellite-to-satellite communications by lasers within the next ten years."*

# THE ELECTRONIC AIR FORCE

***From force control to strike assessment, and from warning of impending missile attacks to the deployment of tactical airpower, communications are crucial to the initiation, control, and termination of major military actions. It is axiomatic that communications associated with command and control must be sufficiently reliable, survivable, and secure so as to not become a limiting factor of the forces they are meant to control. Yet, these needs run head-on into budget constraints, and a compromise is, therefore, unavoidable . . .***

# COMMUNICATIONS MUST NOT LIMIT NATIONAL STRATEGY

**By Edgar Ulsamer**
SENIOR EDITOR, AIR FORCE MAGAZINE

UNDER the heading of "Consolidated Telecommunications Programs," the Department of Defense lists what the military services spend each year on basic communications—that is, the cost of people and equipment needed to transmit defense information. The total is about $2.6 billion. (USAF's share of the total is $1.08 billion.) Neither figure includes the cost of sensors and other means that produce information or of computers and other devices that work on it.

This money, according to Dr. Howard L. Yudkin, DoD's Deputy Assistant Secretary for Telecommunications (Systems), buys—or leases—a vast and efficient communications network that spans the globe, with terminals in space, in the air, and on the ground. It is, however, neither fully secure nor completely survivable. A system with those qualities, in the opinion of communications experts, would certainly be out of reach economically and, perhaps, technically infeasible. It must be assumed, on the basis of immutable laws of physics, that a technically competent enemy can intercept any transmission that leaves the ground; it is a fact of life that a nuclear-armed nation is likely to have the technical capabilities and the forces needed to attack and destroy portions of the communications net of its victim in a first strike.

The central objective of military communications managers, therefore, is a compromise, a system that is sufficiently adaptable to future military and political needs to "not become a limiting factor of national strategy." According to Dr. Yudkin, four basic criteria determine the communications requirement in the following descending order of importance:

The system must be reliable, survivable, secure, and cost-effective.

Ranking cost-effectiveness last in this era of design-to-cost may seem heretical, but Dr. Yudkin defends his reasoning convincingly: "If our communications are not reliable, we negate all other military capabilities. If the survivability of the command control and communications network is not on a par with the strategic forces, everything becomes useless. And if the net is not secure, our strategic posture suffers. Essentially, cost-effectiveness of communications cannot be measured in their own envelope, because the failure to spend, say, $1 billion to provide for survivable communications could render useless an investment of tens of billions in our strategic weapons."

*Dr. Howard L. Yudkin, DoD's Deputy Assistant Secretary for Telecommunications (Systems), is responsible for a global communications net that extends into space.*

## THE RELIABILITY PROBLEM

As used by military communications planners, the word reliability takes on broad meaning. The first need is flexibility in operating mode as well as facilities, because the network must be able to respond to constantly changing strategic and tactical requirements that span the globe and involve allies with widely differing communications capabilities. Satellite-based systems obviously provide the greatest degree of flexibility and will soon become the key factor in global military communications. Until the development of such programs as the Air Force Satellite Communications (AFSATCOM) system and the Navy's Fleet Satellite Communications (FLTSATCOM) system, in which the Air Force participates, US military communications satellite work was largely confined to R&D programs that lacked continuity.

"We now have made firm budgetary commitments to provide a continuing and guaranteed service," involving replenishment of the system whenever necessary, Dr. Yudkin told AIR FORCE Magazine. Changes in the satellite system are to be made only in the case of significant changes in requirements or technology, but, in either case, "we pledge to provide service at least at the same level as that of the satellites which we replace."

Reliability of military communications has another important meaning: The ability to operate in "some mobile form" as well as to allow for interservice communications "interoperability." The latter quality is crucial for the recently initiated, joint tactical communications program (TRITAC), which links the tactical communications systems of the military services into an "interoperable" net. (This does not mean commonality of equipment, which would have adverse effects because of widely differing requirements, but rather creates a linkage through a computerized communications switching system.)

The most critical aspect of reliability, DoD's communications experts believe, is the ability to "execute" the nation's strategic forces in case of nuclear conflict, followed by a feedback of information on how the order was carried out. This is a difficult task so far as the missile-launching submarine fleet is concerned. "Submarines obviously should remain submerged [during nuclear war conditions], yet, communicating through seawater is extremely difficult. We are making good progress on SANGUINE [the Navy's project to provide shore-to-ship communications in the extremely low frequency band for control of the Fleet Ballistic Missile subs under conditions of nuclear blackout and jamming].

"It is almost certainly possible to get the message [to launch] through to a submerged submarine, but the physics of the situation suggests that the submarine has to poke something out of the water to [report back that it has received and executed the launch order]. SANGUINE assures that the submarines receive the execution order. We have special means for the sub to report back with a minimum of compromise of its position," according to Dr. Yudkin. While communications with the submarine fleet represent the "weakest link" of the $C^3$ (command control and communications) network and is "very scenario-dependent," it is compensated for by the balance of the US strategic forces (the land-launched ICBMs and manned bombers) that do not have such a communications problem.

Another important element of strategic communications involves damage and strike assessment information. (The first refers to damage to the US and its strategic forces; the latter to damage to the forces and target system of an enemy.) The assessment requirement is not easily definable because it is greatly influenced by scenarios. The need for such information is obviously most important during a limited exchange.

No binding decisions have yet been made about

## COMMUNICATIONS OF TOMORROW

The ultimate purpose of communications and computer networks is to provide required information in a form that a decision-maker can act on. The way information is displayed is, therefore, important.

Air Force electronics experts believe that in the years ahead, so-called plasma displays will become increasingly important. These devices, similar to neon signs, can be used to portray constantly updated information. In addition, the user can "input" information by simply writing on the displays with an "electric pencil."

Already in existence are large panel displays that can be viewed, and acted on rapidly, by large battle staffs. An alternative to that system could be a network of individual display screens. In the latter case, each member of the battle staff would be able to "interact"—that is, draw information from the system or feed information into it. Air Force computer experts are also examining the potential of modern data entry handling systems that could employ what might be called a universal optical character reader.

Using displays as data entry points into a computer and communications systems is practical only if a limited amount of information is involved. At the moment, written inputs require special formats and special typewriters. The Air Force Systems Command's Electronic Systems Division (ESD) is exploring technology known as the multifont optical character reader, a technique that makes it possible to feed any printed information into computer systems without using special typewriters. The potential of voice input is also being explored by ESD, although the "vocabulary" is still limited to about 200 words or sounds.

these capabilities, but Dr. Yudkin believes that "we need not only a reliable and survivable net for execution orders but one to handle the flow-back of information. If we don't provide the latter, one of two conditions will prevail: The President is either forced to commit the strategic forces early in the conflict because he knows there will be no updating of the information on which he must base his decisions or, if he doesn't want to do this and waits, all the information available to him will become outdated."

From the point of view of systems design, the differences in cost between one-way and two-way communications systems are, of course, fundamental: The two-way system needs transmitters at its terminals, whereas the one-way system doesn't.

## SURVIVABILITY

"We recently set up the basis for survivable communications that are tailored to the survivability of our strategic forces and meet the President's requirement for options [in how he can deploy the strategic forces]. Its key element is the Advanced Airborne Command Post *[see January '73 issue, p. 64]*," Dr. Yudkin told AIR FORCE Magazine. In a nuclear attack, the principal threat to communications, short of the destruction of terminals by overpressure and fire, is the electromagnetic pulse (EMP), which affects circuitry in much the same way as lightning does; it can disable equipment either temporarily or permanently by causing false switching or burning electronic components. Although the electromagnetic pulse follows a line of sight, the EMP field is widely distributed if a nuclear detonation is at high altitudes. The explosion of a large nuclear weapon above this nation's geographic center is likely to black out unshielded communications equipment anywhere in or above the continental United States. Not even geosynchronous satellites, which operate at an altitude of 22,300 nautical miles, are safe from the EMP generated by an explosion in the upper atmosphere and, therefore, require costly shielding.

While the effects of EMP can be crippling, the means for protecting communications are "well understood" by US communications equipment designers. The Air Force is currently developing massive, nuclear-effects-simulation systems at its Weapons Laboratory at Kirtland AFB, N. M., where the interaction between EMP and missiles; aircraft, such as the B-1, AWACS, and AACP; and other systems, is being studied. Hardening against EMP can involve several techniques: preventing the pulse from reaching sensitive elements of the system, inuring the system by providing it with overload protection and building components that can withstand the momentary power surge, or installing sensing equipment that, upon detection of phenomena associated with EMP, disconnects the circuitry. Even extensively hardened systems experience some brief interruptions that are measured in milliseconds and, if not accompanied by damage to the equipment, do not pose a significant operational problem, according to Dr. Yudkin.

The US is well on the way to providing highly survivable communications that support the command and control function, through such programs as the Minimum Essential Emergency communications net. But this will not be true for routine day-to-day communications facilities, such as AUTOVON/AUTODIN. Hardening of these systems would be prohibitively expensive and may not be of critical importance because routine message traffic during a nuclear exchange is hardly essential.

While the effect of EMP varies in different frequency band widths, communications experts do not believe that significant gains in survivability can be realized by concentrating on a particular frequency range. This stems from the fact that the principal problem associated with EMP is not

the interruption of the transmission itself, but rather the phenomenon's damaging effects on communications hardware.

Band width is, however, of major importance for other reasons: It determines basic antenna size and weight, the amount of information that can be transmitted, the noise background or so-called signal-to-noise ratio, and basic signal propagation characteristics. The VLF (very low frequency) range, for instance, is attractive for certain aircraft applications. On the other hand, it requires trailing antenna lengths measured in miles. This precludes its use by all but very large aircraft.

A similar constraint is placed on smaller aircraft communications with satellite-based nets, which normally would use the super-high-frequency (SHF) range. Because the SHF range requires antenna designs incompatible with such aircraft, a less than optimum band width—the UHF (ultra-high-frequency) range—will have to be used, according to Dr. Yudkin. There are no technologies in sight that can overcome these requirements for great antenna lengths. The problem can be eased, however, by phased-array antennas (electronically rather than mechanically steered) that can point precisely at a satellite or other communications terminal.

The amount of information that can be carried over a given channel depends largely on the frequency of its carrier wave; in general, the higher the frequency, the greater the volume. The reason is that the wider band widths available at higher frequencies allow higher bit rates through simple modulation techniques. In addition, noise power generally levels off with frequency. This combination of factors makes possible very high data rate systems using lasers. Ordinary radio frequencies are in the range of $10^6$ cycles per second; radar ranges are between $10^8$ and $10^{10}$ cycles per second; but electro-optics, such as lasers, function in the area of $10^{15}$ cycles per second and, if properly designed, are capable of transmitting data volumes in the gigabit range—many millions of times greater than radio carriers.

While there are few requirements for such high data rates, defense communications experts are actively exploring communications systems using lasers. Dr. Yudkin believes that "there will be some ground-to-space and satellite-to-satellite communications by lasers within the next ten years. But I also believe that laser communications should not be considered a panacea. Most likely, the laser will turn out to be no more and no less than another tool in communications technology." In addition to high data rates, laser communications offer the advantage of requiring simplified, small antennas, especially so far as satellite application is concerned.

Some defense analysts believe that in a nuclear exchange, neither a rational attacker nor a victim would be likely to deliberately destroy his adversary's $C^3$ system, since without command and control there would be no way to limit the conflict. Without $C^3$, the only course open would be to launch all available nuclear weapons in a spasm response. Others say that limiting the opponent to a spasm response may be exactly what the attacker wants. It also could be assumed that a nation which fails to harden its command control and communications net, in spite of the technical ability to do so, might be viewed by an adversary as moving toward a first-strike posture, which requires no hardening.

## COMMUNICATIONS SECURITY

At present, the "bulk of DoD communications must be considered insecure, since a determined enemy can intercept our long-distance microwave transmissions at will and, possibly, find out what we are saying." Dr. Yudkin told AIR FORCE Magazine. "In the past, the costs and procedures for making communications secure" militated against widespread use of security techniques.

"It is fair to say that technology has caught up with these problems. The only factor that is likely to limit us over the next few years in getting widespread, secure communications, especially voice communications, is budget constraints," Dr. Yudkin believes. On a long-term basis, there is little cause to doubt that either costs or doctrinal considerations will prevent the widespread use of secure communications nets.

The principal current means for securing information is encoding digital information. Voice communications can be transformed into digital data and then "read out" in analog form, or simply scrambled. The principal tool for reliable encoding is, of course, the computer. Cryptographic experts believe that the probability of an enemy's breaking a code prepared by a large modern computer approaches zero. But here, too, the limiting factor is cost, according to Dr. Yudkin.

"But to say that money is the limiting factor does not mean we can't have some security in our communications. It does mean that the budget determines the extent to which we have it. Vietnam has taught us that tactical security can be as important as strategic security and that simple communications security measures can be easily broken by a determined enemy. Our sophistication in providing secure communications must keep pace with the steadily increasing sophistication of our adversaries in breaking our protective measures."

Given the needed funds, the communications experts of the military and industry would seem to be capable of reaching that goal within this decade. ■

Some of the Honeywell 6000 computers used in the Worldwide Military Command and Control System.

# THE ELECTRONIC AIR FORCE

*The dependence of the military decision-maker on computers for an ever-increasing range of functions is intensifying for a number of reasons. Primary among them is the fact that computers can do many jobs cheaper and faster than people, that their ability to withstand the rigors of strategic and tactical warfare has sharply improved, and that their staggering increases in computation power have elevated these machines that mimic the human mind to a position of indispensability for virtually all complex real-time, or near real-time, decision-making . . .*

# COMPUTERS—KEY TO TOMORROW'S AIR FORCE

**By Edgar Ulsamer**
SENIOR EDITOR, AIR FORCE MAGAZINE

THE brainy people who build and operate computers see them as "an augmentation of the human intellect, subordinate to man as the principal knowledge worker." To the less sophisticated, the computer's staggering "memory capacity," speed-of-light responsiveness, and recently acquired ability to make basic judgments invite wonder whether, at least in some areas, these smart new machines aren't getting ahead of their makers. The Air Force entertains no such apprehensions. In this era of rapidly rising manpower costs, the Air Force wants all the "artificial intelligence" it can get. Its inventory is already extensive.

At this writing, the Air Force operates or leases 1,302 general-purpose computers valued at $866.4 million. It takes about 23,000 Air Force people to

operate and support them. To program the computers, that is, to tell them how to do specific and frequently changing jobs, costs about $1.5 billion annually, or the price of about 100 new F-15s. Not included in these statistics are the costs of buying and operating special-purpose computers assigned to such specific tasks as test functions, nor the thousands of airborne and spaceborne computers that are integral elements of weapon systems.

The majority of the Air Force's general-purpose computers are government-owned and valued at about $587 million. The remaining $280 million-worth are leased. To operate and maintain—but not program—its 1,302 general-purpose computers costs the Air Force about $400 million each year. Counting the cost of programming and that of verifying the accuracy of the programming—and both factors are skyrocketing—the Air Force spends about $1.8 billion each year on its computers.

## FIFTEEN CATEGORIES

A recent Air Force survey, made available to AIR FORCE Magazine, shows that USAF's computers are used over a wide range of functions, which break down into fifteen specific categories. The largest number, 337 at the time the survey was taken, is used in research and development. The second largest category is supply, involving 253 computers. Other Air Force activities that rely heavily on computers are command and base management, telecommunications, military payrolls, command and control, and intelligence.

While the number of computers has been increasing steadily in recent years, the most dramatic gain in computing power has been realized from the capacity growth of the machines themselves. In the past two decades, computers have undergone three distinct transmutations, each a vast improvement. First came the vacuum-tube-based generation. These were supplanted by a more reliable and compact generation of transistorized computers. That, in turn, was replaced by a third generation, utilizing integrated-circuit technologies and achieving a major breakthrough in miniaturization, which led to a host of attendant advantages. The fourth generation, currently in operation, employs a technology known as large-scale integrated circuitry. There is laboratory evidence of the emergence of a fifth generation of computers, which may rely on such esoteric technologies as electro-optics (lasers and holograms), magnetic-bubble memories, and charge couples. These sophisticated machines, whose feasibility has already been demonstrated, will provide unprecedented improvements in processing speed, reliability, versatility, memory capacity, low power requirements, and, perhaps most importantly, economics.

Computer economics are largely determined by the so-called "price per bit." A bit is the smallest unit of digital intelligence in the computer's memory. The price per bit has dropped in recent years from about ten cents to considerably less than one-tenth of a cent. Of equally far-reaching effect has been the gain in speed. In the last analysis, speed equates with a computer's basic computing power. Third-generation computers can process information at a rate in excess of $10^4$ (10,000) bits per second. Future designs will reach levels as high as $10^8$ (100,000,000) bits before too long. Increases in computation speed are largely a function of the density of the computer's circuitry and data-storage system. All electronic computers work through electronic currents that travel with essentially the speed of light, or about one foot per nanosecond ($10^{-9}$ seconds, or one-billionth of a second). Obviously, the smaller the distance these currents have to travel within the individual logic circuits and memory storage areas, the greater the speed and reliability of the machine.

## INCREASING CAPABILITY

To measure computation power, computer designers use a basic figure of merit in measuring computation power—the processing rate of instructions, expressed as MIPS, for million instructions per second. A recent study by the RAND Corporation for the Air Force, drawing on Air Force and Department of Defense expertise, reached the following conclusion:

By 1985, computers of the so-called pipelined serial type can be expected to achieve a processing rate of 650 MIPS, compared to 100 MIPS theoretically attainable by the world's most powerful computer currently under development, the ARPA-sponsored ILLIAC IV. (A pipelined computer has a "look-ahead" capability; it can plan in advance for up to ten instructions that it knows are coming up by getting the needed data out of its memory storage area. In a sense, it acts like a stage manager who has read the script and arranged his props for the scenes he knows are coming up.)

According to these forecasts, which AIR FORCE Magazine was told by computer experts at Rome Air Development Center "more than likely will turn out to be conservative," advanced-array computers will reach a processing capacity of 2,500 MIPS by 1985. Computers using the most sophisticated architecture presently known, the associative-array arrangement, should be able to reach a processing level of 13,000 MIPS by 1985. (The array or parallel processor consists of a large

*Maj. Gen. Jack B. Robbins, USAF's Director of Data Automation, believes that "the biggest story of the 1970s, so far as the Air Force is concerned, is its emerging dependence on the computer," soon to become "critical."*

number of "slave" computers that work together; the associative processor takes the former's capability one step further by permitting the various arrays to interact on a "cognitive" basis.)

Coupled with this phenomenal increase in processing capability will be equally significant increases in memory storage capacity, according to Air Force computer experts. The first computers used by the Air Force had memories that were in the 100,000-bit range. This figure increased into the million-bit range in the 1960s and is now in excess of the billion-bit level. Maj. Gen. Jack B. Robbins, Hq. USAF's Director of Data Automation, predicts that, in the years ahead, "we will have data bases that are virtually unlimited in terms of volume, especially in such applications as meteorology and intelligence. Once we are able to store and retrieve data at truly reasonable cost and high densities, the only criterion in deciding whether or not we want to go to indefinite data bases may well boil down to a common-sense question: Is the stored data worth the expense?" Some experts believe that future computers will be able to pack vast amounts of data into dimensionally small memories, that the access to that information will be far more rapid than is possible today, and that these memories will be sufficiently "ruggedized," vibration-resistant, and "survivable" in a nuclear environment to qualify for installation aboard airborne command posts as well as spacecraft.

Access time to the computer's memory section is of crucial importance because the machine's logic circuits work with far greater speed than the mechanism of the memory storage. This mismatch in speed between the two most critical elements of computers, in the view of Air Force experts, is likely to continue. But in the foreseeable future, it can be ameliorated. A first step is a change from today's disks and drums, which rotate to provide access to specific data areas, to nonrotating or solid-state systems that have no moving parts. Computer experts fittingly call the latter arrangement "transparent" and the present mechanical system "opaque." In short, such an arrangement cuts down on the time that is now being wasted by the processor having to wait for data to work on.

## "MAGNETIC BUBBLE"

Several revolutionary techniques permit transparent memories and have undergone successful testing in laboratories. One is the "magnetic-bubble," or magnetic domain wall device. In essence, this technology relies on the presence or absence of a small magnetic domain, or "bubble," at predetermined bit positions. The magnetic-bubble device is attractive to the designers of military computers, especially air- and spaceborne, because it permits enormous data densities, in the order of ten million bits per square inch. In addition, it is characterized by low power requirements, low weight, and low cost. Finally, magnetic-bubble devices resist nuclear effects, such as the power surges induced by the electromagnetic pulse (EMP) released by a nuclear explosion, far better than the semiconductors used today.

(The Air Force Systems Command's Space and Missile Systems Organization [SAMSO] is currently in the early development phase of a "Fault-tolerant Spaceborne Controller," tailored for long-duration space operations. This computer is scheduled to incorporate a magnetic-bubble memory. The spaceborne controller program is expected to open the doors to truly extensive space-based computer capabilities. Its main objective is to prove the feasibility of computers functioning unattended over long periods of time by being able to "heal" themselves if faults develop. The machine would bypass faulty areas in its circuitry through special programming and hardware techniques.)

Another new technology that makes possible solid-state computer memories is the charge-coupled device. Its underlying principle is the "translation" of light into electricity, and vice versa. Digital information transmitted by laser or other optical means is recorded in the form of electrical-charge packages. Like the magnetic bubble, the charge-coupled device offers the potential of prodigious data densities. It represents a technology that is bound to catch on if present trends toward electro-optical computer memory construction continue, according to Maj. Gen. Lee M. Paschall, Hq. USAF's Director of Command Control and Communications.

Exploration of electro-optics in computer logic designs is relatively new but, at least in the laboratory, shows great promise. Using photographic emulsions as the storage medium, such a system can cram more than $10^8$ (100,000,000) bits into one square inch. The information is "written" as well as "read" by laser or electron beams. The informa-

tion is represented by microscopic dots—and the absence of dots—which take the place of the typical bits of digital information. An even more sophisticated technique currently under development combines the laser with a new and extremely sophisticated technology known as holographics —essentially, the interaction between two laser beams. This technique makes it possible to record a whole page of digital information at one time.

The combination of potential improvements in processing speeds, greater data densities, and more rapid access to memory data prompts Air Force computer experts to predict that basic computer efficiency will increase at least seventyfold by 1985.

## INCREASING DEPENDENCE

"The biggest story of the 1970s, so far as the Air Force is concerned, is its emerging dependence on the computer. Even by the late 1960s, this dependence had not yet become critical, but the computers that now are being developed will make it so," according to General Robbins. Air Force computer experts believe that "computers beget computers," meaning that it takes another computer to tie together computer networks. As digital controls and central processors perform more critical functions and provide increased automaticity aboard combat aircraft, the information flow that results must somehow be fed into the ground-based system. Obviously, this interface can only be obtained with another computer.

Similarly, future tactical aircraft will have to have direct, near real-time links with AWACS, and that system, in turn, will have to be coupled to airborne command posts. The command post, in turn, will have to link up with a ground-based master command control and communication net. The common bond among these systems, their sensors, avionics, and data-automation systems can be provided only by other computers. Lastly, the overall Air Force system will have to be linked to the command control and communications nets of the Army and Navy operating in a given theater. In all instances, computers will have to provide the means for rapid data processing.

Accelerating this trend is the steadily increasing rate at which modern airborne and spaceborne sensors produce information. To boost the reliability of sensor information or because, under some conditions, certain types of sensors simply will not function adequately, it is necessary to record simultaneously a given event, such as a Soviet missile firing, in a number of ways, each using a specific segment of the electromagnetic frequency range, such as infrared, radar, etc. This process, known as multiple phenomenology, steps up the already prolific data rate of modern sensor systems. In addition, of course, the information furnished by different sensor systems has to be correlated and interpreted, again by high-speed computers. This type of information processing can be handled more efficiently if two basic conditions are met:

First, some preprocessing of the information should take place at its source, that is, aboard the spacecraft, to filter out irrelevant, routine data. Secondly, the processing of the information is best accomplished by computers using parallel or array circuits, rather than a "serial" architecture. Serial architecture means a circuit design that processes information one step at a time, without regard to what is relevant and what isn't. The parallel- and associative-array technology emulates the human mind by operating on information in a selective, cognitive manner. This is accomplished by a number of data channels "comparing" information; this enables them to recognize specific patterns.

## STACKS OF PAPER

A step that the Air Force hopes will bring the manager closer to the computer is a shift in basic philosophy of how to use computers: "Most of our computer products today are thick stacks of paper under which we bury the user at regular intervals, each day, each week, and so on. It is a 'push' system. We force all this data on the manager, whether he needs it or not. We are now working on a new approach, which might be called the 'pull' system. We encourage the manager to pull information out of the system, but only when he wants it. This not only saves costly machine run time and reams of paper, but is psychologically helpful to the user," General Robbins told AIR FORCE Magazine.

Equally important, in General Paschall's view, are improved display systems, which use graphic readouts rather than printed paper. Obviously, the easiest and most effective man/machine interface would be "talking computers," machines that respond to voice instructions and, eventually, even "answer" in the form of human speech. Air Force experts believe that the widespread use of voice-instructed computers won't occur for many years. While experiments in this area already have taken place, the problems are vast. For one, it appears that it will be necessary to tailor such computers to the peculiarities and voice qualities of a specific operator. But even such an individualization provides no reliable solution, because, as General Paschall put it, "even if a computer has been trained to recognize my voice, what will happen if I had a cold? The chances are the machine wouldn't recognize my voice."

## MINI- VS. MAXICOMPUTERS

The Air Force recently completed the acquisition of several major computer systems. Among them is the Advanced Logistics System (ALS), consisting of seven very large computer systems located at Hq. AFLC and at individual Air Materiel Areas. Others involve the Advanced Personnel Data System and the computer update program of WWMCCS (the Worldwide Military Command and Control System), which is being carried out by the Air Force as executive agency for the Department of Defense. In the near future, the Air Force can be expected to concentrate, therefore, on evolutionary improvements, rather than on acquiring massive new systems.

The predominant concern right now is with minicomputers and computer networks, also referred to as federated systems. Made possible largely by advances in high-speed, high-volume digital communications, federated nets of minicomputers or miniprocessors (the actual computation process takes place in a computer's processor section) can share a large common data base, as well as possessing some memory capability of their own. Such nets can be spread out over a large geographic area or concentrated in one location or region. Several networks of this type are under development or study. One involves a Pentagon communications center combining the three services and consisting of six miniprocessors, one of which would be used as a standby spare. Such a federated system remains operational, although in a degraded form, even if only one processor is functioning and is, therefore, attractive to military planners.

Another candidate for a federated net of minicomputers is SATIN 4, the replacement for the Strategic Air Command's Control System (Program 465-L). This widely distributed system, General Paschall told AIR FORCE Magazine, will provide SAC with a survivable and flexible network "that can degrade far more gracefully, and far less catastrophically, than the present system." Two other candidates for federated nets are "Project Create," which supports the command-wide engineering activities of AFLC. The other is a widely dispersed communications net that oversees the maintenance and repair requirements of the entire C-5 fleet.

In terms of numbers, one of the largest uses of minicomputers is the so-called Base Communications Automation system. Also, General Robbins told this reporter, the Air Force is in the process of acquiring a "large number of minicomputers to create what amounts to a computer network in order to permit Air National Guard installations, Air Reserve installations, and smaller active-duty sites access to a host base that maintains and updates the data of each of the users."

## MINICOMPUTER NETS

Several basic factors attract the military to minicomputer nets, according to General Paschall. Such a system can be expanded or contracted easily, reacting to temporary needs. "It looks like we know how to build systems consisting of groups of relatively small minicomputers and assign each machine a specific task. In turn, each machine will have a portion of the system's memory, as well as its link into a central, massive memory bank. Such a system can be organized without the elaborate operating subsystem of a large parallel processor because all operations take place serially and not in a synchronous manner. The result is that there are fewer software problems, the machines themselves are cheaper, and there is far greater flexibility."

The speed and urgency with which data is needed provides a natural guideline for what information should be stored in a minicomputer's own memory, and what can be stored in the network's central data base: If the information is needed instantly, it must be stored at the minicomputer's site. If it is less "time-critical—that is, not needed within seconds—it should be stored centrally," according to General Robbins.

Another advantage of the minicomputer network is that if one becomes overloaded, it is relatively easy to back it up with another machine. This can't be done as easily, maybe not at all, in large, central computer systems, according to General Paschall.

## SAFEGUARDING INFORMATION

To date, computer systems designers have not been able to solve a stubborn problem that crops up whenever several military users share a common computer and its data base. It is referred to as the need for "multilevel security," meaning that some users are concerned only with routine information which doesn't have to be protected by any special means. The opposite condition prevails, of course, if a user performs intelligence functions. At the nub of the problem is the concern that some person, either a user or someone who has access to one of the terminals, "will enter your software machine and, maliciously or for other reasons, take out data that he is not authorized to get," General Paschall explained. In case of a minicomputer net, it appears possible to safeguard such information by building multilevel security measures right into the individual machines.

The great importance attached to minicomputer nets at this time does not eliminate the need for large-scale multiprocessors. "The big machine," General Paschall pointed out, "is still the best number crusher in sight. It would seem highly unlikely that force control on a scale performed by the WWMCCS net could ever be performed by minicomputers."

## NEW COMPUTER SYSTEMS

In spite of the high level of "computerization" that already exists in the Air Force, there remain important areas of activity that need to be developed more fully. Most urgent is the question of the type of computer installation that should be developed for the Advanced Airborne Command Post whose seven aircraft eventually will serve as the nation's most survivable strategic command and control facility. Discussions between the Air Force, the Joint Chiefs of Staff, and DoD's Assistant Secretary for Telecommunications have not yet led to any decision on how the AACP's onboard computers are to interface with the ground-based computers of WWMCCS. Three major approaches are possible:

- Make the aircraft's computer system identical to the WWMCCS machines on the ground, in terms of architecture if not size.
- Design the aircraft's computer system to "emulate" the ground-based system. This could take the form of a minicomputer "at the front" of the airborne system, which would act as the "emulator" and translator between the two systems.
- Make the AACP's data automation system act essentially in the role of an input/output device to the ground-based system and retain only limited storage and processing capabilities aboard.

The decision on AACP will have far-reaching impact on another area of computer applications that is presently in the forefront of concern: spaceborne computers. The amount of computer capability aboard the Advanced Command Post determines the degree to which data from the various spaceborne warning, detection, surveillance, communications, and other sensors must be preprocessed (filtered) at the source. The Air Force's Assistant Secretary for R&D, Grant L. Hansen, recently explained that, while processing of sensor data in the future is likely to take place aboard the AACP or on the ground, "considerable attention is being given to selected processing of collected data on board satellites. This preprocessing removes much of the 'background' data that is not essential to the decision process."

Because a large volume of sensor data from satellites is scheduled to be fed into the AACP's data automation system, the question of how much processing capability should be aboard the aircraft, how much aboard the satellite, and how much on the ground takes on great importance. Many planners favor the idea of placing as much preprocessing capability aboard satellites as is economically possible.

Current efforts to design spaceborne computers capable of "healing" themselves, as well as the option to provide the satellite with a "failure mode," that is, shift the output of its sensors directly into a wide-band transmission to a ground-based or airborne terminal, can increase the reliability of the spaceborne system.

## MAINTENANCE

The Air Force spends about $1.7 billion each year on the maintenance of its weapon systems and assigns more people to maintenance work than to any other activity. While the Air Force Logistics Command has achieved high levels of automation at the depot level, this is not yet true at the base level. Efforts are currently under way to design computer systems that will bring a considerable amount of maintenance automation to the flight lines. This effort, General Robbins believes, could result in an operational system within the next three or four years. Its purpose is to take information from checkpoints in aircraft and missiles and, with the help of computers, translate this data into work orders and specific scheduling of skilled personnel and facilities. (A pilot program was completed earlier this year at the Strategic Air Command's K. I. Sawyer AFB in Michigan and is currently being analyzed.)

## THE PERVASIVE SOFTWARE PROBLEM

The explosive growth in computer hardware capability is likely to continue at a rapid pace in the years ahead. It has already far outstripped the programmer's ability to exploit the full potential of these powerful machines. The resultant dilemma is formidable. Air Force computer experts estimate that, over the life of the system, the software costs of a general-purpose computer exceed its hardware costs sevenfold.

Although hard to define, the software or programming problem of general-purpose computers stems from the fact that a multiplicity of machines perform a multiplicity of tasks under instruction from a multiplicity of people. Not only do the machines speak different computer languages, but literally hundreds of programmers write the software simultaneously, on the strength of what they believe the user wants. This process is both costly

and slow. There has been no radical increase of the speed with which programs are written.

Software experts at Rome Air Development Center told AIR FORCE Magazine that, in the 1950s, programs were written at a rate of 100 instructions per man per month, if validation and "debugging," or corrections of programming errors, are counted. That rate today is about 300 instructions per man per month. While on the surface this might connote progress, it does not: If allowance is made for the high increase in machine capability and the complexity of modern programs, the reverse of progress has set in. No easy solutions are in sight.

The world's most carefully planned and generously funded software program was that developed for the Apollo series of lunar flights. The effort attracted some of the nation's best computer programmers and involved two competing teams. Checking the software was as thorough as the experts knew how to make it. In the aggregate, about $660 million was spent on software for the Apollo program. Yet, almost every major fault of the Apollo program, from false alarms to actual mishaps, was the direct result of errors in computer software.

## MORE FLEXIBLE SOFTWARE

The software problem increases in direct relationship to the complexity and scenario-dependence of the task to be performed. In the case of national defense applications, this means the most crucial areas—such as command and control, intelligence, and force management—that require the greatest degree of reliability are the ones with the greatest potential for errors.

The easiest and most obvious solution, from the point of view of computer scientists, would be to build only one type of machine, or machines, with basically identical circuit architecture, and to use only one data format, or language. This is obviously not practical because it would deprive the system of all flexibility and is unacceptable from the point of view of economics.

The Air Force, therefore, is looking at different techniques to alleviate the software problem and the associated high costs. One promising technique, in the view of General Robbins, is to write more flexible software—that is, program less specifically but more generally in terms of what the user wants. "Our approach today is to go to the user and tell him, 'Give me your data that you want to work on and that is really important to you, and we will try to structure a data file that can be updated, modified, and changed so that if the application changes, we won't have to build a completely new software system, as is the case now.' The difficulty, however, is that it will take extremely talented and capable people to write such a flexible data-management system."

(Computer experts now are less confident of solving the software problem through hardware innovations than was the case in the past few years. While microprogramming—building some of the software into the system from the start—and meta compilers, which permit the transfer of instructions from one machine to another, work reasonably well in the case of minicomputers, these techniques have not proved effective with large-scale, general-purpose computers.)

Structuring of a computer's data-management system can be likened to a phone book that is arranged alphabetically. This works fine when the user wants only to find a single individual on the basis of his name. But what about the user who wants to find all the residents who live on a given street and doesn't know their names?

## VERIFICATION

The problem is aggravated by the fact that in most cases—and *after* the information and the format have been arranged in the way the user thought he wanted them—"somebody tries to do things outside of the range the designer had in mind—with the result that things fail." In addition, and in spite of the fact that the Air Force spends about forty-seven percent of its software money on verification testing of new software, it is physically impossible to fully prove the reliability of the programming, especially since this depends on how the user operates the system.

The software problem, of course, affects the computer industry as a whole. Massive efforts are under way to improve this condition. The Air Force, therefore, spends its own limited funding only on problem areas that are peculiar to national defense, principally command and control.

A promising effort has just been launched by the Rome Air Development Center. Known as the "Software First" approach, it seeks to prove that it is possible and cost-effective to reverse the present sequence of analyzing a specific requirement, obtaining the hardware most suitable to do the job, and then, finally, writing the program. RADC's experts, working closely with computer industry scientists, propose to "design-engineer" software after they have established a given requirement. As they write the software, they plan to test it on an "emulator," a kind of chameleon of computer architecture, which can assume the characteristics of many different computer types. This, they predict, will make it possible to optimize both the software and the hardware right from the start.

It would seem that, sooner or later, the people who were able to create "artificial intelligence" will succeed in taming the software tiger. When they do, the Air Force—and all other users—will enter a truly golden age of computers. ■

*Managing the three dimensions of airspace—a task that is heavily dependent on electronics—is "perhaps the most formidable and complex problem of our times." The Commander of Air Force Communications Service lays out the dimensions of that problem in both peace and war, and tells what is being done about it in this discussion of . . .*

# THE AIRSPACE CRUNCH: NOW AND URGENT

**By Maj. Gen. Paul R. Stoney, USAF**

*Maj. Gen. Paul R. Stoney has commanded the Air Force Communications Service since August 1, 1969. Commissioned on completion of pilot training in July 1942, General Stoney's entire career has been in the communications field. He has served in a wide range of command and staff positions, including duty with OSD-DDR&E and as Chief of Communications and Electronics at Hq. SAC. Prior to his present assignment, General Stoney was Vice Commander of AFCS.*

MOST people I talk with have some appreciation of what air traffic control is. I think an answer given me recently by a youngster in a group touring one of our GCA facilities was pretty accurate. He said that air traffic control was making sure two airplanes don't try to fly in the same place at the same time. That simple definition, that "making sure," is rapidly becoming one of the toughest problems of our time.

I do not need to repeat here the statistics on the growth in aircraft population in the United States during the past fifteen years, or project this growth ten years hence. Numerous recent articles and studies, even novels, have been written on the subject—all predicting dire things for the future unless something is done to improve airspace management. My purpose rather is to address air traffic control in the US Air Force and how it directly affects air operations—particularly how it restricts our flexibility when airspace becomes saturated or controls are too cumbersome or ineffective.

Anything that impacts air operations is important; so, effective air traffic control is important. This fact has never been brought home more sharply than now, as a result of our experiences in Southeast Asia. I also want to discuss how I think we have gotten to the point where airspace management has reached "crunch" proportions; what doctrinal changes are coming about as a result; and the role I foresee for my command in achieving solutions to our problems. The mounting need for better airspace management has been recognized for some time. There is no question that the problems brought about by poor airspace use have had a direct relationship to our ability to function effectively in combat. Why then hasn't something been done about it?

## Evolution of Air Traffic Control

First, some background about air traffic control. The Federal Aviation Act of 1958 charged the Federal Aviation Administration (FAA) with responsibility for the development and operation of a common airspace/air traffic control system in the US and its territories. This charge included, among other things, control of navigable airspace and the safe and efficient regulation of both military and civil operations in that airspace.

The FAA was further charged with the development and operation of a common system of air traffic control and with research and development of air navigation facilities. In the United States and its possessions, then, the National Aviation System, or NAS as it is called, is the arena in which all aircraft must perform. Most of the traffic control facilities operated by the military services, such as control towers, TACAN beacons, and airport approach controls, are operated with FAA permission and as a part of the NAS.

The principal concept of air traffic control has not changed since its "invention" in the late twenties and early thirties. Only instrumentation affording greater precision has changed. The concept is to specify the exact location, altitude, and route of travel of all aircraft under traffic control. By flow control, flight route projection, and knowledge of all other aircraft flight plans, conflicts or collisions are avoided.

Until radar entered the picture after World War II, control was exercised by pilots reporting their progress at established fixes and at assigned altitudes along

airways that were formed by beacons and radio ranges of various types. This method of control is still used in areas not covered by radar or in the event of radar failure. In fact, this is still called "conventional" traffic control. Standards establishing the minimum allowable separation between aircraft using the same airway, altitude, and speed have long existed for this type of control.

Visualizing this method of separation, problems immediately come to mind. What do you do if the second aircraft is overtaking the first? What if an aircraft has an emergency and cannot hold its altitude? And a real tough one—What do you do if all your altitudes and spaces are filled and you suddenly receive an unexpected aircraft that has been flying visual and now must change to IFR? The answer is you direct the pilot to alter course, to hold, descend or climb, slow down, or any combination of these to prevent conflict. However, each alternative causes delay, more route saturation behind, and, quite naturally, pilot and passenger frustration.

The advent of radar has been a real lifesaver to the air traffic controller, literally and figuratively. It allows more positive and constant position identification and flexibility for issuing directions to prevent conflict. Radar obviously permits closer spacing. Distance Measuring Equipment (DME) came along about the same time as general radar coverage was attained, and it enabled the pilot to report his exact distance from a ground station at any time. Another major help was the introduction of identification beaconry (transponder beacons), now refined to give aircraft call signs and altitudes automatically. Much has also been done to automate and expedite the flow of flight-plan information from controller to controller and from center to center. But traffic control itself, the manipulation of flight direction information, is still a human function computed by the human brain and conveyed to the pilot by human voice. And I suspect it will continue to be so for a long time.

## Continuing Air Traffic Control Problems

Then, what is the problem? Actually, there are several. First, all aircraft are not flying under controlled conditions. In fact, most are not. Though prohibited from doing so in some areas, general aviation (private) pilots fly all over the place, providing their own separation visually. Also, many aircraft, though flying under controlled conditions—instrument flight rules, no matter what the weather—are not equipped with the sophisticated gear carried aboard military and commercial aircraft, such as transponder beacons previously discussed. By far the most serious problem, though, is the acceptance rate at terminal airports. This is usually the choke point that starts the holding patterns and flight-plan changes. If your funnel will allow only a certain flow out the spout, you can put only so much in at the top. The result: Aircraft sit on the ground for excessive periods of time, awaiting takeoff clearance. This is the only control valve the controller has to prevent calamities in the terminal areas.

Next in the line of problems confronting the controller is the growing spread in aircraft speeds, rates of climb and descent, and fuel reserve or loiter restrictions. The three-dimensional volume of airspace and the difficulty in calculating closure rates through a widening range of operating envelopes creates quite a mathematical monster. Add a couple of airborne emergencies, or close a dozen terminals unexpectedly because of weather; if all of your airspace "blocks" are about full when these situations converge, you suddenly have a nightmare on your hands. I can assure you that it has happened many times, and today's high-performance aircraft have very little flexibility, particularly after they have descended from their more efficient higher altitudes.

This, then, is the answer to your question, "Why hasn't something been done?" Many things *have* been done, but saturation and aircraft performance have outstripped a system that is essentially based on mental calculations. It is so complex and full of variables that it has defied full automation, and I believe you can see why.

The FAA has just announced the addition of a "conflict prediction" output from the computer system of the NAS—that is, if conflicting flight plans are filed by separate centers and controllers, a red flag will be raised automatically. This is a major breakthrough, but only a single first step down a very long and tough road toward total automated control . . . toward ultimate solution.

## The Military Side of the Problem

Your next natural question, and one I get every day, is, "Why is this a military problem?" The basic answer is in the definition of the NAS as applying only to the US and its possessions. When we deploy overseas, we may find a fairly effective indigenous air traffic control system in existence. By the same token, we may find none at all, or, more likely, we will find a system totally incapable of handling the complexities that our sudden arrival creates. This was the situation in Southeast Asia—in Vietnam, Thailand, and even the areas we transited to get to the combat zone, such as the Philippines and Taiwan. This is the basic problem. We must recognize that it is entirely possible, if not most probable, that in the event of a contingency we must provide our own airspace management when we deploy.

The FAA is prohibited by law from providing this service in a combat theater, except in the event of a declaration of general war. In that eventuality, I'm sure you recognize that it will become even more critical that the NAS work properly and that our FAA controllers are going to be busy at home. So the military must be ready to provide its own air traffic control capability when its elements deploy. But, we must not forget either that within the NAS is where we live and train in peacetime. Approach controls, towers, range controls, etc., are operated in airspace allocated to the military by the FAA. We must also effectively manage this airspace. These two factors are why there are about 6,000 air traffic controllers in my command. Because of the previously mentioned problems, air traffic control specialists are becoming a critical commodity. I hope that you also see why techniques for improving airspace management are as vital to the Air Force as to the FAA.

## Fewer OJT Opportunities

To be a qualified air traffic controller you must work at the job constantly. Six months away from the scene and you really are no longer a qualified controller. Also, unless you have earned your controller's "degree" in the "sweatbox," as controllers say—under the stresses and strains of the saturated, complex traffic control job—you are not qualified to step into an environment

such as Vietnam. My problem is how to keep my controllers ready for such contingencies.

Until recently, there was no problem. Following World War II, there was little or no indigenous air traffic control competence overseas. Most of the air route structures we used to support our overseas operations were provided by the Air Force. But as the various host nations recovered from the war, they began to build their own airports and develop jet air carriers. They established their own air traffic control centers modeled on the FAA system, and often assisted by the FAA in their development. As a result, the Air Force was left with less and less to manage.

In the continental United States, the ground rule on airport approach controls has been that once traffic becomes predominately civil, control will revert to civil authority, the FAA. So one by one, we have also seen our approach controls disappear. The training base for maintenance of controller proficiency within the Air Force has become extremely limited, especially in "center" or "air route" functions. Southeast Asia kept us proficient, but that is now winding down.

New approaches are needed to enhance the air traffic control profession in the Air Force, and we are moving out in this direction. And because the demands on controllers are increasing, the credentials to get into the field are being raised; schooling is being improved; continuation training is being offered. But the key challenge remains that elusive commodity we call "maintenance of proficiency." As a result, we cannot reduce any further our airspace assignment responsibilities. Instead, we must find more opportunities for control, such as reacquiring some approach controls we have relinquished.

Air route training is the most difficult. I see no peacetime alternative except to place a number of USAF controllers on duty with the FAA in their busy centers. I do not mean liaison or over-the-shoulder assignments either: Our people must actually work at a position and become facility rated. We used this method just after World War II to qualify our people to operate newly established overseas centers, and it worked well. Again, we are discussing with the FAA a similar program. Of course, we in the military must work closely with the FAA, too, in the evolution of the NAS to ensure that our operational needs will be accommodated. This is an extremely important part of my job, but another subject I cannot address in detail here.

## Air Traffic Control in a Combat Theater

A new point that needs clarification relates to the Tactical Air Control System (TACS). For reasons that have always been a mystery to me, there has developed a feeling of competition—almost suspicion—between weapons controllers and air traffic controllers. This should not be. Two people cannot control the same airspace at the same time. If there is not complete understanding and support of this fact, then there is no airspace management. I am pleased with the wording of the new AFM 2-12 and the doctrinal base it now establishes for a tactically oriented Airspace Control Center within the TACS.

The weapons controller is a specialist within the TACS whose job it is to put the weapon systems on the target in the combat zone. He performs this job on the terminal end of the flight profile. A corresponding job is done by the approach air traffic controller at arrival and departure airports. The space in between must be used not only by tactical strike and reconnaissance aircraft but by transiting administrative support traffic, airlift support, helicopters, and often commercial carriers. This is the domain of the air route controller.

As was the case in Vietnam and is now true in Thailand, indigenous air route structures and indigenous air route centers may already exist, and we must mesh or superimpose the TACS onto this structure. If the indigenous system is not capable or is nonexistent, then we must totally provide the service. It is not reasonable to expect either weapons directors or approach controllers to do the en-route job. They have enough to do in their specialized areas, and, further, they are not trained for the demanding air route job.

If traffic is not excessively heavy, we can and do establish an Air Traffic Regulation Center by dedicating radarscope positions within the Control and Reporting Center (CRC) to do the en-route function. But as traffic gets heavier or the control area larger and more complex, a more elaborate facility within the TACS—an Airspace Approach Control Center as described in AFM 2-12—may be necessary.

## Needed: A Coordinated Civil-Military Approach

To be effective, air traffic control in a combat theater will require the same personnel expertise, technical development support, instrumentation, and regulation we introduced earlier when discussing the complexities and problems of traffic control in the United States. That is why the development and maintenance of an in-being cadre of qualified controllers is so important; why the quality of controllers in uniform must be first-rate; why a coordinated civil-military approach to equipment and procedures development is essential; and why I am writing this article.

We cannot wait until another emergency is upon us. We have lost the expansion base we once had, and the control problem is becoming more complex daily. We all must recognize the "common use" aspects of airspace and realize fully the impact of uncontrolled and independent actions on the management and safety of this common airspace. Block altitudes, prohibited zones, special use airspace, etc., are the crudest form of airspace management. But airspace has become a very precious commodity; visual separation becomes unrealistic at high Mach speeds; all vehicles in it must now be controlled or none are controlled. Blocked altitudes are grossly inefficient—by orders of magnitude compared to positive control, even with today's inadequate instrumentation. That means we can put one hundred times more aircraft safely in the same airspace if positively controlled.

I realize that it is easy to criticize, to resort to Monday morning quarterbacking, if you will. But I do speak from a fairly respectable data base of experience. Meeting the future demands of managing the three dimensions of airspace is perhaps the most formidable and complex problem of our times. It rates among the more pressing problems facing our society—and in the company of some rather staggering problems, that's saying quite a lot.

If history is any teacher, the progress of nations can be directly related to the development and exploitation of commerce and communications. And our defense is certainly dependent upon effective air movement. So, effective air traffic control is right up there in front. It is now, and it is urgent. ■

# What's Happening in Electronics at ESD

| SYSTEM NO. | NAME AND MISSION | STATUS | CONTRACTORS |
|---|---|---|---|
| 404L | **Traffic Control Approach and Landing Systems (TRACALS):** TRACALS combines USAF updated ground facilities and equipments (fixed and mobile) with associated avionics to provide safe, orderly, and expeditious aircraft movements on a worldwide basis. | Continuing Acquisition | Airborne Inst. Laboratory Texas Inst., General Time |
| 404L | **AN/TPN-19 Landing Control:** The AN/TPN-19 is a modular, transportable, all weather, lightweight Ground Control Approach (GCA)/MRAPCON facility designed to provide simultaneous surveillance, identification, terminal area control, and final approach control of aircraft at a fixed or forward tactical air base. The facility includes an Operations Shelter, an Air Surveillance Radar, and a phased-array Precision Approach Radar. | Acquisition | Raytheon—Prime |
| 407L | **Tactical Air Control Systems (TACS):** A highly mobile communications and electronics system for command and control of tactical aerospace operations. Capable of modular deployment by airlift, helicopter, and truck, 407L can be adapted to specific geographic requirements. The system will provide radar and communications in the tactical environment, airspace management, communications for Army support, and air traffic control. | Acquisition | TRW Systems (Integration) Many for equipment |
| 411L | **Airborne Warning and Control System (AWACS):** Provides a survivable airborne air surveillance capability and command, control and communication functions. Its distinguishing technical feature is the capability to detect and track aircraft operating at high and low altitudes over both land and water. It will be deployed by TAC in both initial phases of hostilities and in protracted situations. For ADC, it provides an efficient solution to the requirement for survivable, strategic air defense surveillance and control. | Acquisition | Boeing—Prime |
| 414L | **CONUS Over-The-Horizon Backscatter Radar:** Provides ADC an early warning system against aircraft attack on the continental United States. | Validation | None |
| 415L | **Military Airlift Command Integrated Management System (MACIMS):** A two-phased program to provide an integrated data-processing and transmission system for MAC's use in accomplishing its mission as single-manager operating agency for global airlift services. MACIMS will utilize computer hardware and software elements of the Worldwide Military Command and Control System. | Development and Acquisition | None |
| 416L | **SEED CLEAR:** Update of the existing AN/FPS-27 radar sets to satisfy operational requirements of the North American Air Defense System (NORAD). | Acquisition | Westinghouse—Prime |
| 416Q | **Common Digitizer:** A data-processing system to be employed at USAF, Canadian, and USAF/FAA joint-use radar sites, replacing AN/FST-2. Provides search and beacon radar data in digital format to both the SAGE/BUIC and FAA National Airspace Systems. | Acquisition | Burroughs—Prime |
| 427M | **NORAD Cheyenne Mountain Complex Improvements:** A system to acquire, with growth potential, new and improved data-processing equipment, software, displays, and communications for the NORAD Cheyenne Mountain Complex, for the purpose of providing a responsive and reliable capability through 1980. | Acquisition | Philco-Ford—Prime |
| 428A | **Tactical Information Processing and Interpretation (TIPI) System:** A homogenous grouping of a modularized family of equipments designed to satisfy the complete spectrum of tactical intelligence requirements for the Air Force and the Marine Corps general purpose forces. | Definition and Prototype Production | GE for system integration Many for equipment |
| 433L | **Weather Observing and Forecasting System:** A system for the modernization of the Air Force Weather Service to provide high-quality and timely weather observations, information, studies, advice, and forecasts in support of military operations and command and control systems. | Acquisition, Operation | Many |
| 436M | **SEED CUPS:** A program to integrate new Worldwide Military Command and Control System third-generation dual processors and accompanying software into the SAC Automated Command and Control System. | Acquisition | Computer Services Corp. |
| 440L | **Forward Scatter Over-The-Horizon Radar:** Provides DoD activities with the capability for real-time information on strategic threats to national security. | Operational | Raytheon—Prime |
| 441A | **Backscatter Over-The-Horizon Radar:** A research and development system to provide the Air Force with a future capability for detection of strategic threats to national security. | Acquisition and Test | RCA—Prime |
| 441D | **COBRA TALON:** A system to provide the Air Force with a detection and tracking sensor system for overseas deployment. | Acquisition | GE—Prime |
| 450A | **Tactical LORAN:** Development and qualification of advanced LORAN ground transmitters and airborne systems to satisfy the Air Force Tactical LORAN common-grid requirements for the 1975–1985 time frame. | Acquisition | Sperry Rand<br>Lear Siegler<br>ITT |
| 451D | **COMBAT GRANDE:** Upgrading, modernizing, and semi-automating the existing Spanish Air Force aircraft control and warning network. | Acquisition | None |
| 465L | **Strategic Air Command Automated Control System:** A system that transmits, collects, processes, and displays data to assist the SAC Commander in Chief commanding and controlling his forces. | Transitioned to AFLC; evolutionary improvements continuing | ITT on original system— many since then |
| 478T | **TRI-TAC Program:** A program to define Air Force requirements for tactical ground communications, both near term and post 1980. It will ensure that Air Force requirements are incorporated into the DoD Joint Tactical Communications Program Office (TRI-TAC). Responsible for development, acquisition, and test of tactical communications equipment unique to the Air Force. Will also guarantee compatibility of Air Force developed equipment with similar apparatus being procured by other agencies. | Definition Phase, R&D, and Acquisition | None |
| 481B | **Advanced Airborne Command Post:** Provides the National Command Authority and the Strategic Air Command with a command and control system. The system will utilize some combination of automatic data-processing and peripheral equipment accessed through remote terminals installed in a large wide-bodied jet aircraft that will be operable during the trans and post-attack phase of a general war. | Acquisition | Boeing for aircraft<br>E-Systems for Phase I electronics |
| 482L | **Emergency Mission Support:** A system that will provide air transportable air traffic control, communications, and navigational aid facilities in support of emergency air operations. | Updating program under implementation on an individual equipment basis | Many |

# A CHECKLIST OF MAJOR ELECTRONICS PROJECTS

| SYSTEM NO. | NAME AND MISSION | STATUS | CONTRACTORS |
|---|---|---|---|
| 485L | **Tactical Air Control System Improvements (TACSI):** Provides evolutionary improvements of equipment and capabilities of communication and electronic systems for command and control of tactical aerospace operations. The system consists of automated and miniaturized equipment compatible with existing Tactical Air Control System (TACS) equipment and interfaces with automated tactical data systems of the Army, Navy, and Marine Corps providing interoperability of joint forces. | R&D and Acquisition | ITT, General Dynamics, Goodyear, Hughes, SDC, Magnavox |
| 490L | **Overseas AUTOVON Switches:** The key element of the overseas portion of the Defense Communications Agency's program to implement a worldwide Automatic Voice Network (AUTOVON). This system provides an automatically switched, wide-band communications network. | Operational with improvements continuing | GT&E Automatic Electric |
| 499L | **AIMS Program:** Modification of DoD aircraft and modernization of radar beacons and identification systems to improve air traffic control in the National Aerospace System and provide secure identification of military aircraft and ships. | Acquisition | Many |
| 616A | **Air Force Support of MEECN:** A project to update the Air Force Low Frequency/Very Low Frequency (LF/VLF) System to present day requirements for CINCSAC and Joint Chiefs of Staff. | Development Phase | Westinghouse |
| 634B | **SEEK BUS:** A program to develop and demonstrate a time ordered, secure, jam resistant, digital ground-air-ground and air-air communications system. | Concept Validation | None |
| 642A | **SEEK POINT:** Design, development, and fabrication of AN/TPB-1A radar system to improve tactical bombing capabilities. System based largely on RADC development of AN/TPB-1 feasibility model. System accuracy, simplicity of operation/maintenance, and mobility are prime engineering objectives. | Acquisition | Sierra Research Applied Sciences |
| 633A | **Cobra Dane:** A system to acquire a phased-array radar to be installed on Shemya Island, Alaska, for the purpose of collecting data on missile testing and satellite tracking. | Acquisition | None |
| 1126 | **SEEK STORM:** A program of high-level national interest in response to Hurricane Camille's devastation. Ultimately intended to provide the Air Weather Service tropical storm reconnaissance aircraft with an improved radar for tropical storm penetration, surveillance, and mapping. | Prototype Acquisition | Sierra Research |
| 1135 | **Automated Armed Forces Examining and Entrance Station (AFEES):** A system to provide improved screening (medical, mental, and psychiatric) of candidates for active military service, utilizing the most modern data recording, processing, storage, display, and distribution techniques. | Engineering Development | None |
| 1205 | **Air Force Satellite Communication System (AFSCS):** The program is for the acquisition of UHF airborne/ground force terminals, airborne/ground command post terminals, ancillary equipment necessary for operational control and communications transponders on selected Air Force satellites. In addition, the associated family of modular UHF transceivers will provide a command-communications capability in the line-of-sight mode. The full grown family of modular UHF radios will result in a common base to provide the transceiver for the satellite SIOP and Force communications terminals and direct replacement of the AN/ARC-27, AN/ARC-34, and other obsolete UHF command units identified by AFLC. | Development/Acquisition | RCA Collins |
| 1213 | **Airborne Weather Reconnaissance System (AWRS):** A high-priority program to provide the WC-130 fleet of the Air Weather Service with improved meteorological data gathering and information processing equipment designed to respond to the weather forecasting requirements of the 1970s. | Prototype Acquisition | Kaman Corp.—Prime |
| 5604 | **Local Digital Message Exchange (LDMX) Secure Terminals:** A project to develop secure terminals suitable for normal office environment in association with the LDMX switch program. | Development with Feasibility Demonstrations | General Dynamics Burroughs |
| 7820 | **Communications Security (COMSEC):** A program to guard overall security of systems against interception, traffic-flow analysis, cryptographic failure, and electronic countermeasures. | Continuing | Many |
| A065 | **SEEK DIGIT:** SEEK DIGIT is a program to define advanced tactical command and control capabilities. Its emphasis is on modernization of the AC&W function, improving the detection and surveillance of surface targets, and improving the response time of the Tactical Air Control System (TACS). | Conceptual Phase | None |
| PE-11311F | **SAC Automated Total Information Network (SATIN):** A program to provide SAC with an integrated command-wide digital communications system that will satisfy, with updating, SAC requirements for command and control, administrative, and support data transmission into the 1980s. | Conceptual Phase | None |
| | **Base and Installation Security Systems:** An evolutionary program to provide for the defense of worldwide DoD resources. The system concept incorporates maximum commonality of major items and a variety of supporting subsystems, offering thereby a flexibility or choice of equipments that can be tailored to the unique physical characteristics of the facility and to the threat. | Development Acquisition Deployment | Many |
| | **IGLOO WHITE:** An air-supported, antivehicular, and antipersonnel system for SEA. | Operational with improvements continuing | Many |
| | **TAFSEG:** The Tactical Air Force Systems Engineering Group (TAFSEG) has the function of illuminating and defining opportunities and problems relative to effective operation between major tactical systems. To do this, TAFSEG has been established as an engineering organization that works independently of, but in close coordination with, system program offices. Results of TAFSEG investigations are acted upon by the system program directors and the AFSC chain of command as appropriate. | Continuing | None |
| | **Automated Technical Control (ATEC):** The planning for production, procurement, and testing of sub-assemblies developed in AFSC Project 1144, which is Phase II of the triservice, Air Force managed, technical-control improvement program; increased performance of automated technical control; and all digital technical control, which is an evolutionary extension of the above. | Development Phase | To be contracted by Rome Air Development Center |

# THE LESSONS OF VIETNAM

***At a luncheon honoring this year's Mackay Trophy winners—the three USAF Vietnam aces—the Commander of Tactical Air Command, who had previously headed Seventh Air Force in Vietnam, talked about tactical fighter operations during the eight years of Air Force combat in Southeast Asia. Here, adapted from that address, is an analysis by USAF's most experienced air tactician . . .***

**By Gen. William W. Momyer, USAF**
COMMANDER, TACTICAL AIR COMMAND

THE Vietnam War has had a profound effect on tactical air forces equipment and training and on the employment of those forces. Even though it is often said that the basic principles for employing tactical airpower haven't changed, the methods and techniques have changed in some very fundamental ways.

Prior to the 1965 decision to bomb North Vietnam, air refueling of fighters was considered a means of deployment, rather than an accepted procedure for the employment of these forces. During most of our training, emphasis was placed on refueling for long overwater flights. These techniques of air refueling gave our tactical air force a rapid-reaction capability to meet contingency situations.

I don't believe many foresaw that air refueling would become a basic part of the scheme of employment of fighter forces over North Vietnam. Yet, early operations indicated that it would be most difficult to sustain any significant tac air effort unless air refueling were used. The fighter force was based about 350 nautical miles from Hanoi. Thus, with any substantial armament load, there was no way

# EVOLUTION FIGHTER TACTICS IN SEA

*Iron Hand flights, flying F-105s similar to these, took out enemy SA-2 missiles so other tactical fighters could bomb.*

an F-105 or F-4 could fly such a mission without air refueling.

As the bombing campaign developed, it was necessary to employ twice a day a strike force broken down in two waves. As long as unguided bombs were the standard munition, this size force represented about the best potential for destroying most of the assigned targets.

It has been estimated that there were four to five thousand AAA weapons of varying caliber throughout all of North Vietnam. As expected, these weapons were concentrated around the targets that were of value, and the largest concentrations were around Hanoi and Haiphong. In World War II, there was the element of surprise, which materially assisted in degrading the quality of the AAA. This was not the case in North Vietnam. There was no element of surprise because of the small geographical area involved, limited approach routes, and the few targets available for attack.

As a consequence of the geography, strike forces had to meet the defenses almost head on. That is, there was limited opportunity to strike from multiple directions and to feint the enemy defenses out of position. It was necessary to designate specific elements of the strike force to counter AAA fire in the target area. For fighter operations, this isn't a unique technique. It was used in World War II and Korea.

In suppressing AAA defenses in North Vietnam, a given number of flights or elements within a flight were armed with CBU (cluster bomb unit) munitions to hit positions that were firing at our strike flights. These supporting attacks had to be carefully timed. If the suppressive strikes were made too soon, it allowed the North Vietnamese gunners to concentrate maximum fire against the strike fighters in their most vulnerable position, which was at the time of roll-in for the dive-bombing run.

The timing was split-second, since the force normally penetrated at about nine miles a minute and then increased speed to over ten miles a minute during the bombing run. Traveling at these speeds demanded that every pilot knew his job in great detail and could react to the anticipated situation without delay.

As a sidelight, I think an old cliché about fighter pilots has been disproved. When I went through flying school, it was said that the pilots with brains but who couldn't fly were put into bombardment; pilots who had no brains but could fly were put into pursuit; and pilots who had neither brains nor ability to fly were put into observation. If there is an elite in the Air

Force, it is the men who fly fighters, since they have to be able to outthink the enemy, make split-second decisions, and translate those decisions into action instantaneously.

### The SAM Threat

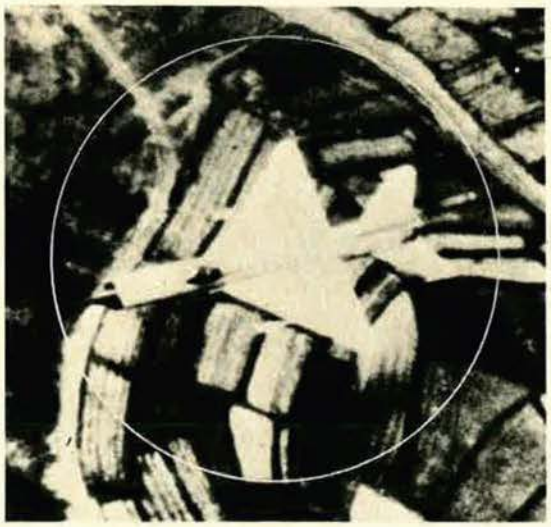
Prior to the Vietnam War, many people in the tactical commands were concerned about the effectiveness of surface-to-air missiles (SAMs). It was generally thought this threat could be managed somewhat like the antiair-


*EC-121s, working with the Navy's sea-based radars, provided radar information to fighter pilots.*

craft threat—that is, direct attack would be the best solution. It has been estimated that the North Vietnamese doubled the number of SA-2 SAM battalions between 1966 and the time bombing in the North was resumed in 1972. Most of these missile battalions were located in the immediate vicinity of Hanoi and Haiphong. Consequently, the threat was of a far greater magnitude than would have been the case if strike forces had a greater array of targets and a much broader area of operation. Lacking these tactical assets, the SA-2 threat had to be handled in a much more sophisticated manner.

This prompted the introduction of the "Iron Hand" flights, which were in direct support of strike forces. Of all the strike and support forces, the Iron Hand flights were truly the elite. These flights sought out the missile sites, and the battle of wits between the F-105 Wild Weasel pilots of the Iron Hand flights and the North Vietnamese controllers makes a most fascinating story. Of course, we knew where most of the active sites were, but there were always a number that were brought to bear against the strike forces that were not known until their radars came on the air.

These Iron Hand flights would attempt to get the SA-2s to come on the air prior to the arrival of the strike flights in the target area. If they could get the SA-2s to commit, then the strike flight would have a decided improvement in probability of hitting the target and escaping without damage. The Iron Hand flights would attempt to launch a Shrike or Standard ARM (antiradiation missile) against the radar of the SAM site. These Shrike and Standard ARM launches were followed up by



*The MIG-21s, this one operating near Hanoi, had the advantage of ground-based radar control.*

other strike aircraft with conventional weapons.

Many times the Iron Hand flights would be unable to launch against the SAM site because the radar signal would be shut down. Nevertheless, if the SAM radars could be forced off the air, this gave the strike force just enough time to slide past the site. These Iron Hand flights were indeed manned by brave pilots. They were the first in and the last out.

### Electronic Countermeasures (ECM)

Prior to the war, I don't believe it occurred to many fighter pilots that the need to block out enemy electronic emissions would dictate the type of formation flown. Yet, this is what developed as a result of the heavy SAM and AAA defenses. Fighters had no capability for protecting themselves with electronic jamming equipment during the early days of the war.

Most equipments were developed for bombers. It was not until early 1967 that an operational ECM pod was ready for fighters.

These ECM pods had a revolutionary effect not only on the employment of fighters in heavy defenses but in reduction of losses. By the time of the cease-fire, each fighter carried two pods. These pods were used to jam SAMs, early warning radars, and ground-control intercept radars. The enemy's entire electronic order of battle was within the jamming potential of these pods.

Fighter pilots had to learn how to fly a precise formation and maneuver the formation at very high speeds without wingmen getting out of position. The formation was the only means by which the fighters could gain self-protection. For maximum effectiveness, each fighter had to maintain a very precise position in the formation because of technical features of the pod. If one strayed from that formation, he was immediately illuminated by enemy radar and became a candidate for a SAM. Formation integrity was absolutely essential until a few seconds before rolling into a dive-bomb run on a target.

Today, ECM has become a standard part of tactical air units. Tactics are designed to take advantage of this equipment. On the other hand, many changes have had to be made in the formations flown. As a general principle, most fighter formations are designed to facilitate an offensive posture. That is, the formation is loose enough for rapid maneuvering and positioning to launch an attack against an enemy fighter. This concept is still preferred. But the severity of the enemy missile and AAA threat may compel compromises in these formations. In other words, in the heavily defended areas, it may be necessary to sacrifice some offensive ability against enemy fighters in order to get more protection against the ground-to-air defenses.

*The EB-66, best known as an ECM aircraft, also guided tac fighters in bombing through cloud cover.*

In addition to the ECM equipment carried by each fighter, EB-66s were employed to jam SAMs and radars. Depending upon the approach to the target, the EB-66s were positioned so that the full power of jamming equipment would be available. All of this coordination demanded very close timing since the whole force during the last few miles into the target was flying at better than ten miles a minute.


*As long as the F-4's speed and acceleration were exploited, it proved superior to the MIG-21.*

## Countering the MIGs

The last element of the attacking force was the fighters. A number of different techniques were employed in using this force. During the early part of the war, F-4s carried bombs and were assigned targets in the same general area as the F-105s. This was done in order to put as much effort as possible against the available targets. Since often some targets were cleared for attack for only a short period of time, it was essential to get as much force onto those targets as possible before they were withdrawn from our target list. In addition, the MIG threat then was very low, so there was no need to sacrifice the bombing potential of the F-4.

As the MIG threat increased and as the

*Gen. William W. Momyer entered pilot training in 1938, following graduation from the University of Washington. A World War II fighter ace, he once single-handedly took on eighteen Luftwaffe JU-87s that were escorted by fighters and shot down four. With the exception of duty as an Air War College faculty member and Deputy Commandant, assignment to a senior position on the Air Staff, and command of Air Training Command, his entire career has been associated with tactical air. Undoubtedly, he is the world's most broadly experienced expert in tactical air operations. General Momyer is a graduate of the Air War College and the National War College.*

enemy radar system improved, it became necessary to take the F-4s out of the strike role and use them exclusively for air-to-air combat. Of course, this didn't make F-4 pilots unhappy since they all wanted to get a MIG. Every fighter pilot has one ambition, I suppose, and that is to be an ace. Nevertheless, somebody has to do the bombing, since this is where the final payoff will come.

With the F-4s assuming a pure fighter role, a number of different techniques were tried to destroy the MIGs. The enemy realized that the bombing attacks were doing the real damage and that his fighter force had to be used primarily to stop these attacks, rather than trying to engage the F-4s that were no bombing threat. In order to stop these attacks, the enemy positioned his MIG-17s, which had good maneuverability, along the ingress routes of the F-105s. These MIG-17s would be held at specific points at a very low altitude.

As the F-105s would start to boost their speed for the final leg into the target and just prior to the heavily defended SAM ring, the MIG-17s would pop up and try to force the F-105s to jettison their bombs. To some extent, this tactic succeeded for a short period of time. As this enemy tactic became established, F-4s were brought down to a lower altitude where these MIGs could be seen, and hit-and-run tactics were employed by the F-4s. This eventually eliminated the MIG-17 threat, and, during this period, the enemy fighter force was for all practical purposes destroyed.

### Fighter Tactics Evolve

After a few months, and with a buildup in the number of MIG-21s, the enemy fighter force returned to combat, but with much more sophisticated tactics. The increased deployment of SAMs, greater concentration of AAA, better integration of radars, and an increased number of MIG-21s made these new tactics feasible. Since the North Vietnamese had only a small fighter force, it was necessary that it be under very close control and that it be committed to battle only when the situation was most favorable. Otherwise, their fighter force would again be driven from the battle.

It wasn't long until these changes in enemy tactics were apparent. Prior to this time, almost all of our aircraft were shot down by cannon fire. Rarely did the enemy fighters use air-to-air missiles, even though the MIG-21 carried the Atoll missile, which is very similar to our Sidewinder or AIM-9 heat-seeking missile. This early period of air combat was characterized by many dogfights with very close-in engagements. During these air battles, we soon learned that the way to employ the F-4 was to hit and run at high speed and not get enticed into a turning fight, in which the MIG-17 and -21 had the advantage. As long as the speed and acceleration of the F-4 were exploited, the outcome of the battle was in our favor. During this period of the war, we destroyed four enemy fighters for every one we lost.

As the enemy changed tactics, it became more difficult to exploit the advantage of our fighters. Instead of engaging in dogfights, the enemy chose to bring the MIG-21s in at Mach 1.2 or thereabouts, in a stern attack with missiles. This was a very effective tactic since it capitalized on his excellent radar control system and employed surprise to the maximum extent. Furthermore, our fighters were normally cruising at about 480 knots in order to conserve fuel, so a hit-and-run attack at the six o'clock position gave the MIGs the best probability of a kill, with the least exposure to fire from the F-4s.

The exchange rate dropped from four to one in our favor to two to one. The rate was beginning to climb to a more favorable ratio at the conclusion of the war. For several reasons, I don't believe it would have reached the Korean rate of fourteen to one. Most of the time, our fighters were beyond the limits of our ground-based radar during these engagements. Consequently, the enemy—operating under radar control—had a tremendous advantage. After we began using the EC-121 as an airborne radar platform and had worked out better integration with the Navy's sea-based radars, we were able to provide timely radar information to the fighters. This information, when used with that from the F-4's own radar, created a better situation for engaging the enemy fighters. I am convinced that, had the war continued in North Vietnam, it would have only been a matter of time until the enemy air force would have been completely destroyed.

Our greatest strength in this war, as has been true in all of our wars, is people. The conduct of tactical air operations was highly complex. Bringing together all the elements of a combat force—the tankers that did the air refueling, the Wild Weasels that suppressed the SAMs, the fighters that did the bombing, and the fighters that engaged enemy fighters—required great skill and professionalism.

We must not let that professionalism decline. We must provide the resources to maintain our tactical air forces in a strong and viable condition in the years ahead. I have been through the dismantling of our tactical air force after World War II and Korea. Surely, the lessons of history are clear. We cannot afford again to not be ready. The surest path to peace is through strength. ■

## INTERVIEW WITH DR. MORRIS JANOWITZ

*Service chiefs of staff should resign if they do not agree with defense policy; all upper echelon positions in the armed forces should be reduced at least one grade to give officers more responsibility at a younger age; the idea that USAF is a "positive" force is going to change; the Navy is in a new ascendancy. These are some of the ideas discussed by the famous Chairman of the Department of Sociology at the University of Chicago, Dr. Morris Janowitz, who looks at . . .*

# SOCIAL SCIENCES, THE ARMED FORCES, AND SOCIETY

*Dr. Morris Janowitz wants a revitalization of critical dialogue between the military and society.*

**By Maj. Robert W. Hunter, USAF**
CONTRIBUTING EDITOR, AIR FORCE MAGAZINE

"THE SOCIAL sciences are no substitute for human character; for sound military judgment and political leadership." Dr. Morris Janowitz, perhaps this country's best-known sociologist of the military and author of the now-classic book, *The Professional Soldier: A Social and Political Portrait,* expressed that view of the social sciences in a post-Vietnam, all-volunteer military force. Dr. Janowitz was interviewed this spring by AIR FORCE Magazine at Peterhouse College, Cambridge University, England, where he is spending the year as Pitt Professor and Fellow of Peterhouse.

Recently, much publicity has been given to the role of social research as the answer to current and anticipated problems facing the armed forces. No simplistic or easily definable application of the social sciences will solve these problems, in the view of Dr. Janowitz.

### The Role of Social Sciences

That does *not* mean no role exists. "The *main* task of the social sciences is to present concepts; to get people to sharpen their thinking. And while the social sciences also supply systematic information [research] to help people solve problems, they are not engineering sciences," Dr. Janowitz said. "While they make contributions, they cannot solve the problems of society. Social sciences can help fashion and articulate issues, but there is always a division of labor between the politicians and the scholars. The politicians must lead. People who

### About Dr. Janowitz

*Dr. Morris Janowitz is Chairman of the Department of Sociology at the University of Chicago. He is a native of Paterson, N. J., received his A.B. in economics from Washington Square College, New York University, in 1941 and his Ph.D. in sociology from the University of Chicago, where he has been affiliated since 1946. He is a World War II Army veteran, serving as Chief Wehrmacht Morale Analyst, Psychological Warfare Branch, Supreme Headquarters Allied Expeditionary Force, among other posts.*

*He has held a number of fellowships and visiting professorships. Among them have been: Fulbright Research Professor, University of Frankfurt; Fellow, Center for Advanced Study in the Behavioral Sciences; and Ford Foundation Visiting Professor, Graduate School of Business, University of Chicago.*

*His professional activities span a broad spectrum. He has served on the Research and Development Board of DoD's Committee on Human Resources, has been a consultant to the Senate Committee on Armed Services, a member of the Social Science Advisory Board of the US Arms Control and Disarmament Agency, and has served as Consultant, National Advisory Commission on Selective Service, among a long list of such positions.*

*In 1970, he was Chairman, Research Committee on Armed Forces and Society, International Sociological Association, and, from 1970–71, served as Vice President of the American Sociological Association.*

*Besides his famous text,* The Professional Soldier: A Social and Political Portrait, *he has written and edited extensively. He has held editorial posts with the* American Journal of Sociology, *the* American Sociological Review, *and* Journalism Quarterly, *to name a few. He has authored, coauthored, or edited well over 100 books, monographs, or articles in the social sciences.*

*He is a member of Phi Beta Kappa and a Fellow of the American Academy of Science and has been a sought-after lecturer in professional military colleges.*

believe that social sciences are some sort of religion are wrong," he continued.

While he believes, for example, that the social sciences have made people more aware of the role of force in international relations and have contributed to an understanding of our strategic role in the world, he is critical of those who "sell" a cookbook approach to professional and organizational issues; those who see research producing formulas, the application of which will settle issues.

Dr. Janowitz is concerned with the general intellectual effort in our society, with a "revitalization of critical dialogue" between the military and society.

"In the years ahead, only by continuing and enriching policies of social science education in our service academies and in second- and third-level professional military education can we expect to achieve this revitalization. In an all-volunteer force, the danger is one of doctrine developed without reference to the sociopolitical currents in larger society. One of the central roles of the social sciences is in the education of the military in an all-volunteer system."

### Two Themes to Be Examined

He sees two major themes to be examined. One is sound critical evaluation of the changing role of violence in international relations.

"Research in this area cannot be programmed easily or hired on contract. It's a long haul of trying to understand the consequences of thermonuclear weapons in the world balance of power," he said. "The military as part of a democratic society must draw upon the intellectual effort of the whole society. I think what we need is not only new research, but more efforts to assess our existing knowledge; what I call 'codification' of knowledge so we can identify areas of agreement and disagreement. A great deal has been written over the last twenty-five years, and we have to assess the validity of game theory, or of systems analysis for international relations.

"All this might be done if competing teams were set up who would then try to synthesize ideas. I would not give any group the monopoly on this kind of thing. I would like to see, for example, mixed military and civilian teams. In order to get this kind of synthesis done, you can't expect people to be part of an ongoing bureaucratic organization, and so you would pull them together for a year or two. I also believe that Congress itself should be doing some of this. And there *have* been study groups we need to evaluate. We can already begin to evaluate the Gates Commission, for example. Even the famous paper on 'containment theory' by Kennan. We could go back and start from that."

The second theme, more specific, is the study of comparative military institutions. Dr. Janowitz observed that "Americans have to see their military establishment as it relates to and contrasts with other societies. Britain, for example, has gone through ten years of experience with an all-volunteer force, and there are few people in America who appreciate or understand it." When he speaks of comparative studies he explained that he also means the functioning of civilian control; how the German armed forces or the British are under civilian control, and what the problems are. He feels, especially because of our NATO commitment, we have to know a lot more about military institutions in the Western European sociopolitical context.

### Is the Climate Right?

Is the climate right for this kind of intellectual effort? "Yes," says Dr. Janowitz. "Now that the Vietnam War is over, there is more understanding that somehow the society has got to solve the problems of an all-volunteer force and make it compatible with a democratic society. There *is* a realization that we are rethinking our foreign policy. I find university students more interested now in studying these problems than simply screaming about them."

One problem remaining, however, is that social science research is not yet adequately organized, according to Dr. Janowitz. "First, civilian foundations do not spend enough money on these topics [civil-military relations]. Foundations have neglected this in the last five years. In addition to that, the military involvement in social science research has been fragmented and [is] self-defeating. It has often been under the management of the natural science people, and it has not proceeded along fundamental lines. It has been '*ad hoc*-ed' all over the place. Immediate problem areas of race, drugs, and so on, are not fundamental enough issues. We need *broader* conceptualizing on professional and organizational issues."

Dr. Janowitz believes that, in the present climate, it is unproductive for universities to take government money for this kind of effort. Therefore, he believes that some of the effort should be done through the educational institutions of the military. "I would like to see some sort of quasi-independent group just outside the military with some degree of academic distance. You must recognize that any degree of scientific investigation creates tension between the host body and the people involved. You have to accept that. New institutions and new mechanisms are needed to get good research that is publishable in professional journals," Dr. Janowitz said.

He believes one cannot rewrite history. "One should study the past to free oneself from it, not to apply it." With regard to the Vietnam War, by way of an example, he believes that the President's advisers did not use existing social science knowledge, but he does not feel that use of that knowledge would have prevented US involvement, "because social research does not negate political power."

### Social Science and Military Capability

In accordance with the first of the two themes for social research cited above, he sees a role for critical dialogue in an updating of NATO, and feels social science should be part of any discussion on what the US can do militarily, *e.g.*, how much of the GNP we can afford for defense (no more than seven percent in his view), how large a force should be maintained (just under 2,000,000 he says), how many US troops should be in Europe (about 150,000—after mutual negotiation).

"The military—the Air Force, for example—must also face the fear that, unless in combat, it cannot maintain readiness. That's a question they must answer for themselves; how to accept the role of strategic deterrence without the inevitability of conventional combat involvement. That's a question that requires every man to be self-critical without exaggerating the consequences or potential of conventional warfare or being lost in the debate of tactical vs. strategic airpower as a result of our Vietnam experience."

Dr. Janowitz believes that a number of such questions will have to be faced as the services strive for professional ideology and self-conception in the decade ahead. Clearly, he believes, social science plays a role in the obvious upcoming dialogue and in the education process leading to that dialogue.

He sees, for example, the Army as having the biggest problem in the doctrine arena. The Navy is in a new ascendency. He feels they have political support for new ships, and ". . . will be the bigger military consumer in the future," he said. "Their image is one of international strategy. The Navy emphasizes its role to protect our oil interests and to give us the first-class image of a superpower, a naval presence worldwide."

He thinks "the Air Force has reached its maximum. It's going to be a vast technological operation. Its strategic deterrent role—which is *crucial*—will be costly, but taken for granted. It's going to go the way of the RAF, in which ninety percent of the force has seen no combat. The idea that the Air Force is a positive weapon system is going to change."

Dr. Janowitz sees the armed forces in need of examining secondary or derivative functions that do not divert them from their primary mission. He sees unused resources to be employed. While he does not want the services to become rehabilitation agencies for larger society or engage in economic development vis-à-vis the military of some other countries, he does feel they should examine some further *discontinuous* roles in national emergencies, such as they now perform in floods, earthquakes, and the like, as well as opening new vistas in education and training. For example, some new form of enlistment might be in order. A person might enter the military at a much younger age (something like Britain's "Boy Soldier" concept), be given a trade, offered the opportunity to complete his general education, and perhaps even serve only part time. The national conscience and Congress would accept such an idea, he thinks, if the assurance

*The author, Maj. Robert W. Hunter, USAF, is an Air Force information officer who has been serving during the past year with AIR FORCE Magazine as part of USAF's Education With Industry (EWI) program. Major Hunter reports for duty this month at his new assignment, with the Office of Information, Office of the Secretary of the Air Force. He will assume duties as Deputy Assistant for Policy and Programs, Internal Information Division.*

were given that that person would not be deployed in combat until reaching the currently acceptable age.

He sees a problem in maintaining cohesion and job satisfaction in a post-Vietnam, all-volunteer force. The question of underemployment will have to be dealt with. He said he would want to see intensive participant-observer studies on basic training and socialization, "because the sense of *esprit de corps* developed in basic training becomes attenuated. We've got to continue to maintain it. We need research to find out how to keep people actively involved." He postulates a number of ideas for examination.

### How to Keep People Involved

For example, he sees a need for earlier promotions to authority and the opportunity for exciting work. The first task to be undertaken to achieve this kind of thing is to look at the whole retirement system as a means of moving people in and out of the services. "By changing the retirement system, you reconceptualize the idea of a career," he said.

He lists an analysis of the rank structure as a relative priority for social science attention. He maintains there should be at least a one-grade reduction, particularly at the general officer level, so that younger people prepared to adapt to a changing environment can be assigned to important posts.

Manpower utilization is also tied to these matters. Critical debate should be conducted on not only the *forms* of enlistment suggested above, but the question of *periods* of enlistment. Dr. Janowitz would reevaluate the extent to which forces are engaged in tasks that do not require extensive training. Such jobs could be handled by people enlisting for shorter—or even flexible—lengths of time, in his view.

Tied in also with the reconceptualization of the military career would be intellectual debate over such ideas as abolition of the "promotion or exit" system; lateral entry into the military from appropriately skilled civilian manpower pools with commensurately higher rank; better articulation of a "two-step career" by which officers, in particular, would be allowed to transfer to the Civil Service establishment, taking with them pension benefits to be integrated into the new job and paid upon retirement at age sixty-five. Transfer could take place after the presently accepted twenty-year military retirement mark or, more ideally, between one's seventh and twelfth years of military service.

Dr. Janowitz said that his list of topics for debate includes more discussion on the existing worldwide personnel system, which, in his view, "leads to continuous, expensive, and disruptive assignment rotation." In a post-Vietnam, all-volunteer force, "these procedures are outmoded because they weaken military cohesion. They are the cause of important family discontent that leads to resignations and failure to reenlist." He also added that it might be possible to modify the British regimental system in which each member would have a parent unit and spend much of his or her career within that unit, moving with it should it deploy.

Further listed for debate would be a restructuring of the military education system. Obviously, he feels the service academies should do more and reach a wider audience with intellectual debate on questions about the armed forces and society. However, he also said that second- and third-level professional military education (Air Command and Staff College and the Air War College, in the case of the Air Force) is too restrictive in concept. Officers should be given other alternatives. But at least within the present system, more unstructured time should be allowed for the officer to follow his own intellectual bent.

### Will a Volunteer Force Work?

On the question of whether or not an all-volunteer force will work, particularly since all these issues surround it, Dr. Janowitz was clear. "It's going to work. The question is at what level and in what dimensions. At some point, an equilibrium will be reached on the numbers issue. It will not be as big as the Gates Commission reported, and it will cost more, but a country as rich as this can afford an all-volunteer force. The quality of personnel is an open question. Will you be able to get exceptional people as well as the average person? The danger lies in the possibility that such a force could become bureaucratized, routinized, and isolated, and the creative types will drift out."

Bonuses and adequate pay, he told us, are needed to get the simple numbers involved. "In order to keep in the extraordinary gifted people, you have to have important positions in the lower ranks with challenging work."

He was critical of the fact that "nobody has done anything about the major findings of some research on recruitment incentives. The major findings are that young people will go into the military less on the basis of visible pay and more on a trade off between military service and a paid college education." In his view, the problem is motivated by the "Milton Friedman philosophy of economics and the Gates Commission, which was concerned with the pure economic model involved. That kind of thinking—that of the laissez faire economist—is atrophying. Obviously, in my opinion, I think that some of the military is overpaid,

but you still don't get enough people in, because there's more to it than pay."

While Dr. Janowitz had anticipated the emergence of the all-volunteer force as early as 1954 when he began writing his text, *The Professional Soldier* (it was first published in 1960), he said that he had believed the transition would be easier. "Of course, the impact of Vietnam has been to slow down the self-criticism that goes with the transition to an all-volunteer force."

Dr. Janowitz also allowed that his original concept of a "constabulary force" included both the idea of an all-volunteer military force and a volunteer national service, which he still hopes is achievable. "Once, citizenship and military service were the same thing. That's no longer true. People wish to have other ways of serving society. Any failure in expressing that desire is the fault of the politicians for not developing the institutions for that service. I believe in the concept of some form of national service as a form of 'taxation.' Young people and older people owe something to society. It is up to the political leadership to make such a form of taxation fair. I believe that large numbers of young people—sixty to seventy percent of those who count—will give public service to society in one form or another. They will respond to higher ethics. The problem of political leadership is to make that possible."

The danger exists, he observed, that as we get into an all-volunteer force and as professional military leaders turn their attention from Vietnam, a resentment will set in, that a hard-core mentality will develop, and "selected" contacts with larger society will result. "Military officers have a perspective," he judged, "that is comparable to society as a whole. So far, they have been nonpartisan without becoming political eunuchs. However, there is a danger now in an exaggeration of an already existing conservative bias."

In his view, we have not yet truly entered a post-Vietnam phase. "There has not yet been any major, meaningful debate in Congress as to the kind of military we're going to have. It's all argued in very narrow budgetary terms."

### The Decade Ahead

In the decade ahead, Dr. Janowitz sees many role changes within the military. For example, he sees more of a role not only for women as discussed today, but an added role for the military wife. Some, he feels, will want to be a member of the service, others will want more of a role as civilians in the management of the military community.

He sees a danger in an all-volunteer force that is overly represented by blacks. He sees the danger because he feels that no democratic society can allow itself, in conscience, to be defended by its minorities.

He feels it is crucial for the armed forces in the decade ahead to face an evolving concept of deterrence that, in his view, means "internalizing the implications of the *strategy* of deterrence and abandoning the 'killing business' as the organizing principle of the profession." He sees such an evolution retarded by a prolongation of the heroic leader image in the services and an exaggeration of the role of military affairs in the world balance of power. With the growing recognition of some need for arms control, he said, "the 'fighter spirit' has turned to an exaggerated interest in counterinsurgency, limited war, and psychological warfare, for example." He argues for the services to more narrowly define their management roles in recognition of "the duality of American foreign policy—the difference between American interests, responsibilities, and capacities in Western Europe and in East Asia." That task, he said, would be in the balance in the next three to five years.

Included in the role changes ahead would be, in the professor's view, a role and an articulation of dissent in an officer's professional responsibility. "The political process is designed to make use of dissent so that you can formulate new policy. In a profession like the military, there are devices for making use of professional disagreement without disruption. The number one device is the resignation of the chief of staff. He doesn't go out and form a political party, or make a speech, or carry a placard. Within the unique characteristics of the profession, he contributes his views, and, once a decision is made, he has the right to resign if he feels the decision is not in the best interests of his profession. One is struck by the fact that, although military tasks were progressively more difficult because of the opposition encountered from national and political forces over the past several years, no chief resigned. That has to change, so that professional dissent can be made manifest in a responsible fashion."

Dr. Morris Janowitz is a man of ideas—some grand, some controversial, some, it might be argued, idealistic, others unrealistic. Yet, he is unswerving in his dedication to the need for open, honest debate on those ideas. He is committed to the betterment of the intellectual effort of society. And with the armed forces so much a part of that society, military minds must be ready and willing to be part of that effort and to engage in that open and honest debate. If that happens, it will be interesting to watch and see just how many of the ideas presented here are, in fact, viable. ■

## AFA SYMPOSIUM—A SPECIAL REPORT

*For more than a decade, the intercontinental ballistic missile, ready for launch around the clock with almost 100 percent reliability, has served as this nation's central element of deterrence and key to world peace. But the steadily increasing level of technological effort on the part of the Soviet Union necessitates improvements of the US ICBM force. To present a status report on where the US and the Soviet Union stand in terms of ICBM technology, and where they are headed in the years ahead, the Air Force Association arranged with the leaders of the Strategic Air Command to brief an important audience of civic and industrial executives from around the country on . . .*

# A SEARCHING LOOK AT 'THE ICBM CHALLENGE'

**By Edgar Ulsamer**
SENIOR EDITOR, AIR FORCE MAGAZINE

★ The most effective way to counter recent, significant advances in Soviet ICBM technology is to convert all, not just part, of the Strategic Air Command's Minuteman force to the advanced, multiple-warhead Minuteman III missile.

★ Even under the worst conditions that can be "reasonably" postulated, "700-plus" Minuteman missiles would survive a nuclear surprise attack on this country and would be available for retaliation.

★ The Soviet Union has developed, and may soon place into operation, two advanced ICBMs, one of them even larger than the immense SS-9, which can deliver a twenty-five-megaton warhead.

★ It is a "myth" that nonrated missile crew members are limited in promotion potential, compared to rated people.

These were some of the findings of an AFA Symposium on "The ICBM Challenge," held at Vandenberg AFB, Calif., May 1–3, 1973. Keynoted by SAC's Commander in Chief, Gen. John C. Meyer, the three-day program was held in conjunction with the Strategic Air Command's 1973 Missile Combat Competition.

The event attracted an overflow audience of more than 600, including many mayors, county executives, and other civic leaders, industry executives, news media representatives from around the country, AFA officials, and Air Force Academy and AFROTC cadets.

## The ICBM Challenge

In his keynote address, General Meyer assessed the theme of the Symposium, "The ICBM Challenge." "We can see the near-term response to that challenge very clearly," he said. "While quantitative improvements in ICBMs are no longer permitted, qualitative improvements can be, and are being, made. The conversion of Minuteman I missiles to the vastly improved multiple-warhead Minuteman III is well under way. As time goes on, I would also hope to see the Minuteman II missiles converted to Minuteman IIIs." (At a preceding press conference, General Meyer explained that the most effective means for countering the improving Soviet missile technology is to replace all 450 Minuteman IIs with Minuteman IIIs. Present schedules call for a force of 450 Minuteman IIs and 550 Minuteman IIIs.)

Another imperative step in boosting the deterrent capabilities of the ICBM force, General Meyer said, is the modification of Minuteman missile sites at Francis E. Warren AFB, Wyo., where "we are not only hardening the silos to withstand bigger incoming warheads with greater accuracy, but we are also making a major advance in reaction time and targeting flexibility."

He added that these improvements at Warren will be followed by modification of other missile wings elsewhere in order to "balance with quality the quantitative missile advantage held by the Soviets."

The long-term aspect of the ICBM challenge, SAC's Commander in Chief said, "is more obscure" except for one basic requirement: "While we cannot be sure what course events will take, we do know that we have to develop the technology that will keep us competitive in the future. In fact, I believe that a vigorous technology is another element in our deterrent strategy. For, by showing that we have the resolve to stay competitive in the future, we are showing that we have the resolve to deter in the future."

In focusing attention on the subtle distinction between the nuclear might needed to successfully *deter* war rather than *fight* it, General Meyer pointed at what he termed the ICBM's "profile problem."

The nearly 100 percent strategic alert rate of the nation's 1,054 ICBMs, unmatched by any other weapon system, is an "abstraction" to the public, which neither sees the missiles in their silos nor the missile combat crews that man them around the clock, he pointed out. By contrast, the strategic bombers are visible, and their performance in Southeast Asia "leaves no doubt about their capabilities."

General Meyer expressed the hope that the high level of competence manifest during the SAC Missile Combat Competition, "which is really representative of all our missile crews throughout the nation, is not wasted on those who might seek to attack us. I firmly believe that the more they know about how good these crews are—and how reliable the missiles are—the more effectively they will be deterred."

## The Strategic Threat

"Over the past few years, while US attention has been primarily focused on the war in Southeast Asia, the Soviet Union has embarked on a program of expansion and improvement of its strategic forces," SAC's Deputy Chief of Staff for Intelligence, Brig. Gen. Harry N. Cordes, reported in the opening presentation of the AFA Symposium.

More than 900 SS-11s form the numerical mainstay of the Soviet ICBM force, according to General Cordes. Modification of the SS-11 has been going on for some time and includes tests of a new reentry vehicle using penetration aids and multiple warheads. Augmenting the SS-11 is the solid-propellant SS-13. But the Soviets have encountered "problems with solid-fuel engines, which probably accounts for the fact that this system is deployed in very limited numbers. In spite of these difficulties, the Soviets are pressing the development of a new solid-fueled missile, which may be intended to replace the SS-13," he told the AFA Symposium.

The Soviet Union's largest and most powerful ICBM is the SS-9, which can deliver either a single twenty-five-megaton warhead or three five-megaton warheads over a 6,500-nautical-mile distance. A variant of the SS-9 has been tested as a Fractional Orbital Bombardment System (FOBS) and "could be operational today."

When the SALT I agreements were signed last year, General Cordes revealed, "the Soviets had about 100 new missile silos under construction. Under the terms of the agreement, these silos may be completed. It is believed that

*In his keynote address, Gen. John C. Meyer, SAC's Commander in Chief, pointed out that "a vigorous technology is another element in our deterrent strategy . . . showing that we have the resolve to deter in the future."*

these new launchers are intended for the two new liquid-fueled missiles currently under development.

"One of these new missiles is slightly larger than the SS-11 and will probably go into the majority of the new silos, while the other one, larger than the SS-9, could be designed for the other new silos."

The remainder of the Soviet ICBM inventory, which numbers 1,618 missiles, is made up of 210 older SS-7 and SS-8 6,500-nautical-mile-range missiles. SALT I permits trading the older missiles for sub-launched ballistic missiles (SLBMs) on a one-for-one basis. The Soviet ICBM force, General Cordes reported, has a four-to-one advantage in total payload over the US force of 1,000 Minuteman and fifty-four Titans.

Augmenting the ICBMs are about 1,000 SS-4 and SS-5 medium- and intermediate-range missiles that represent a "potential threat . . . to our overseas forces and bases as well as those of our allies. The target coverage afforded by these shorter-range systems would allow the Soviets to concentrate their bombers and ICBM weapons against the United States," according to General Cordes.

Accompanying the rapid growth of the Soviet ICBMs has been an equally vigorous expansion of the Soviet sub-launched ballistic missile force, which, if continued, could give the USSR a "substantive lead" over the US SLBM force within the next few years.

The most significant Soviet SLBM development, General Cordes disclosed, was the launching last year of a new, larger class of submarine designed to carry a longer-range missile. The missile, known as the SS-N-8, was originally believed to have a range of about 3,000 nautical miles, but tests conducted late in 1972 covered distances of more than 4,000 nautical miles. The sub, designated the Delta class, and the new missile, could be operational in the next two years. At the current production rate of six to seven subs per year, the Soviets will surpass the US SLBM strength early in 1974, he predicted.

The Soviet strategic bomber force is made up of more than 800 aircraft, not counting about 500 bomber-type aircraft in the Soviet Navy. This force consists of about 140 Bears and Bisons, and about 700 Blinders and Badgers. These four bombers are air-refuelable, and a significant portion of them carry air-to-surface missiles. In addition, General Cordes reported, the Soviets are now flying "several" prototypes of a new strategic bomber, the Backfire. More than twice as large as SAC's FB-111, the Backfire has a longer range than the Badger and Blinder. It may be in full production and "could be deployed in operational units within the next few years."

Two other factors that affect the strategic balance between the US and the Soviet Union are the growth of Soviet ASW capabilities and ballistic missile defenses. Soviet emphasis on ASW systems is three-pronged, involving surface ships, killer submarines, and aircraft. Two Soviet helicopter carriers were put into service recently. They "operate in conjunction with other ships and aircraft in hunter-killer groups, which seek out and destroy enemy submarines. In addition to these, a third, larger carrier is under construction, which might employ VTOL [vertical takeoff and landing] aircraft in addition to helicopters. These ships represent a definite asset in projecting Soviet politico-military power throughout the world," according to General Cordes.

The Soviet antiballistic missile (ABM) system, begun seven years ago and deployed around Moscow, is "apparently being expanded; construction has been renewed at some previously uncompleted launch complexes. Improved ABM radars and interceptor missiles could be programmed for these sites. In addition, the Soviets have an active research-and-development program [in ABM technology] under way at their Sary Shagan Missile Test Center."

The rapid growth of the Soviet strategic offensive and defensive forces is paralleled by intensive R&D efforts. During the past year, the Soviets spent about $17 billion on R&D, compared to about $12 billion by the US, according to General Cordes. At the end of 1972, US intelligence experts estimate that Soviet R&D manpower numbered about 641,000, compared to 536,000 in this country.

### USAF Missile Improvements and Force Planning

SAC's Deputy Chief of Staff for Plans, Maj. Gen. Ray B. Sitton, told the AFA Missile Symposium that our "Minuteman forces, due to [their] high readiness posture, account for approximately sixty-five percent of the number of Triad forces on alert, but the annual opera-

tions and maintenance costs of Minuteman are only about one-third that of the SLBM force and about one-quarter that of the bomber force. Personnel and training costs are minimal when compared with other systems."

Assessing the central importance of the ICBM force to the US Triad, General Sitton pointed out that "target hardness—the redundancy of the netted command and control system—and other uncertainties, some inherent in [the attacker's] own forces, make the problem of successful attack against our ICBMs insurmountable from the point of view of any rational adversary." An enemy's problem, he said, "does not go away even if we assume that US national policy requires the ICBMs to ride out the attack." Because it is widely dispersed, the US ICBM force "must be attacked over a very short period of time, but not so short as to invite the destruction of attacking missiles by other attacking missiles.

"A lengthy attack, on the other hand, allows a retaliatory strike, which is also unacceptable. An important point to remember, and one which is often overlooked, is that launched or destroyed [enemy] missiles are both counted as expended forces in the final analysis. Consequently, we must measure our missiles not only in terms of targets they destroy but also the number of weapons they require an enemy to use to destroy them," General Sitton explained.

In discussing the complex rationale that might tempt an adversary to attack the US strategic forces, General Sitton explained that "theoretically, a potential aggressor would like to have the capability to eliminate enough of our force while using so few of his own that he achieves apparent superiority. . . . This capability does not exist against our forces at the present time, and realization of such a capability by the Soviets would depend on several costly force-structure improvements."

### Minuteman Improvement Programs

Lt. Gen. William F. Pitts, Commander of Fifteenth Air Force, SAC, outlined current programs to assure the continued survivability of the ICBM force under the concept of "balanced hardness." That term refers to equal levels of silo protection against the effects of blast and shock, on the one hand, and electromagnetic pulse (EMP), on the other. With the hardness levels achieved through current modification programs, "we expect the Minuteman silo to be able to survive a near-miss from a large-yield weapon."

One of these programs, General Pitts explained, is the Upgrade Silo Program. In the late 1960s, a series of high-explosive simulation tests at a number of missile sites proved that "the concrete and steel portions of the Minuteman silo were much stronger than originally calculated. We found that certain subsystems, such as the launcher closure, the shock-mounted floor, and the missile suspension system, could be modified to substantially increase the hardness of the entire silo."

The upgrade program, he explained, modifies the silo subsystem—in the main, the missile suspension system and the shock mounted floor—so that they equal the structural survivability of the silo itself. "When we are finished with the upgrade program, the hardness of the facility will be increased to such an extent that any attack designed to neutralize Minuteman would require a great number of dedicated RVs [reentry vehicles]," according to General Pitts. This hardening is accomplished by suspending the missile on cables [that cause it to act in the manner of a pendulum]. Horizontal shock is muted by foam blocks, and vertical shock by liquid, mechanical springs. Finally, the silos are being equipped with special debris protection and more survivable support equipment.

Matched to the silo hardening, according to General Pitts, is an EMP protection program. The burst of a nuclear warhead can cause a tremendous pulse of several thousand volts in the power, communications, and status monitoring lines entering the launch facility. This voltage surge could completely paralyze the silo's electronics.

The EMP program uses two basic defenses against nuclear weapon effects: "One approach is to limit the amount of current entering the silo. This is done by electrically sealing the silo through the use of improved seals, filters, rewiring, and grounding. The second approach is a routine we call circumvention reset, [which] warns critical circuits within the facility and the missile to shut down for a matter of milliseconds until the pulse is passed. Power is then reapplied with no adverse effect on the components or the logic circuits, and, most important, with no degradation in accuracy."

The third element of current Minuteman modification work is the Command Data

Buffer, which will permit rapid, remote retargeting of all Minuteman III missiles. At present, General Pitts told the AFA Symposium, remote retargeting is limited to targets stored in the missile computer's memory. To enter new target information into the Minuteman system, a combat targeting team has to put a magnetic tape containing the new trajectory data into the missile computer. These retargeting kits have to be produced and verified by SAC headquarters and must be sent to the individual wings, with the result that it "takes approximately ninety days to retarget the entire force for a SIOP [Single Integrated Operational Plan—the master plan for retaliatory action by all US strategic forces] revision. Even on an emergency basis, it takes approximately twenty hours to retarget a single sortie."

The Command Data Buffer makes it possible to transmit retargeting information from the Launch Control Centers (each one controls ten remotely located, unmanned silos) to the in-

## WHERE WE STAND ON THE B-1

"We feel the B-1 design is sound. We have been under way for two and a half years and have performed some 17,000 hours of wind-tunnel testing. The external configuration remains unchanged. The engine test program is doing well. We are managing within our development funding thresholds and feel that the program can be completed for $2,709.3 million.

"The weight estimates based on the early parametric studies have proved to be unachievable. We have studied the effect of the predicted weight of the production airplane, and the performance goals can be met. The cost impact of the production aircraft weight increase in 1970 dollars is approximately $2 million per unit. . . . This will bring the unit cost to $44.1 million in then-year [at time of acquisition] dollars. In summary, the system performance is satisfactory."

This is how Maj. Gen. Douglas T. Nelson, the Aeronautical Systems Division's Deputy for B-1, described the status of USAF's new strategic bomber program to the AFA symposium on "The ICBM Challenge."

In a comprehensive status report, General Nelson disclosed that the decision on whether or not the aircraft is to be entered into production is now scheduled for July 1975, or three months later than originally planned, in order to permit airborne testing of the B-1's offensive avionics suit. The contractor team headed by Rockwell International and General Electric Co. has been broadened recently by the addition of the Boeing Co. to perform the avionics integration and offensive system development; the AIL Division of Cutler Hammer and the Raytheon Co. to perform competitive risk reduction and to prepare proposals for the engineering development of the defensive avionics; and LOGICON of San Pedro, Calif., to provide software for the B-1 avionics system.

The present focus of the B-1 development program is on subassembly of Air Vehicle Number One, General Nelson said. (Three flight test and one static test aircraft are being produced for fly-before-buy testing.) The engine program, he reported, is also well into its development hardware phase. Nine XF101 engines are currently undergoing test and another one has been shipped to Rockwell International for compatibility testing with the airframe. The so-called Preliminary Flight Readiness Testing (PFRT) is scheduled for October 1973, six months prior to the B-1 prototype's first flight.

In the area of avionics, all but the defensive system will draw on existing equipment. The B-1's navigation system, for instance, will be adapted from that of the FB-111, General Nelson said. The weapon delivery equipment is made up largely of existing components, but includes "some new development by Boeing." The B-1's computer system will consist of three Singer - Kearfott SKC-2000 control units. After extensive laboratory testing, the offensive avionics system will be subjected to seventy-five hours of flight testing.

Concerning the defensive avionics systems, General Nelson said, "This summer either Raytheon or AIL will be selected to proceed with engineering development if the Phase I studies indicate that planned production estimates can be achieved. If not, the Air Force has a backup system under definition, which could be considered as a substitute to a new engineering development program."

A recent design change of the B-1's engine inlet was made to "reduce both the development risk and acquisition and operating costs. We changed to an external compression air-flow inlet to reduce complexity. . . . Sustained supersonic performance had to be decreased slightly, but the investment of about $10 million should return about $40 million in total life-cycle cost savings," according to General Nelson.

Last year, General Nelson reported, the B-1 program experienced some development problems in the subsystems of the so-called Crew Module Escape System. "We began to solve the hardware problem, but also became concerned about crew conditions and the stability of the module. After a careful review of alternatives, the Air Force declined to continue with the development of the capsule, but to proceed under a carefully controlled, two-phased plan where the initial system . . . will be capable of at least 450 knots bailout," which equals the best currently operational escape systems while the production mode is to have a 600-knot bail out capability.

Flight testing will have reached approximately 250 hours prior to the time of production decision in July 1975. SAC crews will be heavily involved in the entire flight-test program, he reported.

dividual missiles over secure communications lines. It also provides for simpler retargeting tapes, making it possible to "transmit emergency target changes by voice from either SAC Headquarters or the Airborne Command Post directly to the Launch Control Centers. There, by means of a keyboard printer, the crew will load the data into the Launch Center's computer and subsequently transfer the new target data directly to the missile. By using this method, an emergency change can be accomplished in "less than thirty minutes," General Pitts reported. A major SIOP revision can be reduced from ninety days to thirty days once the Command Data Buffer is fully operational, he added.

Another modification of the Minuteman force, and a key part of SAC's Minuteman Improvement program between now and 1980, is the so-called Dust Retrofit program. Based on recently acquired knowledge of the combat environment in which the hardened Minuteman force might have to operate, this program provides in-flight protection for the missile against dust and debris injected into the atmosphere by exploding enemy warheads. This protection is provided by erosion-resistant materials, such as heavier gauge aluminum, additional cork, and titanium, and results in a missile "capable of surviving extreme conditions of nuclear attack," according to General Pitts.

All Minuteman III missiles now coming off the production line include this "fix," and all presently deployed Minuteman IIIs will be retrofitted.

### A New Mission for Titan

Backing up the Minuteman force are fifty-four Titan IIs, the largest US ICBMs. "The vital part Titan plays in the SIOP is highlighted by SAC's efforts to maintain Titan at its present force level. It has been, and will continue to be, a SAC objective to keep all fifty-four of our Titan launchers in the force and on alert through the 1970s," General Pitts said.

He announced that "SAC's faith in the Titan has been expressed in a recently published ROC [required operational capability] that assigns a completely new mission to the Titan, one that has never been assigned to a SAC missile before." He did not reveal details of the mission, which presumably is classified, but explained that it was a key reason for an extensive study of "the logistics necessary to maintain the system for another decade."

For the longer term, General Pitts pointed out that under the SALT I agreement, "technology is the only avenue through which we may improve our missile force. Therefore, our position is that we should continuously develop the necessary technology in the areas of guidance systems, reentry vehicles, and boosters. This should be done not with any specific system in mind but to simply have the research accomplished and the technology in hand and available for production."

In keeping with this philosophy, "SAC has submitted a requirement for an advanced missile that would begin replacing Minuteman sometime in the future. This missile system should represent a quantum jump in effectiveness, and not just be another version of Minuteman." General Pitts said that current M-X studies (*see March '73 issue of* AIR FORCE *Magazine*) address the question of whether such a system should be mobile-based, but that "no firm decisions have been reached as yet."

AIR FORCE Magazine will report on other presentations and activities associated with the AFA Symposium on "The ICBM Challenge" in its August issue. ■

### WINNERS IN SAC'S 1973 MISSILE COMPETITION

The 90th Strategic Missile Wing from F. E. Warren AFB, Wyo., was named SAC's best missile wing and received the Blanchard Trophy from Air Force Chief of Staff Gen. John D. Ryan on May 4, 1973, at the conclusion of this year's Olympic Arena Missile Combat Competition. The trophy is named in honor of Gen. William H. Blanchard, the late Vice Chief of Staff of the United States Air Force.

The 351st Strategic Missile Wing from Whiteman AFB, Mo., took second place in the competition, scoring a total of 4,508 points, compared to the 90th Strategic Missile Wing's 4,544 points. Third place went to the 91st Strategic Missile Wing from Minot AFB, N. D.

The 308th Strategic Missile Wing from Little Rock AFB, Ark., was named the best Titan wing in the competition and took fifth place in the overall score.

*When all the blocks are in place, this will be a hundred-ton sphere of solid TNT. On detonation, its shock effects, which resemble those of a nuclear blast, permit simulation measurements.*

## AT KIRTLAND AFB, N. M.

"Insurance for the future" might be an appropriate phrase to sum up the work of the Air Force Weapons Laboratory. Staffed mostly by blue-suit scientists, this key facility operates under the pragmatic philosophy that "ability and expertise outweigh rank when scientific decisions are made." The lab, which delves into a broad range of research extending to high-energy lasers and nuclear effects, keeps its eye turned . . .

# TOWARD NEW HORIZONS IN USAF WEAPONS

**By Forrest M. Mims, III**

THIS YEAR marks the tenth anniversary of the Air Force Weapons Laboratory, one of the most productive military laboratories in the United States. Most military laboratories in this country are predominantly staffed with civilian scientists and engineers, but the Weapons Lab is a "blue-suit" organization. Well-qualified civilian scientists occupy key positions in the lab and provide important continuity, to be sure, but most research and development efforts are carried out or monitored by Air Force officers.

An outgrowth of the Air Force Special Weapons Center's Research and Technology Division, the Weapons Lab, located at Kirtland AFB, N. M., began operation on May 1, 1963. Gen. Raymond Gilbert, then a colonel, was the first commander, and he was later designated Director of Laboratories for the entire Systems Command.

The primary role of the newly created Weapons Lab concerned studies of nuclear-weapons

effects. The mission statement specified that the lab would ". . . plan, formulate, present, and execute the AFSC research and advanced technology programs associated with kill mechanisms, effects, hazards, and delivery techniques. . . ." Additionally, the lab was directed to ". . . conduct in-house research to maintain a high level of competence . . ." and to ". . . work closely with the Army, Navy, NASA, ARPA, AEC, and other government agencies."

The key to the Weapons Lab's success was the provision concerning in-house research. Some government labs are little more than coordinating centers for contractors and conduct little or no significant in-house research. The Weapons Lab, however, is noted for its extensive laboratory facilities, some of them highly specialized, and its wide range of in-house research efforts. The lab works closely with outside contractors on the development phase of many projects, and the expertise gained from conducting in-house research gives project officers invaluable experience and preparation for contact with contractors.

When first begun in 1963, the Weapons Lab contained the highest concentration of military scientists and engineers at any Air Force laboratory. One hundred and forty-four of the nearly 400 officers held at least a master's degree, and twenty-four held Ph.D.s. The lab has now expanded to include a force of some 1,200 permanent and 150 temporary personnel, more than 500 of whom are officer-scientists. More than 100 Ph.D.s are now assigned to the lab, and the annual budget has climbed from an original $30.2 million to more than $80 million.

### New People—New Ideas

Col. Robert W. Rowden, Commander of the Weapons Lab since February 1970, is the latest in a series of highly regarded commanders at the lab. With a Ph.D. in physical chemistry and past assignments at the Aeronautical Research Laboratory at Wright-Patterson AFB, Ohio, and as an associate professor of chemistry at the Air Force Academy, Colo., Colonel Rowden is well qualified for his position.

Like previous Weapons Lab commanders, Colonel Rowden is enthusiastic about the concept of a predominantly military contingent of scientists and engineers. "One of the big advantages of the blue-suit concept is a constant influx of new people with new ideas," he observes. "There's less tendency to keep studying a project beyond the point of diminishing returns." When the blue-suit concept was first promulgated, some criticism was voiced about the competency of military scientists and engineers. But the Colonel notes, "We have shown that blue-suit scientists and engineers cannot only perform respectable research and development, they can and have done a great job."

Scientific research is a highly specialized profession, and Colonel Rowden has continued the lab's policy of responding to the needs of its officers in a uniquely flexible manner. He personally interviews new arrivals, and they spend at least two weeks touring most or all of the various divisions. They then make three choices and present them to Colonel Rowden in a second meeting. In most cases, the new officer is given his first choice. He's also been given an excellent idea of the lab's capabilities and mission.

Particularly bright young officers find a ready reception since ability and expertise outweigh rank when scientific decisions are made. Some of the lab's college-trained enlisted men also are frequently called upon for counsel and advice on contracts and research projects.

In recent years, the Weapons Lab has been widely publicized for its work, much of it highly classified, in the futuristic field of laser weaponry. *(See Mr. Mims's article on the lab's laser work in the June 1972 issue, p. 54.)* So far, no practical laser weapons have been developed, but Colonel Rowden feels the forty-five percent of the lab's budget devoted to laser research, the biggest single chunk, is well spent. "I think it's critical to study laser weapon technology," he observes. "It's insurance for the future."

The Weapons Lab got into the laser business early in the game, thanks to the farsightedness of Col. David Jones. Now retired, Colonel Jones served as Commander of the lab from 1967 to early 1970. As head of the old Physics Division in 1963, Colonel Jones sought out skilled officer-scientists like Pete Avizonis to explore the use of lasers in simulating nuclear effects. When superenergy lasers were developed in 1968–69, the Weapons Lab was well prepared to accept the assignment as the Department of Defense's lead laboratory for developing laser-weapon technology. Now a civilian, Mr. Avizonis is still at the lab serving as Technical Director of the sprawling Laser Division, the fastest growing part of the lab.

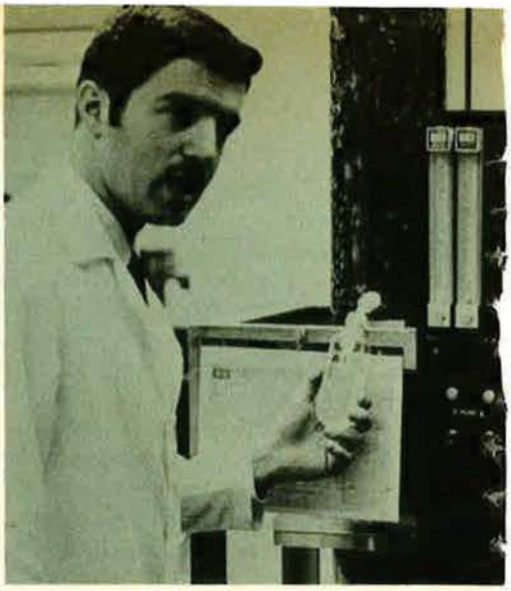
### Studying Nuclear Effects

Lasers are the glamour subject at the Weapons Lab, but research into ensuring this country's nuclear deterrent through survivability and vulnerability studies gets top priority. In an era of drastic budgetary cuts for research and development, Colonel Rowden notes, "There's been no decrease in our R&D effort for main-

*Air Force Col. Robert W. Rowden, Commander, USAF Weapons Lab, says blue-suit scientists often carry more responsibility than their peers in private industry.*

*Maj. Donald Silva shows how a water-injection system reduces smoke from burning fuel during fire-fighting practice.*

*Col. David Jones, former lab Commander (1967–70). His foresight led to the lab's prominence in laser weaponry.*



*1st Lt. Ronald Kroop of the Civil Engineering Division's Environics Branch has degrees in civil and bioenvironmental engineering.*

taining a credible nuclear deterrent. It has, in fact, increased."

The lab's history in exploring nuclear effects is as diversified as it is impressive. The atmospheric nuclear-test-ban treaty of 1963 caused the lab to emphasize the simulation of nuclear effects. Accordingly, such varied effects of nuclear blasts as fireballs, high-altitude phenomena, ionization, electron trapping, and electromagnetic-pulse (EMP) effects were studied.

The lab also developed systems for mating nuclear weapons to aircraft and practice bombs that simulated the size, shape, and weight of real weapons. Blast effects on structures and radiation effects on animal and simulated human tissue were studied as well.

Today, the most important area of nuclear-effects research concerns the electromagnetic effects of nuclear explosions. Nuclear blasts produce an instantaneous burst of electromagnetic energy in the form of X rays, light, heat, and radio waves. The effects of light and heat can be devastating in the immediate vicinity of the blast, and persons viewing the fireball from miles away can receive retinal burns. Other effects can be far more extensive, and electronic and communication systems hundreds and even thousands of miles away can be temporarily or permanently knocked out of service.

In order to simulate the electromagnetic-pulse effects of nuclear blasts, the Weapons Lab has developed pioneering large-scale simulation devices that produce EMP effects virtually identical to those of an actual nuclear weapon. Of course, the effects are restricted to a much smaller area than those of a real bomb, but they are sufficiently potent to permit entire aircraft and missiles to be tested.

Dr. Carl Baum, a civilian scientist who came to the Weapons Lab as a young lieutenant in the early 1960s, is responsible for the design of the complex antenna systems that accurately reproduce the EMP characteristics of a nuclear blast. Dr. Baum is typical of the high-caliber civilian scientists the lab likes to have. A highly dedicated and hard-working individual, he doesn't hesitate to use his personal funds to finance emergency purchases of reference books and even small research projects when authorized funds are either unavailable or tangled in red tape.

According to Dr. Baum, "Among nuclear-effects studies, EMP has the highest priority." He notes that technology has made significant improvements since the early 1960s. In those days, only twenty people at the lab were working on the problem. Now, there are more than 100, and the budget has increased from less than $1 million to more than $20 million.

Another highly regarded civilian scientist who stayed on at the Weapons Lab after completing his Air Force tour is Dr. Arthur Guenther. An internationally recognized specialist in high energy, ultrafast pulsing technology, author of nearly 100 scientific papers, and recipient of numerous awards, Dr. Guenther has made pioneering contributions to the study of nuclear weapons effects. As Scientific Director of the lab's Technology Division, Dr. Guenther oversees a widely diversified research program. His division provides scientific support to the entire Weapons Lab, so Dr. Guenther is as knowledgeable as anyone about the overall laboratory program and philosophy. "I've got the best job in the lab," he observes.

Guenther speaks highly of the lab's administrative history and policies. "You cannot do things by the numbers in an R&D environment," he states, "and Colonel Rowden stimulates the creative atmosphere so necessary for good

## ABOUT THE AUTHOR

A former Air Force officer, Forrest M. Mims, III, was assigned to the USAF Weapons Lab's Laser Division from March 1968 to June 1970. The lab and Mr. Mims recently received the coveted IR-100 Award, each for developing "one of the 100 most significant technical products of 1972." Mr. Mims's project was an infrared travel aid for the blind. The lab's project, an airborne fire-fighting system, is described in this article.

Now a full-time science writer and photographer, Mr. Mims has contributed articles to twenty-five magazines and is at work on his eighth book. He first wrote about the Weapons Lab for this magazine in his article "The Evolution of Revolutionary Laser Weapons," which appeared in the June '72 issue. His byline last appeared in the April '73 issue with "USAF Sensors Help Build a Better World." He credits Robert Bickett of the Kirtland AFB Information Office and Millie Brown of the base's Historical Division with assistance in the preparation of this article.

research." Though a civilian now, Dr. Guenther's Air Force background has kept him closely attuned to the critical needs of national defense. Like other highly productive military and civilian scientists at the lab, he has turned down lucrative offers from industry. "As far as I am concerned, this lab stretches a dollar further than any lab I've seen. Our facilities are second to none, and our ability to solve problems of a diverse nature is unsurpassed."

### Environmental Research

Originally, the Weapons Lab was subdivided into four divisions. With changing national priorities, however, the original organization has changed considerably. The lab now has eight divisions in fields ranging from nuclear safety to civil engineering to lasers.

The Civil Engineering Research Division is a good example of the lab's flexible response to changing national priorities. The official mission of the division is to "anticipate, plan, conduct, support, and guide research in support of Air Force civil engineering requirements and protective construction." Accordingly, Civil Engineering has developed a range of techniques for simulating the physical effects of nuclear explosions. The most dramatic is the High Explosive Simulation Technique, a method that employs huge quantities of TNT to simulate a nuclear blast. One test incorporates a 100-ton sphere of solid TNT.

The recent interest in protecting the environment shows how a mission statement can be expanded with highly beneficial results. One example is MAFFS, the Modular Airborne Fire Fighting System developed by the FMC Corp. with Civil Engineering Division support and funding. A spin-off of defoliant spraying systems developed for use in Vietnam, MAFFS consists of a portable package of pipes, tanks, nozzles, and rollers to spray 3,000 gallons of fire retardant over a controlled area ahead of an advancing fire line. The entire system can be installed in a C-130 in less than thirty minutes.

*Lab personnel look over the two-million-volt Marx Generator, built entirely in house. It will be used to simulate the electromagnetic-pulse (EMP) effects of a nuclear explosion.*

MAFFS was first employed against a real fire during the Santa Barbara, Calif., blaze in October 1971. The system spray-painted quarter-of-a-mile strips with the red slurry mixture. MAFFS attracted national attention again in 1972 when the Weapons Lab and FMC received an IR-100 Award for developing "one of the top 100 technical products of 1972."

The Civil Engineering Division has also become deeply involved in environmental research. Federal and state statutes restricting water and air pollution apply to military bases as well as private industry, and the Weapons Lab has been designated the Air Force's lead laboratory for solving environmental problems.

In 1968, the Civil Engineering Division formed an Environics Branch. The new branch initially consisted solely of Maj. Donald Silva, two other officers, and a tiny $15,000 budget. Major Silva's branch now has thirty-six people and an annual budget of $2.5 million. At first, the Environics Branch was preoccupied with a busy effort to plug Air Force pollution leaks and emissions in order to comply with a rash of federal and state laws and regulations. Now the branch is looking ahead three to five years and working closely with the Environmental Protection Agency on a variety of problems. Major Silva says, "The broad spectrum of things we're looking at is almost unbelievable," and he's right.

### Interfacing With Systems Command

In addition to formulating environmental impact statements, the branch is studying water treatment, recovery of silver from photographic film, control of birds at airfields, aircraft noise, and a host of other projects. The branch is even working with the B-1 bomber program to predict and evaluate topics as diverse as exhaust products, engine noise, and the amount of water needed to wash the aircraft.

Nuclear-weapons effects, laser weaponry, and environmental studies capture the most attention at the Weapons Lab, but the division serving as an interface between many lab projects and the rest of the Air Force, the Analysis Division, is a behind-the-scenes operation. Dr. Guenther regards Analysis as the most important division at the lab.

Col. Charles Hyre, chief of the Analysis Division, describes his division as an interface between the Weapons Lab and the product divisions of the Systems Command. "We support the product divisions with advice and assistance in developing their nuclear survivability and vulnerability (S&V) capabilities," he explains. Analysis works closely with the Electronics Division and its EMP studies. "There's no glamour in this division," Colonel Hyer notes. "It's all hard work." But the Colonel's skilled staff of scientists and mathematicians have the personal satisfaction of making a very real contribution to this country's nuclear deterrent.

The Weapons Lab's impressive range of R&D activities and accomplishments speak for themselves, but how about the blue-suit concept. Do young science and engineering officers become turned on to the Air Force at the lab when lucrative offers and opportunities await them in the civilian world?

### Mecca for Young Officers

For an answer, we can turn to a scientist-officer like Lt. Col. William Whitaker, former chief scientist at the Weapons Lab. While most Air Force personnel are used to transfers every three or four years, Colonel Whitaker was at the Weapons Lab from the day it began operation until a few months ago, when he left for an assignment with the Advanced Research Projects Agency (ARPA) in the Pentagon.

Colonel Whitaker is highly admired by his colleagues at the Weapons Lab. His accomplishments include pioneering studies and calculations in the complex fields of nuclear-weapons effects and simulation. He is recognized throughout the defense community as having made invaluable contributions to this country's nuclear deterrent.

He's a firm believer in the blue-suit concept: "I believe it's safe to say that in the scientific area there is no assignment more highly prized than one at the Air Force Weapons Laboratory. The morale there is the best I've seen anywhere, and the dedication to the mission is without parallel." Dedication means a lot to Colonel Whitaker, and he is well known for his willingness to work day and night at the lab to complete a high-priority project.

Colonel Whitaker believes that the lab is tops at solving important problems quickly and efficiently. He also thinks the lab provides excellent training for those fortunate enough to be assigned there. "It provides the best possible environment for a young officer or airman to develop both exceptional scientific expertise and the motivation and dedication the Air Force needs," he concludes.

With four Outstanding Unit Awards, a staff that includes several world-renowned scientists, and outstanding laboratory, computer, and field-test facilities, the Weapons Lab is no longer an experiment but an established institution.

As for the future, Lt. Col. Carl Weis, veteran of two assignments to the lab, sees a definite trend: "The lab was formulated to study nuclear effects, and the biggest change is the move from nuclear to laser technology."

In any event, as one of the most productive laboratories in the Air Force, the Weapons Laboratory can be expected to continue its leadership role in such widely diverse fields as nuclear survivability and vulnerability, laser weaponry, and environics. ■

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### BOURBON AND BRANCH WATER

Our air base at Chaumont, France, had been without water for two weeks in 1954. Our Wing Commander, Col. Chesley G. Peterson, had exhausted all "regulation" efforts to obtain new pumps for our two defunct water wells. His final effort, a "nonregulation" message to Twelfth Air Force Commander Maj. Gen. Robert M. Lee, not only produced instant action—with the desired results—but the last sentence of that message surely must qualify for one of the great classics of this century: "Class VI supplies [alcoholic beverages] are most unsatisfactory for showering purposes. Signed, Peterson."

—CONTRIBUTED BY LT. COL. BERT MCDOWELL, JR., USAF (RET.)

(AIR FORCE *Magazine will pay $10 for each anecdote accepted for publication.*)

# MIA/POW Action Report

**By William P. Schlitz**
ASSISTANT MANAGING EDITOR, AIR FORCE MAGAZINE

## On Behalf of MIA/POWs

Returned POWs were honored by AFA Chapters at numerous affairs around the country in recent weeks.

The Olmsted Chapter of Pennsylvania reports that AFA National Treasurer Jack Gross was master of ceremonies at a dinner honoring one of its members, Maj. Konrad W. Trautman, who spent five and a half years as a POW in North Vietnam.

The event also paid tribute to the Pennsylvania Air National Guard's twenty-fifth anniversary and its Commander, Brig. Gen. Richard B. Posey, who is also Deputy Adjutant General for Air, a member of AFA's National Guard Council, and Past Chapter President.

In a highlight prior to the banquet, the Air Force Thunderbirds demonstrated their aerial skills at Harrisburg International Airport before an audience of 18,000. The Thunderbirds were later introduced at the dinner, which was also attended by Medal of Honor winner Lt. Col. Merle H. Dethlefson, eleven Past Chapter Presidents, and area dignitaries and their wives, including Mrs. Trautman, a leader in the MIA/POW wives' effort.

Speaking to the assembly, Major Trautman vividly described his capture and subsequent inhumane treatment at the hands of his captors. He reaffirmed the better diet and treatment of POWs after 1969. (Mr. Gross had prefaced Major Trautman's remarks with a rundown on AFA's role as a catalyst in generating interest in the MIA/POW situation, beginning with Louis Stockstill's article on POW treatment in the October 1969 issue of AIR FORCE Magazine.)

At Hickam AFB, Hawaii, a recent MIA/KIA Benefit Bazaar sponsored by the officers' wives club netted a sum of about $8,000. The money has been donated to the Red River Rats, an association of fighter pilots and other aircrew members who flew missions against targets in the Red River Valley area of North Vietnam.

The River Rats maintain a scholarship fund to provide financial help for dependents of servicemen killed or missing in action in Southeast Asia.

AFA donated the bazaar's main door prize, an all-expense-paid trip to Maui.

Meanwhile, at Hill AFB, Utah, some $1,500 was donated to the base's Chapter of the River Rats. The money will also go to the scholarship fund for dependents of those killed in action or MIA in SEA.

The money was raised by the Utah AFA through the sale of POW bracelets and Christmas cards, among other activities. More than 11,000 bracelets were sold in Utah in the last year and a half.

Helping in the drive was MSgt. John A. Irwin, an Air Force recruiter in Salt Lake City, and the 1550th Aircrew Training and Test Wing at Hill AFB.

The Air Force Academy Cadet Heritage Committee is requesting "the cooperation of all Americans to send [MIA/POW] bracelets to the Committee once the POW has returned or, in the case of the MIA, when his status has been determined," the Committee said.

"The Heritage Committee is interested in ensuring that all Amer-

*Kathy Varble and PACAF Commander Gen. Lucius D. Clay, Jr., at Hickam AFB's MIA/KIA bazaar.*

*Ex-POW Maj. Konrad W. Trautman with bracelet plaque presented by AFA's Olmsted, Pa., Chapter.*

*Miss Lee Gilbert, Utah AFA MIA/POW coordinator, presents check to River Rats' Lt. Col. Kenny Cobb. At left is Maj. Gen. Bryce Poe II, Ogden AMA Commander, and, right, Lynn Summers, AFA Utah President. Utah AFA donated $1,500 for scholarship fund.*

## MIA/POW Action Report

icans wearing the bracelets do not just throw them away" now that the POWs have returned, said Committee Chairman Cadet Lance W. Bachran. Millions of Americans have worn the bracelets for many years as a constant reminder of the state of the POWs and MIAs.

"This project has been undertaken for two reasons. First, we would like to alleviate the flash flood of bracelets and letters the POWs might receive from well-wishing Americans. We plan to collect all of the bracelets, sort them out, and send a bracelet to the former POW with a letter listing all of the people . . . who kept their vigil alive by wearing the bracelet. Secondly, we would like to establish a permanent display at the Academy as a POW/MIA Memorial," Cadet Bachran said.

If interested, send bracelets to:

Cadets Care
AFA Heritage Committee
P. O. Box 6026
USAF Academy, Colo. 80840

More than 100 members and guests attended New York State Falcon Chapter's recent first Annual Champagne Brunch honoring three Air Force POW returnees and their families.

Held at the West Point Officers' Club, the brunch feted Capt. Henry C. Barrows, Massachusetts; Capt. Theodore S. Sienicki, New Jersey; and SMSgt. Arthur Cormier, Long Island, N. Y.

Attending AFA dignitaries were James Grazioso, Vice President for AFA's Northeast Region; New York State President Gerry Hasler; New York State Vice President Kenneth Thayer; and New Jersey State Treasurer Lloyd Nelson.

Highlight of the affair was the presentation to the three former POWs of AFA Citations "For Meritorious Service—Above and Beyond the Call of Duty."

Former POWs were honored guests at a number of large celebrations across the land. President Nixon entertained more than 600 returnees at the White House on May 24 *(see p. 81)*. At Dallas, Tex., some 300 ex-POWs were the star attraction at the Vietnam Veterans Homecoming Celebration, June 1–3.

### Lest We Forget

On the other side of the ledger, the League of Families and other MIA/POW groups, such as VIVA, are continuing to press for recognition of the inconclusive MIA situation. By late May, the groups' "missing-man" poster campaign was in full swing, including full-page ads in many newspapers requesting public support.

Also late in May, a House Foreign Affairs Subcommittee, headed by Rep. Clement Zablocki (D-Wis.), held hearings on the MIA problem, with a number of returned POWs, representatives of the League, and of State and Defense Department as witnesses.

Major thrust of the hearings was to explore any suggestions by witnesses concerning action or policies that should be pursued to assure a full accounting of the missing.

According to the League, "The hearings in May could lead to a series of expanded hearings exploring the entire MIA situation."

There is growing concern among the families of missing men that the status of MIAs will summarily be changed to "killed in action" without a thorough search or full effort to ascertain the facts in each case. (DoD has vowed to do all in its power to discover the fate of MIAs.)

The families of men missing in Laos or Cambodia are particularly anxious on this score, since, as yet, no firm agreement exists to provide for combing those areas by identification and recovery teams. This, they believe, may lead to the presumptive reclassification of missing men who may be alive and still in captivity in Laos or Cambodia. ■

*At Falcon Chapter brunch, from left, J. P. Grazioso, President W. C. Rapp, Kenneth Thayer, Capt. H. C. Barrows, SMSgt. Arthur Cormier, Capt. T. S. Sienicki, and G. V. Hasler.*

*Guests at recent California AFA convention, from left, ex-POW Lt. Col. Robert Barnett, MIA wife Connie Hessler, Mrs. Shirley Pritchford, former POW Col. John Pritchford, MIA wife Pat Mearns, and Mrs. Barnett.*

**The guest list was limited to the POWs, their families, and those honoring them. The atmosphere was relaxed—spontaneity reigned. It was the POWs' party, and the President, the White House staff, and show-world celebrities gave center stage to their honored guests at the . . .**

# WHITE HOUSE PARTY FOR THE POWS

**By Maj. Robert W. Hunter, USAF**
CONTRIBUTING EDITOR, AIR FORCE MAGAZINE

—White House photos

*Singing filled the air at the White House POW gala. Irving Berlin (upper photo) led the on-stage celebrities and the audience in several rounds of his classic, "God Bless America." A POW chorus (lower photo) sang their original composition, a POW hymn written and sung in the prisons of North Vietnam.*

WASHINGTON, D. C., MAY 25—Last night, the President of the United States opened his home to this nation's Vietnam POWs in an unprecedented outpouring of hospitality. The event was well covered by the press, who explored a number of topics: the menu, the guest list, the entertainment, the decorations, the President's mood, Henry Kissinger's latest trip to Paris, and even Edward Cox's opinion of Watergate. Yet, to this reporter, none of these seemed important. It was the POWs' party. I chose to observe *them* and gather some personal impressions.

More moving to me than anything else was what I sensed to be a special chemistry between the former POWs and their wives. In many small and nonverbal ways, I saw them communicate a love perhaps known only to those who have shared in reunions so long in doubt. Vic Damone sang "Portrait of My Love," and, if you watched, you could see tightly clasped hands squeeze tighter. Arms entwined all evening, never seemed to tire of the closeness, and I thought how the rest of us take what we have for granted.

The long absence of the men told in other ways. When Bob Hope (referring to the enormous tent under which the dinner and entertainment were held) thanked Totie Fields for loaning the White House one of her dresses, some wives quietly whispered who the contemporary comedienne is. Wifely explanations of jokes about people and events in the spotlight during the prison years went on occasionally. Sometimes the updating fell on deaf ears as husbands tried not to appear *too* out of touch.

As an Air Force officer, I had thought I could identify with these men, most of whom were Air Force officers. Yet, somehow I came away feeling less than adequate. These men and their families knew a comradeship I could never appreciate. I felt like an outsider. Nor do I think I was alone. The celebrities all took back seats. They, too, seemed inadequate. And the words about being "honored to be here" and "it's the high point of my professional career," while sincere, seemed uncomfortable and gave proof that the joy of this party could not *really* be shared unless one had known the years of captivity and separation.

The intense group identity of the guests was most apparent as couples roamed the living quarters of the First Family before dinner. With so much to see and such a unique opportunity to see it, the men still searched for a buddy to whom their wives might be introduced, and wives looked for those who had stood with them during their long wait.

At times, it reminded me of a college weekend when guys were anxious to show off their "special" dates, and girls swelled with pride to be seen with such a "catch."

"Richard the Lion Hearted." That's what was on the plaque given to the President by these men. I'm convinced it was an expression of admiration for the determination of a man—*any* man—to "hang in there" —a quality they ascribed to the President's Vietnam Policy. After all, it was a quality the POWs could identify with. It was what kept many of them alive.

A young reporter covering the party for her Texas paper told me she couldn't get over how "beautiful" all these people were. She was, I think, referring not to the formal gowns and dress uniforms, but to an inner beauty—a spiritual beauty—that comes to those who somewhere have found the strength to triumph over separation and uncertainty and physical suffering. And I saw just enough sunken eyes, gaunt frames, and disfigured limbs to know the suffering they represented.

Yes, it *was* the POWs' night, and only they could fully appreciate it. When the Marine Band played "America the Beautiful" as the dinner began, and later when Irving Berlin sang "God Bless America," everyone joined in, unabashed. And there was beauty embodied in an Air Force first lieutenant who stood next to me, tears streaming down his cheeks. That told it all. ■

## FROM HOLLAND: ECHOES OF WORLD WAR II

Aerial combat over the Netherlands during the war years was vicious. Hundreds of aircraft—Allied and German alike—plunged into that country's Zuider Zee. Now, as areas of that great inland sea are drained, many of these lost aircraft are being recovered and their crews identified and given decent burial. This humane work is being directed by the author of this article, who—with his associates—is helping solve thirty-year-old "secrets of the hoary deep . . ."

# STRANGE HARVEST FROM THE ZUIDER ZEE

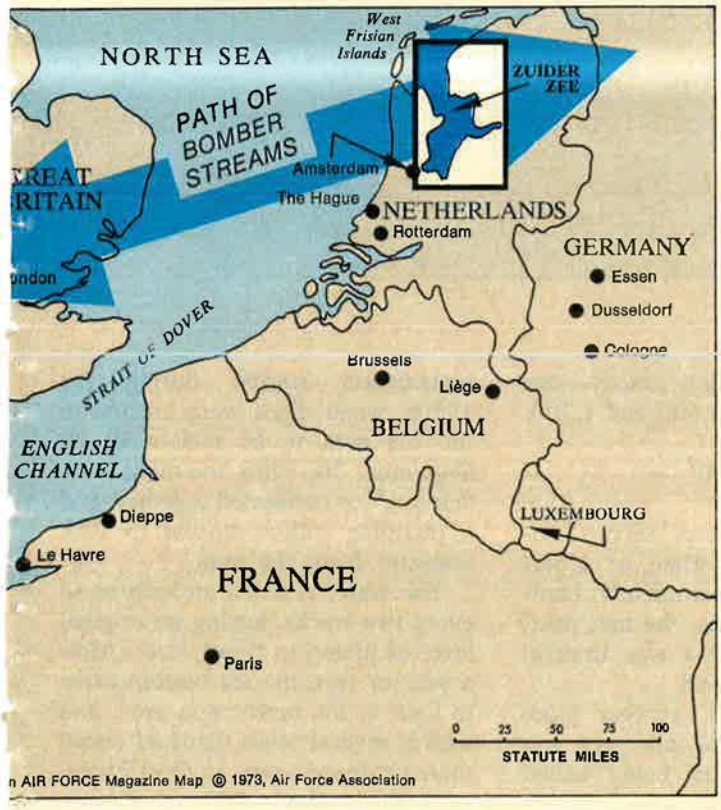
**By Lt. Col. A. P. de Jong**
ROYAL NETHERLANDS AIR FORCE

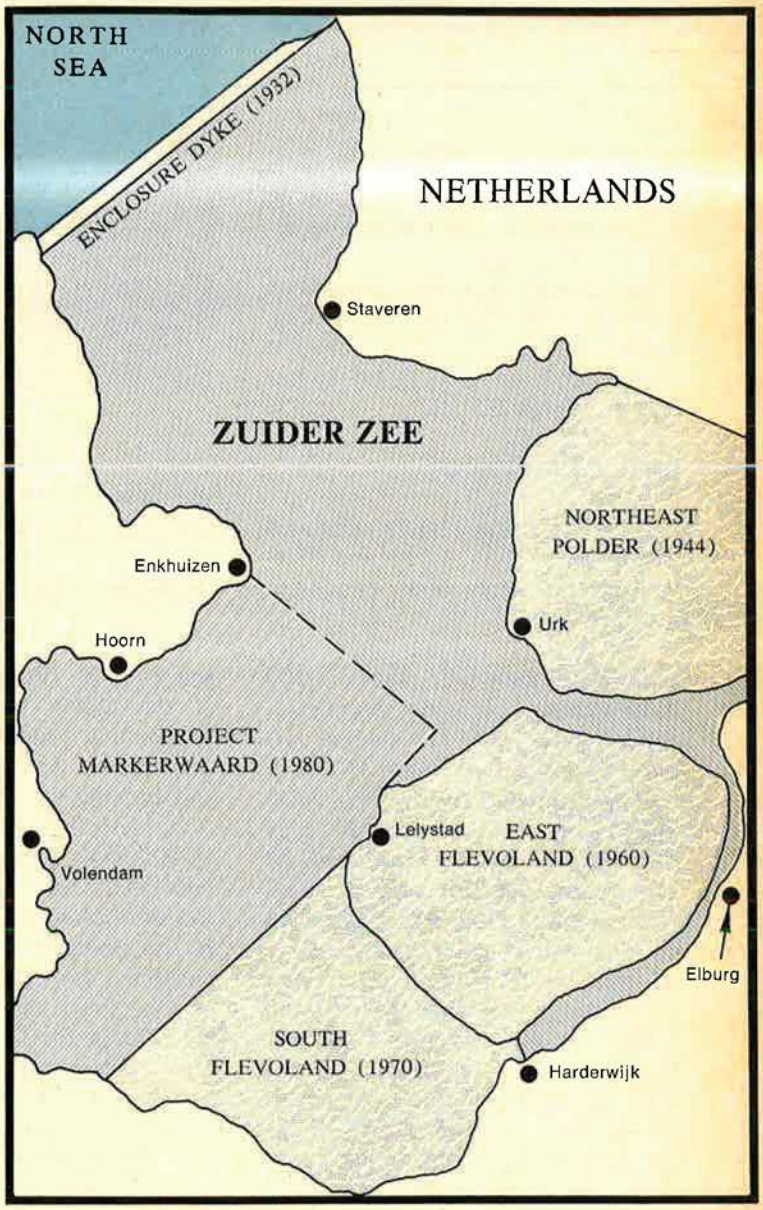
"Before their eyes in sudden view appear
The secrets of the hoary deep . . ."
—John Milton: *Paradise Lost*

HOLLAND is a relatively small country comprising a significant part of continental Europe's western coastline, ranging 100 miles from the German border in the east to the North Sea in the west, and some 150 miles from the Dutch Frisian Islands in the north to the Belgian border in the south (*see map*).

Geographically, Holland lies between England and Germany, thus making it the aerial no-man's-land of the World War II years, when British bomber formations at night and US air forces in daylight twice had to cross German-occupied Holland on their missions to and from targets in Germany.

During those years, the Allied air forces and the German Luftwaffe lost a total of 10,000 aircraft in the European theater of operations. Many found graves in the North Sea and the other waters of Western Europe. Holland's *IJsselmeer,* or Zuider Zee, as it was known before enclosure by a dike in 1932, took an especially high toll. The formations of RAF Bomber Command and the US Eighth and Ninth Air




*Fate—and geography—decreed that the skies over Holland should become the aerial no-man's-land of World War II. The map shows how the natural path for Allied bomber streams destined for targets in Germany crossed Dutch territory. Right, the Zuider Zee, tomb of many aircraft, showing areas drained to date.*

Forces often followed the less-dangerous route over the IJsselmeer to and from their targets, thus overflying an antiaircraft-free zone above enemy-occupied territory.

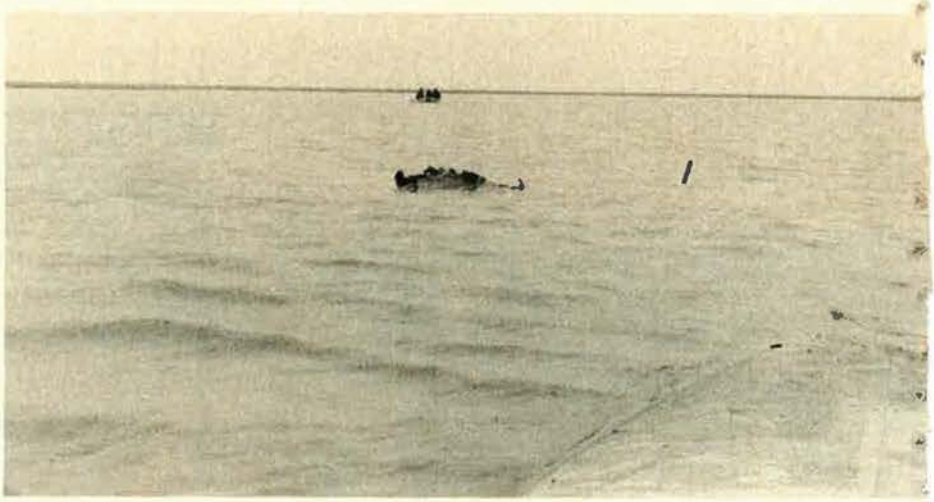
The Germans, however, frequently concentrated their fighter forces at airfields on both sides of this large Dutch inner sea, and the result would be violent air battles over the IJsselmeer. Many RAF, USAAF, and Luftwaffe crews made their last impact on its shallow waters.

A few crews were lucky enough to use their dinghies after bailing out or ditching successfully, but for the most part they went with their aircraft to the bottom, some fifteen or twenty feet below the surface, to join the lists of missing for a long span of years.

Now, many of these casualties are being found and identified. The Royal Netherlands Air Force Recovery Unit thus far has unearthed eighty-seven aircraft wrecks from newly reclaimed areas as the IJsselmeer is being drained. Some 140 more have been recovered from the

*The wreckage of a Heinkel HE-111 is hoisted from the waters of the Zuider Zee.*

*As draining reduces the water level of this area of the Zuider Zee, the wreckage of a B-24 bomber comes to light.*



shallow waters of the IJsselmeer in a joint effort of the Dutch Department of Waterways and the RNAF. Thus, dozens of names have been removed from the lists of missing. After all these years, it means the return of those who failed to return in World War II.

### Some 7,000 Crashes

RNAF historians have estimated that about 7,000 Allied and German aircraft came down on Dutch territory or in Dutch waters during World War II. Among these were some 2,500 Luftwaffe planes, 3,300 RAF aircraft (mostly bombers), and roughly 1,200 US combat aircraft, about half of them B-17s.

It is estimated further that some 700 World War II aircraft may have crashed in the IJsselmeer, or about ten percent of the total crashes within Holland's borders, in an area which also covers nearly ten percent of Holland's territory. Assessments vary between 600 and 1,200 for the IJsselmeer. In our files are details concerning 140 aircraft of RAF Bomber Command alone; such other sources as the US Eighth Air Force missing lists show that some hundreds of B-17 Fortresses and B-24 Liberators were lost there.

Many kinds of war documentation have enabled us to establish a record of probable Luftwaffe crashes and ditchings, accounting for another 100 or so aircraft.

Add to these the considerable tally of Allied and German fighters shot down in the area, plus those of all types that exploded or disintegrated before they struck, unseen by ground observers, and one can conclude that the final figure—which will never be verified exactly—lies somewhere between 600 and 1,200.

### "Operation Harvest"

RNAF's "Operation Harvest" began back in 1960, when, as a part of the Dutch government's land-reclamation program, the first postwar Zuider Zee area was drained and became new land.

Earlier, in 1942, another piece of Holland's famous inner sea was reclaimed, this area being called *Noordoostpolder* (Northeast Polder). In this polder, or tract of low land reclaimed from the sea, a number of US planes made crash or belly landings in the last two war years, after being forced down by German fighters or flak damage. One of these was B-17G *Dinah Might,* of the 452d Bombardment Group, which bellied in on the mud on February 10, 1944. Three of her crew members were taken POW by the Germans; the remaining seven escaped and were brought to safety by the Dutch underground. The fuselage of *Dinah Might* stayed to serve as a rain shed for polder laborers in this still-uncultivated area until 1950.

Wartime-reclaimed Noordoostpolder covered some 119,000 acres of land; the first postwar polder, *Oost Flevoland* (Eastern Flevoland), covers 133,000 acres. This reclamation started during the 1950s, when dikes were erected in the sea area to be reclaimed; on September 30, 1956, the dikes were "closed," or connected together, and a pumping station started to suck seawater from the area.

The water receded an inch or so every two weeks, having an original level of fifteen to twenty feet. After a year or two, the sea bottom came to light in the newly won area, and with it several relics that had rested there for many years. In Oost Flevoland alone about 200 ships were discovered, some dating back to the Middle Ages. Several aircraft wrecks also were found. As soon as the ground surface permitted the use of vehicles, RNAF's Recovery Unit investigated the first aircraft wrecks on the dry sea bottom.

Operation Harvest started in April 1960, when the first relic was salvaged, a 1954 RNAF Gloster Meteor jet fighter. The same summer, four additional aircraft were recovered—two RAF Lancaster bombers, a Spitfire, and a Messerschmitt Bf-109.

After winter, work was resumed in April 1961. During that year, a Vickers Wellington, an RAF Hampden, and a Junkers JU-88 were unearthed. Two more Lancasters were salvaged in summer 1962, and a Luftwaffe Bf-110 and Bf-109G. The latter's MIA pilot, Sgt. Fritz Kosten-

*Wing marking leaves no doubt as to the origin of this submerged aircraft, identified as a B-24.*

*This 452d Bomb Group B-17,* Dinah Might, *bellied in on a muddy area of the Northeast Polder in 1944. It was used as a rain shelter by polder workers until being scrapped in 1950.*

*The furnishings of a downed B-17 emerge as the water in a polder recedes in land-reclamation project.*

*This fourteen-cylinder Bristol Hercules engine once powered an RAF Vickers Wellington bomber. Note the remains of its wooden propeller.*

*Few aircraft recovered by the Dutch during "Operation Harvest" are in other than fragmented form. Ditched planes stood the best chance of remaining relatively intact.*

bader, was found and given a decent burial.

### Old Bird

When working on the recovery of an RAF Lancaster in August 1963, a tractor driver reported having found some rusty old bicycle-type wheels on a strong axle, probably parts of a very old-fashioned airplane, as he pointed out.

Driven by curiosity, we made a rapid first survey of the location. The remnants of the old aircraft's undercarriage were the first clues indicating that this was not another World War II tragedy. Some ten yards from the wheels, a honeycomb engine cowling was located; pieces of copper and iron wire were found in several places.

Digging brought new discoveries: first, a heavy copper fuel tank of rectangular construction was recovered. Next, a smashed-up instrument panel. An almost undamaged .30-caliber machine gun came to light, inscribed "Parabellum Berlin 1913." Near it was a circular ammunition drum with dozens of relatively well-preserved bullets, made in 1916. Other "finds" soon followed, including a "Napoleon"-type Very-

*A RNAF crane hoists a British Bristol engine retrieved after a thirty-year delay.*

pistol with four flares, and even tires; though damaged, the rubber remained in unbelievably good condition.

By comparing construction details and dimensions with silhouettes and construction drawings of World War I combat planes, we identified the wreck as a German Gotha G-IV *Riesenbomber* (Giant bomber), the type that undertook a number of raids on London in 1917 after too high a toll of Zeppelins forced the Germans to turn to bombers.

RNAF Historical Branch files disclosed that as far as was known only one aircraft came down in the Zuider Zee during World War I. The official diary stated: "On October 13, 1917, a heavy German bomber crashed into the Zuider Zee, some ten miles south of the island of Urk. A few parts were fished up on October 20, and transported to Soesterberg airfield for examination. They belonged to a Gotha G-IV bomber and were of no use to our air force. . . ."

## Reducing the List of Missing

Recovery of wrecks has been a continuous task over the years. This work is carried out primarily for practical reasons: The ground has to be made ready for cultivation, and explosives that are a threat to safety have to be removed. Yet, the significance to the relatives of those still missing in action is profound. The identification of a suddenly rediscovered aircraft often reveals the ultimate fate of airmen and makes possible proper burial in their own country or at their National Cemetery in Holland.

The lists of those missing in action over Europe are still long. Some 1,200 aircrew of the US Army Air Forces alone were lost without trace over the Netherlands. Their names appear on the Wall of Missing at the American Military Cemetery at Margraten in Holland, beginning with Abernathy, Mercer, and ending with Zolynski, Chester. We of the RNAF are convinced that a number of these cases will be solved, as have others in recent years. So far, the bodies of thirty-four missing crew members have been found, identified, and given proper burial.

In June 1970, the second postwar reclaimed Zuider Zeepolder, *Zuid Flevoland* (South Flevoland), permitted the first recovery operations on its fresh soil. This polder covers some 106,000 acres in the most southern part of the IJsselmeer. The first aircraft to be discovered there were a 4th Fighter Group P-51D, which crashed on November 20, 1944 (its pilot, Capt. Shell Monroe, survived the bailout), and a pathfinder B-17G of the 812th Bomb Squadron, 482d Bomb Group, shot down on February 21, 1944. Thus far, eighty-seven wrecks have been recovered by RNAF excavation experts in these reclaimed IJsselmeer areas.

Identified among these were eleven RAF Lancasters, eight Wellingtons, seven Stirlings, eight B-17s and three B-24s, four Bf-109s, four Bf-110s, and three Junkers JU-88s. None of the aircraft was found in one piece. In general, the wrecks are indeed wrecks. When an aircraft in a dive hit the water surface, the impact was similar to hitting a concrete wall. Only in the case of a successful ditching can one expect to find an aircraft in a recognizable condition.

Although aircraft structures like fuselage and wings are very much disintegrated when found, some components may survive in fairly good condition. Such items as engines, oxygen bottles, machine guns, bombs, and similar objects are often found in relatively good shape. After refurbishing, these are made available to museums, such as the RAF Museum at Hendon; the US Air Force Museum at Wright-Patterson AFB, Ohio; the German Luftwaffemuseum at Uetersen Air Base near Hamburg; and the RNAF Museum at Soesterberg, Holland. Other equipment is frequently mailed to the US for aerospace laboratory research tests of the materials after their long stay at the bottom of the sea.

## Threat to Fishnets

In the undrained parts of what was the Zuider Zee, commercial fishing is the principal activity. In these areas, there have been many instances of fishermen snaring their nets on sunken aircraft debris.

Where possible, this wreckage, usually fragmented, is recovered. Once on shore, it is turned over to the RNAF at Enkhuizen or Hoorn Harbor and the task of identification begins. All fragments are laid out, jigsaw-fashion, in an attempt to determine the aircraft type, serial number, and squadron markings, while a painful search starts for crew members. Files are consulted for any details about the date of the crash, the numbers lost on the mission concerned, the route taken, the fate of the crew. Finally, a detailed salvage report is sent to the air attaché of the appropriate country. Each successful identification represents another mystery solved.

The Dutch Waterways Department has thus "fished up" some 140 aircraft wrecks from the watery parts of the IJsselmeer since 1946. Among these were a few unusual craft, such as a Tupolev SB-2 Anuschka twin-engine light bomber with Luftwaffe markings, apparently captured by German forces during their first rapid advance in western Russia during the summer of 1941. Other German relics found have been two Messerschmitt ME-262 jet fighters and a German Heinkel HE-115 floatplane. The remains of a V-2 rocket were found by salvage vessels during the early postwar years.

Among US planes, the B-17 again played a starring role. One was retrieved from a sandy shallow in the center of the IJsselmeer, called the *Enkhuizerzand*. Identification presented no problem this time, for the complete fin and rudder were brought ashore, bearing a large black "L" on a white triangle, with the aircraft's serial number beneath

it. The B-17F came from the 533d Bomb Squadron, 381st Bomb Group, and was one of sixty heavies lost during raids against Halberstadt and Brunswick on January 11, 1944.

This brought the number of B-17s and B-24s definitely located in Holland from this operation to fourteen, three of which went down in the IJsselmeer: a 96th Bomb Group B-17 a few miles northeast of Amsterdam, a B-17GSH pathfinder of the 482d Bomb Group in the eastern part of the IJsselmeer, plus the 381st Bomb Group B-17 at the Enkhuizerzand. Incidentally, the pathfinder B 17 was unearthed in summer 1970 in reclaimed Oost Flevoland, and the remains of the only crew member still missing, 1st Lt. Roy Peterson, were found and buried. Also found in this particular plane was a smashed-up and muddy combat camera containing film, which we carefully developed. Incredibly, after twenty-six years on the sea bottom, it showed impressions of other B-17s flying in lower echelon.

Further on the 381st Bomb Group case, a check of the records disclosed that four members of this aircraft were still on the missing list, while five others were buried during the war and one crew member survived. Careful investigation of the fragments produced no further information, although we found a number of boots and shoes. Large pieces of the fuselage were recovered, and among a lot of miscellaneous equipment were two radio sets bearing both US and British Air Ministry nameplates.

When lecturing on Operation Harvest on behalf of the US Aerospace Writers Association at Los Angeles last February, I mentioned this case among others, word of which subsequently appeared in several American newspapers. Soon after my return to Holland, I received a cablegram from John Lantz of Tulsa, Okla., informing me that he had read the article and had recognized the airplane as his B-17, from which he was the only survivor. Mr. Lantz described how he was rescued from the ice-cold water by a Dutch fisherman. Mr. Lantz was eager to contact his rescuer if the man were still alive. We located the rescuer, a seventy-year-old fisherman named Hannes de Graaf, from medieval Spakenburg harbor on the IJsselmeer's south coast.

Hale and hearty Mr. de Graaf remembered every detail of the event, thus providing the complete story. Even his old wooden fishing boat was still in existence.

Whenever the Royal Netherlands Air Force receives word of the discovery of another aircraft wreck, we begin our work again in the hope of bringing some comfort to the hearts of those who still have no knowledge about the ultimate fate of their beloved, other than the cold message, "missing, presumably killed."

In forthcoming years, we will try to identify those aircraft and men now resting at the bottom of the sea, which will become land. There are still many back home who want to know. ■

## ABOUT THE AUTHOR

*Lt. Col. Arie P. de Jong, Chief of Public Information of the Royal Netherlands Air Force, was born at Schiedam in 1927. During World War II, he kept a daily log of air activities over occupied Holland while a high school student. Colonel de Jong joined the Royal Netherlands Air Force in 1948 after studying aircraft technology at Delft Technical University. In the 1950s, he was an instructor at the RNAF Intelligence and Recognition School, switching to the field of public information in 1958. Colonel de Jong has also been active in athletics and won the Dutch national championship for the 440-yard dash in 1951. He now supervises the RNAF effort to find and identify aircraft that crashed into the Zuider Zee during the war. Since 1960, eighty-seven such wrecks have been salvaged, and most have been identified as the result of Colonel de Jong's painstaking efforts. Married and the father of two children, he makes his home in Leiderdrop.*

*A Dutch recovery crew struggles with the bowed propeller of a British Stirling bomber. The RAF lost some 3,000 bombers over the Netherlands in World War II.*

The September "Anniversary" issue of AIR FORCE Magazine will be distributed to those attending AFA's 1973 Aerospace Development Briefings and Displays. In addition to this bonus readership, all advertisements in this issue will be prominently displayed in our "Industry Salutes the Air Force" exhibit at the entrance to Exhibit Hall. Closing for advertising reservations is August 3. Why not join us? It is a good advertising buy!

AIR FORCE
MAGAZINE

**PLAN NOW...**
**...TO ATTEND**

# AFA'S ANNUAL CONVENTION AND AEROSPACE BRIEFINGS AND DISPLAYS

## AFA's National Convention
(TENTATIVE SCHEDULE OF EVENTS)

**SUNDAY, SEPTEMBER 16**

| | |
|---|---|
| 12:00 n.n. | Registration Desk Open |

**MONDAY, SEPTEMBER 17**

| | |
|---|---|
| 8:00 p.m. | Registration Desk Open |
| 10:00 a.m. | Opening Ceremony & Awards |
| 1:00 p.m. | 1st AFA Business Session |

**TUESDAY, SEPTEMBER 18**

| | |
|---|---|
| 8:00 a.m. | Registration Desk Open |
| 8:30 a.m. | 2nd AFA Business Session |
| 9:00 a.m. | Briefings & Displays Open |
| 11:45 a.m. | Briefing Participants' Luncheon |
| 11:45 a.m. | USAF Chief of Staff Reception |
| 12:30 p.m. | USAF Chief of Staff Luncheon |
| 2:30 p.m. | Air Force Symposium |
| 6:00 p.m. | AFA Annual Reception |

**WEDNESDAY, SEPTEMBER 19**

| | |
|---|---|
| 8:00 a.m. | Registration Desk Open |
| 9:00 a.m. | Briefings & Displays Open |
| 11:45 a.m. | Briefing Participants' Luncheon |
| 11:45 a.m. | USAF Secretary's Reception |
| 12:30 p.m. | USAF Secretary's Luncheon |
| 2:30 p.m. | AF Reserve and Air National Guard Seminar |
| 4:00 p.m. | Briefing Participants' Reception |
| 7:00 p.m. | USAF Anniversary Reception |
| 8:00 p.m. | USAF Anniversary Dinner-Dance |

**THURSDAY, SEPTEMBER 20**

| | |
|---|---|
| 9:00 a.m. | Briefings & Displays |
| 11:45 a.m. | Briefing Participants' Luncheon |
| 4:00 p.m. | Briefing Participants' Reception |

September 17, 18, 19, 20
Washington, D.C.

AFA's 1973 Annual National Convention and Aerospace Briefings and Displays will be held at the Sheraton-Park and Shoreham Hotels, September 17-20. Accommodations are limited at the Shoreham Hotel and will be used primarily by other organizations meeting in conjunction with AFA's 1973 National Convention.

All reservation requests for rooms and suites at the Sheraton-Park Hotel should be sent to: Reservations Office, Sheraton-Park Hotel, 2660 Woodley Road, N.W., Washington, D.C., 20008. Be sure to refer to AFA's Annual National Convention when requesting your reservations. Otherwise, your reservation requests will not be accepted by the Sheraton-Park.

AFA's Annual National Convention activities will include luncheons for the Secretary of the Air Force and the Air Force Chief of Staff and the Air Force Anniversary Reception and Dinner-Dance. The National Convention will also include AFA's Business Sessions, an Air Force Symposium, an Air Force Reserve and Air National Guard Seminar, and several other events, including the Presidents' Reception, the Annual Outstanding Airmen Dinner, and the Chief Executives' Reception and Buffet Dinner.

With the increased attendance expected at this year's Annual National Convention and Aerospace Briefings and Displays, we urge you to make your reservations at the Sheraton-Park Hotel as soon as possible.

# The Bulletin Board

**By Maj. Robert W. Hunter, USAF**

CONTRIBUTING EDITOR, AIR FORCE MAGAZINE

## Legislative Update

Following is an update of the briefing on personnel legislation by Lt. Col. Henry J. Streenstra, Jr., Office of Legislative Liaison, Office of the Secretary of the Air Force, reported in this column in April '73. Only significant changes and new items are reported here.

**DoD 93-3—Revise Special Pay Structure.** Revised to delete special pay for lawyers and the sea pay increase. (Submitted to Congress on April 2.)

**DoD 93-5—Modernize the Non-Disability Retirement System.** (Submitted to Congress on March 28.)

**DoD 93-7—Make Permanent the Dependents' Assistance Act.** This proposal makes permanent certain authorities tied in the past to draft authority that expired on June 30. Its most important provision permits E-4s with less than four years' service and below to receive the higher "with dependents" quarters allowance. It also eliminates mandatory Class Q allotments. (Submitted to Congress on March 21.)

**DoD 93-11—Income Tax Treatment of Moving Expenses.** This proposal would: (1) provide that cash or "in kind" payments received in a PCS move not be included in taxable income; (2) exempt a military member from the requirement that, before moving expenses be deductible, he have thirty-nine weeks on station and move at least fifty miles; (3) when a member is assigned to an unaccompanied tour, permit moving expense deductions in connection with the move of dependents and household goods to an approved place of residence and then to the new permanent duty station; and (4) extend the law permitting deduction for expenses of meals and lodging while in temporary quarters at the *new* duty station to also apply to similar expenses at the *old* duty station. (Submitted to Congress on April 19.)

**DoD 93-44—Travel and Transportation Allowance for Dependents' Schooling.** (Submitted to Congress on March 16.)

**DoD 93-45—Reimbursement for Private Shipment of POVs (Privately Owned Vehicles).** (This proposal has been deleted from the DoD program.)

**DoD 93-49—Officer Tenure and Separation.** (Submitted to Office of Management and Budget [OMB] for clearance on April 25.)

**DoD 93-54—Flight-Pay Legislation.** Proposal provides for: (1) payment of flight pay on the basis of years of aviation service until eighteen years of active officer service; (2) a gradual decline of pay rates from eighteen years of active officer service with termination of all flight pay after twenty-five years of active officer service; (3) the highest rates of pay ($245 per month) after six years of aviation; (4) no increases in flight-pay rates of general and flag officers over existing rates; and (5) a "save-pay" period of three years from date of enactment. (Submitted to Congress on May 18. Since legislation could not be enacted before the May 31 cutoff of flight pay for O-6s and above, the proposal asks for a retroactive extension of the May 31 date to allow time for this legislation to be considered.)

## FASST Looks at Students and Technology

A recent study conducted at the University of Michigan by David Fradin, Chairman, Federation of Americans Supporting Science and Technology (FASST), offers some interesting insights into technology, the economy, and the space program, as seen by some of the university's students. As a rationale for the study, Mr. Fradin writes:

"Over the past several years students have been labeled by some as anything from anti-technology, anti-science, anti-military, and anti-space, to anti-establishment, anti-profit, and anti-free-enterprise. But what factual basis exists for such labels? . . ."

His study sought to find answers to some questions about these matters. He found that fifty to seventy-five percent of the student respondents know: the federal government is the major source of R&D funds; it takes six to ten years to research and develop a new product; the US has a positive balance of trade in high-technology and agriculture products; and the trend in US trade has been negative.

However, he also found that seventy-five percent or more of the respondents did *not* know the amount of federal expenditures on defense or the amount the federal government spends on human and physical resources. They did not know of the major shifts in spending from defense to human and physical resources or that the aerospace industry is the nation's largest manufacturing employer.

Mr. Fradin also reports that not even fifty percent of his sample was "anti-technology," although there was considerable disenchantment with technology. Seventy-five percent or more felt our social needs lagged behind our scientific accomplishments, but they had not lost confidence in scientists, engineers, and technology. They saw technology as *part* of the answer to health care, education, housing, mass transit, overcrowding, unemployment, and other such problems. The same percentages felt that government should use technology to attack these problems and that training for scientists and engineers should continue, despite unemployment.

Twenty-five to fifty percent felt that scientific effort is unnecessary for national defense.

Fifty to seventy-five percent felt that our space program helped America's technological growth while holding the opinion that

money spent going to the moon was wasted. They considered tangible benefits from the program, such as new knowledge about the environment, to be more important than aerospace leadership, national prestige, or keeping ahead of the Russians.

Seventy-five percent or more believed, Mr. Fradin reports, that science must provide substitutes for dwindling natural resources.

Twenty-five to fifty percent indicated they believed the US should stop economic growth.

Copies of the study may be purchased for $2.00 from: David Fradin, Chairman, FASST, 736 Packard #202-B, Ann Arbor, Mich. 48104.

### New IG System

USAF is streamlining its IG system. A revised regulation (AFR 123-11) provides **automatic review by higher headquarters** if a member says he's not satisfied with local action. Or, initially, one may submit a complaint to a higher level if fair local treatment is in question. Higher headquarters must respond within seven working days, and, if the member is still not satisfied, the complaint can go to *any* level of command. In the change, each unit is to appoint a unit complaint officer. A senior NCO is recommended as assistant.

### A Generation Gap

Results of a USAF sample survey conducted late last year indicate that **the average E-3's views are more likely to be in step with a young first lieutenant's than with an older E-7's.** For example, colonels may find it easier to communicate with the E-7 than with the first lieutenant. In the study, more than 23,000 airmen and 9,000 officers rated in order of importance these fifteen national problems: crime, drug abuse, international tensions, the environment, the war in SEA, inflation, race relations, lack of personal integrity, national budget priorities, overpopulation, poverty, worldwide communism, changes in social values, loss of individual identity, and women's rights.

Results were totaled for officers and airmen, for two age groups (twenty-one to twenty-five, and forty-one and over), and by race. Both officers and airmen, taken as groups, rated crime and drug abuse highest, and also tended to discount women's rights. On other issues, sharp differences emerged between older officers and younger airmen. For example, younger airmen ranked loss of individual identity high, while older officers put it below poverty and overpopulation. Younger officers and younger airmen put the environment high on their lists. Older officers and older airmen put it below crime, drug abuse, international tensions, the war in SEA, and overpopulation.

Blacks rated race relations as the top problem, whites put it seventh (officers) and eighth (airmen). Black officers and airmen ranked poverty fourth and third, respectively, while, as a group, officers ranked it eleventh, and airmen put it as seventh.

*Maj. Gen. Warren D. Johnson, Chief of Staff, SAC, pins Aviators' Valor Award on Lt. Col. Joseph F. Mudd. Colonel Mudd, a 1954 graduate of the Naval Academy, was chosen the recipient for 1971 by the American Legion Aviator's Post 743 of New York. Colonel Mudd won the award for his heroism in rescuing a downed pilot in Vietnam on March 6, 1971, while he served as a Jolly Green Giant (HH-3) commander there.*

### GI Airline Fares

**Frontier Airlines reportedly has canceled military standby fares** on all of its noncompetitive route segments. DoD protested Frontier's action. The Civil Aeronautics Board dismissed the DoD complaint. Officials advise that when a military member is considering Frontier, he should check with the airline to find out what parts of his itinerary will not include reduced fares.

### More CCAF Accreditation

**The North Central Association of Colleges and Secondary Schools has accredited the USAF Schools of Applied Aerospace Sciences at Chanute AFB, Ill., and Lowry AFB, Colo.,** for a five-year period. That accreditation culminates a year-long project by the Community College of the Air Force (CCAF) seeking recognition for USAF technical training *(see "The Bulletin Board," January, February, and March '73 issues, for more on CCAF).*

### AFROTC Area Commandants Relocated

AFROTC **area commandants, now stationed at Maxwell AFB, Ala., will be reduced from nine to seven, and six will be moved from Maxwell.** The newly designated "resident area commandants" will move, before the 1973–74 academic year, to Norton, Offutt, Carswell, Lockbourne, Pease, and Seymour Johnson AFBs. Each is responsible for some twenty AFROTC units assigned to his geographical area.

# The Bulletin Board

### Profile of New Lt. Cols.

The following data from the last temporary lieutenant colonel promotion board provide a profile of selection to that grade. Of those **line officers considered in the primary zone for the first time, sixty-two percent were selected.**

Of those passed over once before and considered again, twenty-three percent were selected. Of those meeting the board for the third time, only five percent were selected. Two percent were selected from those on their fourth through sixth try.

About thirty-two percent of those selected in the primary zone were nonrated. Just over thirty-five percent of those selected in the secondary zone were nonrated. No career Reservists were selected in the secondary zone, and only about six percent of those selected in the primary zone were non-Regular.

Of those considered in the primary zone with advanced degrees, fifty-six percent were selected. Of those with a baccalaureate degree, thirty-seven percent were chosen. Those with no degree had only a twenty-one percent selection rate. In the secondary zone, just over sixty percent had advanced degrees.

### Senior Staff Changes

**B/G John C. Bartholf,** from V/C, WRAMA, AFLC, Robins AFB, Ga., to Dep. Dir., Maintenance, Engineering & Supply, DCS/S&L, Hq. USAF, replacing retiring B/G James L. Stewart . . . **M/G Gordon F. Blood,** from Cmdr., 12th AF, TAC, Bergstrom AFB, Tex., to Cmdr., USAF Tac. Ftr. Wpn. Ctr., TAC, Nellis

*Ed Gates . . . Speaking of People*

## GRADE CREEP—IS IT AS BAD AS SOME SAY?

Every year or so, the military services—the Air Force perhaps more than the others—are censured for "grade creep." The military promotes so rapidly, the critics insist, that it has become top-heavy in the star and field grades.

The critics' solution?

Put a clamp on promotions. Force out many of the higher-ups. Eliminate numerous upper-echelon slots.

A grade-by-grade comparison of USAF officers onboard today and at the end of World War II does, indeed, confirm the charges of heavy rank inflation. The Army Air Forces of mid-1946, for instance, had only 174 generals, compared with 405 today. A mere 2.2 percent, or 1,815 members of the officer force, then served as colonels; today, 5.3 percent, or 6,128 persons, so serve.

Similarly, in the lieutenant colonel and major grades, the percentages of the total force and the actual numbers of persons in these grades are substantially larger than they were twenty-seven years ago *(see accompanying chart)*.

So, it might appear that curbs on promotions, plus a downgrading of numerous high-level billets, are in order. Do we really need, as one critic asked, more lieutenant colonels than second lieutenants? He also noted that during WW II, second lieutenants far outnumbered light colonels.

The Air Force insists that it must not shave its high-ranking positions to any degree. It also resents being singled out among government agencies and private enterprise as the main culprit in the grade-creep issue.

And with justification. At the same time that critics have blasted the Air Force and the other services for sharply increasing their star and field-grade slots, congressmen's staffs, private businesses, and government agencies generally have experienced executive inflation, some far more than the military.

Grade creep provides an excellent example of anti-military lawmakers lashing out at the services for operating precisely within the ground rules that Congress established.

Rep. Otis G. Pike (D-N. Y.) and Sen. William Proxmire (D-Wis.) have raised the most static about inflated military rank. The latter, for a time last year, even threatened to shelve Air Force officer promotions indefinitely *(see June '73 issue of* AIR FORCE *Magazine)*.

Mr. Pike more recently declared that billions of dollars —repeat, billions—could be saved in Defense's FY '74 budget if the services adopted the grade structure of 1946. He said he hoped to bring that about during budget hearings.

Congress could take no quicker and surer route toward wrecking the military establishment than to adopt Pike's irresponsible plan. Just for starters, reverting to the 1946 grade structure would require the demotion of some 61,000 of the 115,000 USAF officers currently on board. Seventy-five percent of the airmen would be demoted or bounced out.

Such a step, USAF says, would save an estimated $538 million in pay and allowances, but that would be more than offset by huge outlays for retirement and involuntary separation, and for replacement training costs, to say nothing of the devastating impact on the mission, morale, the prospects of an all-volunteer force, and national security.

Fortunately, there's no chance that the Pike proposition will get anywhere. But, for the edification of other quarters that may plan to rap grade creep within the services, here are some related items to consider:

- When USAF was created in 1947, its officer force was a mere infant. Only sixteen percent of the members had more than six years of service. Today, fifty-six percent have more than six. And, with a maturing force, the need for boosts in high-level billets is obvious. Without them, there would be few promotions, little career progression, and the recruitment and retention of quality force would suffer.
- The increasing tempo of research and development has created more sophisticated weapons and support systems and increased the need for talented managers and technicians. This, too, means more rank. It's the same story in civilian life. The escalation in grade structures—in service and on the outside—reflects changes at work in society at large.
- The expansion of "outside agencies" during the past quarter century also has caused the services to assign thousands of high-ranking officers outside their own organizations. The Air Force, for example, must furnish officers to the Defense Department and the Joint Chiefs of Staff. It sends others to NATO, SEATO, NASA, and FAA; to the various defense creations such as Defense Supply Agency and the Defense Intelligence Agency; and to joint commands. These are all new positions,

AFB, Nev. . . . **M/G Marion L. Boswell,** from Dep. Dir., to Dir., Legislative Liaison, OSAF, Hq. USAF, replacing M/G John C. Giraudo . . . **M/G John J. Burns,** from Dir., Operational Rqmts. & Dev. Plans, DCS/R&D, Hq. USAF, to Cmdr., 12th AF, TAC, Bergstrom AFB, Tex., replacing M/G Gordon F. Blood.

**M/G Charles W. Carson, Jr.,** from Cmdr., AF Mil. Tng. Ctr., ATC, Lackland AFB, Tex., to Cmdr., AAC, Elmendorf AFB, Alaska, replacing M/G (L/G selectee) Donavon F. Smith . . . **B/G David B. Easson,** from Dir., Pers. Resources & Distribution, AFMPC, Randolph AFB, Tex., to Dep. Dir., Legislative Liaison, OSAF, Hq. USAF, replacing M/G Marion L. Boswell . . . **M/G John C. Giraudo,** from Dir., Legislative Liaison, OSAF, Hq. USAF, to Cmdr., 17th AF, USAFE, Sembach AB, Germany, replacing M/G Robert W. Maloy . . . **B/G Edgar S. Harris, Jr.,** from Cmdr., 14th Air Div., SAC, Beale AFB, Calif., to C/S, 15th AF, SAC, March AFB, Calif.

**M/G Robert W. Maloy,** from Cmdr., 17th AF, USAFE, Sembach AB, Germany, to Cmdr., AF Mil. Tng. Ctr., ATC, Lackland AFB, Tex., replacing M/G Charles W. Carson, Jr. . . . **Col. (B/G selectee) John J. Murphy,** from Cmdr., 306th Bomb Wing, to Cmdr., 42d Air Div., SAC, McCoy AFB, Fla., replacing retiring B/G Edward O. Martin . . . **Col. (B/G selectee) Don D. Pittman,** from Cmdr., 48th TFW, RAF Lakenheath, England, to Cmdr., 14th Air Div., SAC, Beale AFB, Calif., replacing B/G Edgar S. Harris, Jr.

**M/G (L/G selectee) Donavon F. Smith,** from Cmdr., AAC, Elmendorf AFB, Alaska, to Cmdr., 6th ATAF, SHAPE, Izmir, Turkey, replacing retiring L/G Gordon M. Graham . . . **Col. (B/G selectee) Michael J. Tashjian,** from Dep. Dir., Proc. Policy, DCS/S&L, Hq. USAF, to Dir., Proc. Policy, ODASD (Proc.), Washington, D. C. . . . **B/G Felix J. Zaniewski,** from Staff Judge Advocate, 15th AF, SAC, March AFB, Calif., to Staff Judge Advocate, MAC, Scott AFB, Ill.

**PROMOTIONS:** To be **Lieutenant General:** Donavon F. **Smith.**

**RETIREMENTS:** M/G Thomas G. **Corbin;** B/G William R. **Goade;** L/G Gordon M. **Graham;** M/G Oris B. **Johnson;** B/G Edward O. **Martin;** M/G Melvin F. **McNickle;** B/G James L. **Stewart.**

*—Compiled by Catherine Bratz*

predominately field and star grades, laid on since WW II.

Congress, of course, via its legislative power and confirmation authority, actually controls military promotions. It enacted the Officer Grade Limitation Act in 1954 and has amended it six times since then. Throughout OGLA's nineteen years of existence, the services have adhered strictly to its ceilings.

In 1969, Congress—not the services—removed medical and dental officers from the OGLA restrictions, thus handing hundreds of them quickie eagles and silver leaves. So, perhaps the grade creep critics should direct their complaints at their fellow lawmakers who pushed through OGLA and the medic-dentist quickie hike measure, before excoriating the military services for doing what Congress, as a whole, agreed they could do.

The grade structure truly has become inflated; grade creep is for real. Let's acknowledge it, note that the services are better off in some ways because of it, and underscore that Congress has okayed it all along the line. "This evolutionary change has been repeatedly recognized and endorsed by Congress through enactment of grade authorization legislation," USAF notes.

Finally, since grade creep is not a phenomenon limited to the military, how does USAF's rank-inflation pattern compare with that of other government agencies and with private business?

Congressmen's personal staffs and the various legislative committee staffs, of course, have ballooned in recent years with high-salaried staffers. Most revealing is a special study comparing USAF officer rank with equivalent staff positions in agencies under direct congressional control, such as the General Accounting Office, the Congressional Library, and the US Tax Court.

For comparative purposes, GS 16–18 is equivalent to star rank, GS 15 to colonel, GS 13–14 to LC, GS 12 to major, GS 10–11 to captain, and GS 7–9 to lieutenant. Compared to the legislative branch, USAF has a lower percentage of senior people at the star, colonel, and lieutenant colonel levels—including sixty-six percent fewer in the light colonel category.

Studies made last year by the USAF Personnel Research and Analysis Division also compared Air Force officer manning with many other agencies. One was State Department's Foreign Service, where it was found that, on a percentage basis, there are five times as many Foreign Service Officers equivalent in rank to colonels and nearly twice as many LC-equivalents as in USAF.

The Commerce Department, the study revealed, has three times as many star equivalents, twice as many colonel equivalents, and nearly twice as many lieutenant colonel equivalents as the USAF. The Agriculture Department is the one large executive agency that is slightly less inflated—but only slightly—than USAF officer grades.

And among corporations? On the basis of salaries paid, they, too, have outdistanced USAF in the grade-creep race, according to the Personnel Research and Analysis Division study.

What it all adds up to, it seems, is that nearly all federal agencies—legislative as well as executive—plus the private sector, have experienced substantial grade creep. And, usually, for compelling reasons.

Singling out the military services as the bad guys is a cheap shot by irresponsible critics. ■

### The Changing USAF Officer Grade Structure

| End FY | Star | O-6 | O-5 | O-4 | O-3 | O-2 | O-1 | WO | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1946 | 174 | 1,815 | 3,213 | 7,649 | 19,845 | 32,831 | 12,392 | 3,814 | 81,733 |
| 1964 (Pre-Viet) | 426 | 5,352 | 14,537 | 23,471 | 50,694 | 21,737 | 14,401 | 2,771 | 133,389 |
| 1968 (Viet Peak) | 443 | 6,611 | 16,920 | 29,920 | 47,725 | 15,382 | 21,235 | 1,367 | 139,603 |
| 1973* | 405 | 6,128 | 14,336 | 22,152 | 44,708 | 15,764 | 11,509 | 120 | 115,122 |
| 1974* | 402 | 6,052 | 14,013 | 21,763 | 40,635 | 14,000 | 15,958 | 70 | 112,893 |

*Estimated

As total officer strength continues to decline, the percentage serving in the higher grades edges upward. That's inherent in OGLA, the governing law. Thus, the 405 Air Force generals on board now comprise 0.35 percent of the total officer force, while the 402 projected for end-FY 1974 will represent 0.36 percent at that point. The ratio of colonels will rise from 5.3 to 5.4 percent of the total officer force during the same period. Majors will show a similar rise, but LCs will dip from 12.5 to 12.4 percent. Note the approaching demise of the USAF warrant officer force.

# Letter from Europe

**By Stefan Geisenheyner**
EDITOR FOR EUROPE, AIR FORCE MAGAZINE

## "Militarized" European Airbus?

The A-300B European Airbus, which has been under development for several years, completed its maiden flight last year. A second prototype recently joined the test program, which has been remarkably trouble free. The A-300B is the largest aircraft yet produced by the European aviation industry. It is a joint venture of Hawker Siddeley of Britain, Aérospatiale of France, Deutsche Airbus of Germany, CASA of Spain, and is powered by US-manufactured engines.

The aircraft, a wide-body twin-jet specifically designed for the short- to medium-range market, has a length of 175 feet, a span of 147 feet, and a fuselage diameter of eighteen feet. It is presently offered in two versions. The A-300B2 has a takeoff weight of 302,000 pounds, a payload of 70,000 pounds, and can seat up to 345 passengers.

This is the short-range version suitable over distances of up to 1,400 nautical miles. It holds, in addition to the passengers, twenty IATA A1 containers. The aircraft is powered by two General Electric GE CF6-50A turbofans of 49,000 pounds of thrust each. These engines might be exchanged at a later date for the Dash 50C version of 51,000 pounds thrust.

The A-300B4 has been stretched to allow space for additional fuel. Its takeoff weight is 330,700 pounds and payload 77,630 pounds. Passenger and freight capacity is the same as in the B2 version, but the range is increased to 2,100 nautical miles.

*A strong selling point for the A-300B Airbus, pictured here on a test flight, is its equipment commonality with such other aircraft as the DC-10, 747, and L-1011.*

A strong sales argument is the equipment commonality with other existing wide-body jets. For instance, the total propulsion system is identical with the podded engines of the DC-10. Other equipment also used in the DC-10 includes the APU, air-conditioning, and electrical generating systems. More than eighty major components are common with either the DC-10, 747, or L-1011. Operators of combined A-300B/DC-10/30 fleets can expect to achieve major savings in spare-parts investment and ground-support equipment.

Thirty-eight A-300Bs have been ordered so far, and it is expected that the craft will sell well during the coming ten or more years. The rate at which the aircraft sells is, however, not sufficient to satisfy the investors, and a number of different markets are being sought. Mainland China has been approached, but the range of the A-300B is apparently not adequate for the vast distances to be covered there. Airbus Industrie, the Paris-based sales and management organization for the A-300B, is eyeing the military market because the aircraft, which offers STOL capability in certain configurations, is adaptable as a heavy transport.

Germany has been offered a military version of the A-300B fitted with large cargo doors. The Luftwaffe has in its inventory close to 100 Aérospatiale/VFW-Fokker C-160 D Transall twin-turboprop tactical transports, similar in performance to the Lockheed C-130 Hercules. Four Boeing 707-320Cs, two DC-6s, twenty-one ancient C-47s, and three recently acquired Boeing 737s are available in the transport wings. This fleet has no heavy-freight capability, and thus Airbus Industrie's proposal has certain attractions.

The A-300B would have to be remodeled extensively to give it a tactical capability. The proposal presently includes fitting a twenty-three-foot-wide side door, but this might not suffice. Without a doubt, a front-loading door similar to that of the 747F is preferable for loading such long freight as missiles, their launchers, helicopters, or trucks. In addition, the landing gear would have to be strengthened to provide a semiprepared field capability.

*The Luftwaffe inventory contains about 100 C-160 D Transall twin-turboprop tactical transports, similar to the C-130, and made by Aérospatiale/ VFW-Fokker.*

Should a larger market for a military A-300B develop, these changes, which are not envisioned at the moment, are possible.

The modified A-300B could also be easily converted into a tanker. Although the Luftwaffe does not have a tanker requirement, the French Air Force must gradually replace its six aging KC-135Fs, and the RAF eventually will need a tanker of larger capacity than the old converted Victor bombers. As soon as the MRCA (Multi-role Combat Aircraft), the Panavia 200—a joint British-German-Italian design—becomes operational in the late 1970s, a new tanker force will be needed to exploit the full capability of this aircraft.

Furthermore, a truly militarized version of the A-300B might find a worldwide market wherever a fast and economical transport in the 70,000-pound-payload class is needed.

### Uprated Engine for VTOL Fighter

The RAF and the US Marine Corps have the Hawker Siddeley Harrier VTOL fighter-bomber in their inventories, and both services are well satisfied with its performance. So far, close to 200 have been sold. Originally designed as a close-support fighter, the Harrier, due to its VTOL capability, can take off and land anywhere. The only limitation in the choice of landing zones is the rough-field capability of the ground-support equipment such as fuel trucks and bomb loaders. The aircraft has been operating successfully off ships, cruisers, and aircraft carriers, in hot climates, at high altitudes, and in the Arctic regions. When taking off vertically, the payload is limited to 8,000 pounds. This is the reason behind the development of an uprated engine.

*Upcoming MRCA may dictate a tanker role for modified A-300B aircraft.*

*The British-built Harrier V/STOL, or AV-8A as it is known to the US Marine Corps, is limited to an 8,000-pound payload on vertical takeoff.*

The Harrier GR. Mk 1, or AV-8A as it is known in the US, is powered by a Rolls-Royce Pegasus Mk 103 vectored-thrust turbofan of 21,500 pounds thrust. The vectored-thrust system is the most efficient propulsion method for VTOL aircraft, but has one limitation that prohibits a significant thrust increase for a given aircraft size. The engine operates with four nozzles that can be rotated to direct the thrust from downward to backward. The engine's turbofan delivers the air mass to the front nozzles and turbine exhaust to the rear nozzles. Therefore, the aircraft stands, figuratively speaking, on four legs, each of which is created by a carefully balanced flow of gas.

An increase in engine efficiency would strengthen primarily the turbine exhaust legs, and the inherent stability of the aircraft would be lost since the fan-driven flow of air to the front nozzles would not be increased correspondingly. Only an increase of the fan diameter could solve the problem, but this, in turn, demands a larger fuselage diameter for an increased air-inlet area. In short, a new aircraft would have to be developed.

A possible solution is offered by so-called plenum chamber burning (PCB). The plenum chamber, the cavity where air is distributed to the front nozzles, can be used in much the same way as the afterburner of a high-performance jet engine. Fuel can be injected in the chamber and ignited, giving a considerable thrust increase, which is fully adjustable, for the front nozzles. The PCB Pegasus, a second-generation vectored-thrust engine, is presently under consideration and limited development at Rolls-Royce. This, however, is a major long-range project.

A more immediate potential solution to the Harrier's payload limitation is the Pegasus 15 engine, which has been under discussion for a considerable time. It might solve the problem until a better solution is offered. This engine would have a design rating of at least 24,500 pounds of thrust, an increase of 3,000 pounds over the Pegasus 103. Rolls-Royce and Pratt & Whitney have been contracted by the US and British governments to conduct an eight-month study of the joint development of this engine.

Major changes would include an increase of 2¼ inches in fan diameter, an improved turbine, a redesigned exhaust diffuser, and a new high-pressure compressor of increased efficiency. Hawker Siddeley and McDonnell Douglas—the latter holds the US license to produce the Harrier—will study how the new engine can be integrated into the Harrier airframe.

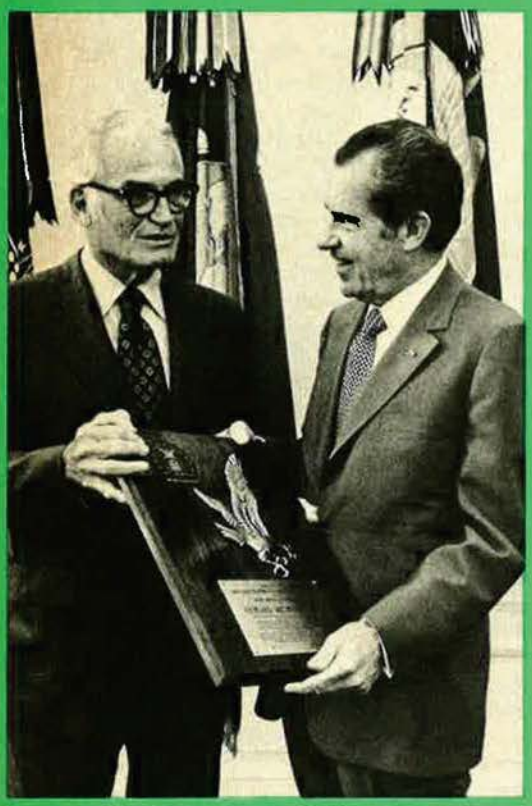
The Pegasus 15 would fit the fuselage of the Harrier without major structural changes. The air intake, however, would have to be enlarged to allow for a greater air-mass flow. This, in turn, might entail a redesign of the adjacent fuselage frames. It seems illogical to tear the existing aircraft apart for the envisioned gain in thrust.

It would seem preferable to design a modified aircraft based on the proven Harrier design. It should be compatible with both the Pegasus 15 and a follow-on engine. Aerodynamically, it would be advantageous to plan for a supercritical wing, and it seems likely that Hawker Siddeley and McDonnell Douglas are working on such a design. The thrust of the Pegasus 15 and the characteristics of the new wing would allow for an increased payload and help to achieve considerably better range. ■

# AFA News

**By Don Steele**
**AFA AFFAIRS EDITOR**

During his recent visit to Alaska, AFA President Martin M. Ostrow was guest of honor at a social meeting cosponsored by AFA's Midnight Sun Chapter and the Fairbanks Chapter of the National Defense Transportation Association. Shown with Mr. Ostrow are Chapter officers, from left, Dr. Charles Lafferty, Membership Chairman; Secretary-Treasurer Ray Karns; Second Vice President Betty Clark; Mr. Ostrow; First Vice President Bel Frol; and President Ed Phillea.



Sen. Barry Goldwater (R-Ariz.), left, a member of AFA's Iron Gate Chapter, presents the Chapter's Bronze Eagle Award to President Nixon for "his brilliant and courageous use of airpower in Southeast Asia." The award was scheduled to be formally presented at the Chapter's Tenth National Air Force Salute in New York City last March.

Rep. Lester L. Wolff (D-N. Y.), left, presents the H. H. Arnold Chapter's "Man of the Year" award to Donald J. Strail, Vice President and General Manager, Fairchild Republic Division. Both are members of the Chapter's Executive Council. More than 300 leaders of Long Island's aerospace industry community attended the Chapter's Annual Awards Dinner at which the award was presented.

Winners in the Charleston, S. C., Chapter's annual AFJROTC essay contest received a sightseeing trip to Washington, D. C. Shown during their visit to AFA National Headquarters are, from left, Col. H. Foster Hamilton, USAF (Ret.), their escort and the Chapter's AFJROTC Coordinator; Cadet Sgt. Tom Parker, Garrett High School; Cadet Lt. Harvey Lloyd, Berkeley High School; and AFA Executive Director James H. Straubel.


Gen. Paul K. Carlton, right, Commander, Military Airlift Command, and guest speaker at the Scott Memorial Chapter's annual dinner meeting, congratulates Lt. Col. Elden S. Billington, left, and Col. Cary D. Stephenson, both of whom received citations for outstanding efforts in helping to organize the one-year-old Chapter.

Principal participants in the High Desert Chapter's recent dinner meeting at the George AFB, Calif., NCO Club were AFA President Martin M. Ostrow, guest speaker; Chapter President Ralph A. Hoyt; AFA National Director Tillie Henion; and California AFA Organizational Director Ed Stearn. Mr. Ostrow discussed the role of airpower, especially of the B-52s in the Southeast Asian war.

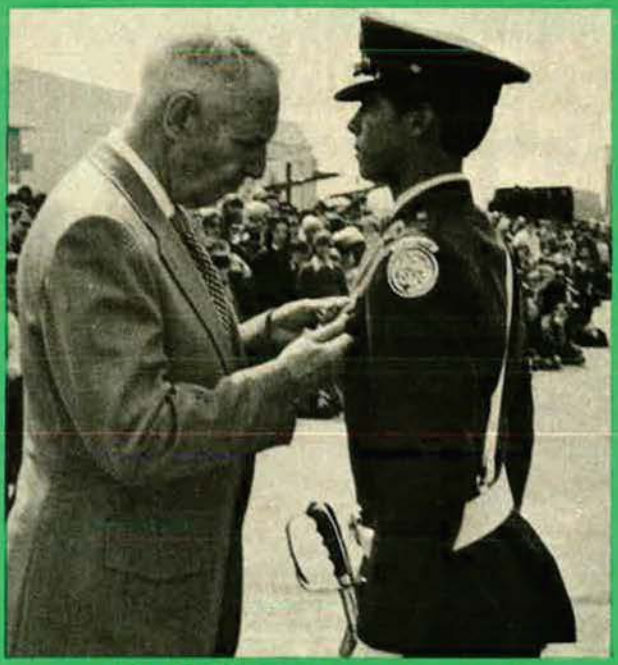
# CHAPTER AND STATE PHOTO GALLERY

At the Santa Monica, Calif., Chapter's recent Past Presidents' Brunch, Chapter member Lou Dyer, right, a member of Los Angeles Mayor Sam Yorty's staff, accepts a Chapter Citation for Mayor Yorty from Chapter member Lou Dyer, right, a member of Los Angeles Mayor Lawson, Vice President for AFA's Far West Region; AFA President Martin M. Ostrow; and Mrs. James H. Doolittle, wife of the retired Air Force General who was also AFA's first President.

Shown at the Warner Robins Air Force Band's concert, sponsored by AFA's Savannah, Ga., Chapter and attended by more than 500, are, from left, Theodore Whalen, Chapter Executive Council member; Georgia AFA Vice President Don Devlin; Capt. Benny Knudson, Band Director; Chapter President Cal Garing; and Dick Stein, also a member of the Chapter's council.

Maj. Harold Johnson, a recently returned POW, was guest speaker at the Charter Night Program of the newly organized Central Missouri Chapter at Whiteman AFB on March 28. Participants included, from left, Chapter Secretary Louis Sassi; Chapter Treasurer J. R. Hopkins; Major Johnson; Col. William J. Grossmiller, III, 351st Strategic Missile Wing Commander; and Missouri AFA President Dean Anholt.

Four outstanding first-term airmen were honored during a recent Big Spring Chapter banquet at Webb AFB, Tex. The four are shown with two Texas AFA leaders. They are, from left, Sgt. Gary Childers, A1C Gary Mickelson, Chapter President Jack Alexander, Texas AFA Vice President A. J. Statser, Sgt. Leon Crawford, and A1C Gary Bowen.



This spring, AFA's AFJROTC Bronze Medal was presented to outstanding AFJROTC cadets in high schools across the nation and at military bases in foreign countries. In the photo, Brig. Gen. Clyde K. Rich, USAF (Ret.), Past President of AFA's Madrid, Spain, Chapter, presents the medal to Cadet Capt. Joseph Rodriguez of the Torrejon American High School at Torrejon AB, Spain.

# CHAPTER AND STATE PHOTO GALLERY

Representative of the many functions at which AFA's AFROTC Silver Medal has been presented at colleges and universities throughout the country is the University of Florida's Awards Banquet. Participants included, from left, Brig. Gen. Robert M. White, AFROTC Commandant and guest speaker; and Florida AFA President Troy Jones, who presented AFA's Silver Medal to Cadet Larry B. Voss.

During the graduation ceremonies of Class 73-2 of the Tactical Air Command's NCO Academy, Langley Chapter President Charles W. Scott, left, presents a replica of the Chapter-sponsored "TAC Commander's Trophy" to MSgt. James L. Caldwell, honor graduate of the class.

Special guests and participants in the Houston Chapter's recent meeting included, from left, Maj. Gen. John W. Hoff, Commander, Central Air Force Reserve Region; Chapter President Roy I. Smith; Lt. Gen. Albert P. Clark, Superintendent, US Air Force Academy, and the guest speaker; and Maj. Gen. Stuart Hayns-worth, USAFR, a Past President of the Texas AFA and the Houston Chapter.

During a recent congressional mission to Germany, Rep. Morgan Murphy (D-Ill.), left, and Rep. Robert H. Steele (R-Conn.), right, were briefed on the Air Force's mission in Europe by Gen. David C. Jones, center, CINCUSAFE. Representative Steele is a charter member of AFA's Northern Connecticut Chapter and a member of its Executive Council.

Participants in a breakfast meeting sponsored recently by the Gold Coast Chapter of Fort Lauderdale, Fla., included, from left standing, a Florida AFA Past President, Herman A. Hauck; Chapter President Robert H. Bubier; Florida AFA President-elect Albert W. Heymon; Col. Alonzo J. Walter, Jr., 31st Tac Fighter Wing Commander and guest speaker; and, seated, Jay H. Staley, a Past President of the Chapter and one of its founders.

During the Orange County, Calif., Chapter's recent dinner meeting, Capt. Richard S. Ritchie, center, an Air Force ace of the Vietnam War and guest speaker at the dinner, received a plaque from Fullerton Mayor Robert E. Root, left. The plaque, held by Chapter President John Lee, right, is in "recognition of outstanding service to country on behalf of a grateful community."

# 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.*

**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—$10 per year.

**Service Members** (nonvoting, nonofficeholding): US citizens on extended active duty with any branch of the United States armed forces—$10 per year.

**Cadet Members** (nonvoting, nonofficeholding): US citizens enrolled as Air Force ROTC Cadets, Civil Air Patrol Cadets, Cadets of the United States Air Force Academy, or a USAF Officer Trainee—$5.00 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—$10 per year.

**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 principle of freedom and equal rights to all mankind.

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Newport News, Va. 22601
(703) 596-6358
**Central East Region**
Maryland, Delaware,
District of Columbia,
Virginia, West Virginia,
Kentucky

# AIR FORCE ASSOCIATION

## with Life Insurance Protection up to $100,000 for USAF Personnel

## Two Great New Plans! Choose Either One . . . AND Get Big, Strong Coverage

☑ **The High-Option Plan ($100,000 Maximum)**

| Insured's Age | Coverage | Extra Accidental Death Benefit* | Monthly Cost | Optional Family Coverage Spouse | Each Child** | Monthly Cost Family Coverage |
|---|---|---|---|---|---|---|
| 20-24 | $ 66,000 | $12,500 | $10.00 | $6,000 | $2,000 | $2.50 |
| 25-29 | 60,000 | 12,500 | 10.00 | 6,000 | 2,000 | 2.50 |
| 30-34 | 50,000 | 12,500 | 10.00 | 6,000 | 2,000 | 2.50 |
| 35-39 | 40,000 | 12,500 | 10.00 | 6,000 | 2,000 | 2.50 |
| 40-44 | 25,000 | 12,500 | 10.00 | 5,250 | 2,000 | 2.50 |
| 45-49 | 15,000 | 12,500 | 10.00 | 4,050 | 2,000 | 2.50 |
| 50-59 | 10,000 | 12,500 | 10.00 | 3,000 | 2,000 | 2.50 |
| 60-64 | 7,500 | 12,500 | 10.00 | 2,250 | 2,000 | 2.50 |
| 65-69 | 4,000 | 12,500 | 10.00 | 1,200 | 2,000 | 2.50 |
| 70-75 | 2,500 | 12,500 | 10.00 | 750 | 2,000 | 2.50 |

☑ **The Standard Plan ($66,000 Maximum)**

| | | | | | | |
|---|---|---|---|---|---|---|
| 20-24 | $100,000 | $12,500 | 15.00 | $6,000 | $2,000 | $2.50 |
| 25-29 | 90,000 | 12,500 | 15.00 | 6,000 | 2,000 | 2.50 |
| 30-34 | 75,000 | 12,500 | 15.00 | 6,000 | 2,000 | 2.50 |
| 35-39 | 60,000 | 12,500 | 15.00 | 6,000 | 2,000 | 2.50 |
| 40-44 | 37,500 | 12,500 | 15.00 | 5,250 | 2,000 | 2.50 |
| 45-49 | 22,500 | 12,500 | 15.00 | 4,050 | 2,000 | 2.50 |
| 50-59 | 15,000 | 12,500 | 15.00 | 3,000 | 2,000 | 2.50 |
| 60-64 | 11,250 | 12,500 | 15.00 | 2,250 | 2,000 | 2.50 |
| 65-69 | 6,000 | 12,500 | 15.00 | 1,200 | 2,000 | 2.50 |
| 70-75 | 3,750 | 12,500 | 15.00 | 750 | 2,000 | 2.50 |

* In the event of an accidental death occurring within 13 weeks of the accident, the AFA plan pays a lump sum benefit of $12,500 *In addition to* the benefit, except as noted under AVIATION DEATH BENEFIT, above.

** Each child is covered in this amount between the ages of six months and 21 years. Children under six months are provided with $250 protection once they are 15 days old and discharged from the hospital.

**AVIATION DEATH BENEFIT:** A total sum of $22,500 under the High-Option Plan or $15,000 under the Standard Plan is paid for death which is caused by an aviation accident *in which the insured is serving as pilot or crew member of the aircraft involved.* Under this condition, the Aviation Death Benefit is paid in lieu of all other benefits of this coverage.

### CHECK THE ADVANTAGES OF THESE AFA PROGRAMS

**Wide eligibility!** If you're on active duty with the U.S. Armed Forces [regardless of rank], a member of the Ready Reserve or National Guard [under age 60], a Service Academy or college or university ROTC Cadet, you're eligible to apply for this coverage [see exceptions].

**Keep your coverage at the low, group rate to age 75, if you wish.**

**Full conversion privilege.** At age 75 [or at any time, on termination of AFA membership] the amount of insurance shown for your age group at the time of conversion may be converted to a permanent plan of insurance, *regardless of your health at that time.*

**Disability waiver of premium,** if you become totally disabled for at least nine months, prior to age 60.

**Convenient premium payment plans.** Pay direct to AFA or by monthly government allotment.

**Reduction of cost by dividends.** Net cost of insurance to AFA insured persons has been reduced by payment of dividends in eight of the last eleven years. However, dividends cannot, of course, be guaranteed.

**Administered by insurance professionals on your Association's staff,** for excellent service and low operating cost.

### EXCEPTIONS:

Group Life insurance: Benefits for suicide or death from injuries intentionally self-inflicted while sane or insane shall not be effective until your coverage has been in force for 12 months.

**The Accidental Death Benefit and Aviation Death Benefit** shall not be effective if death results: [1] From injuries intentionally self-inflicted while sane or insane, or [2] From injuries sustained while committing a felony, or [3] Either directly or indirectly from bodily or mental infirmity, poisoning or asphyxiation from carbon monoxide, or [4] During any period a member's coverage is being continued under the waiver of premium provision, or [5] From an aviation accident, military or civilian, in which the insured was acting as pilot or crew member of the aircraft involved, except as provided under AVIATION DEATH BENEFIT.

The insurance will be provided under the group insurance policy issued by United of Omaha to the First National Bank of Minneapolis as trustee of the Air Force Association Group Insurance Trust. However, because of certain limitations on group insurance coverage in those states, nonactive-duty members who reside in Ohio, Texas, Florida, and New Jersey are not eligible for AFA group life insurance coverage.

### EFFECTIVE DATE OF YOUR COVERAGE

All certificates are dated and take effect on the last day of the month in which your application for coverage is approved. Coverage runs concurrently with AFA membership. AFA Military Group Life Insurance is written in conformity with the Insurance Regulations of the State of Minnesota.

Yes, now the Air Force Association offers members of the United States Air Force their choice of two great new life insurance plans, both designed to meet the special requirements of Air Force personnel.

**Planned for You**

Both plans have been specifically designed to fill your particular needs. This is full-time, worldwide protection. There are no war clauses—no hazardous-duty restrictions, or geographical limitations on AFA life insurance protection. At AFA, our policy is to provide the broadest possible protection to our members, including those in combat zones.

**Low Group Rates**

And, as a member of AFA, you are able to secure this outstanding protection at low group rates. What's more, there's no increase in premiums for flying personnel. In fact, in most cases, flying personnel are entitled to full death benefits. Only when death is caused by an aircraft accident in which the insured was serving as pilot or crew member does the special Aviation Death Benefit take effect.

**Higher Benefits for Young Families**

The higher benefits for younger members make both plans particularly outstanding buys for the young family. The young family breadwinner can make a substantial addition to his life insurance estate at a time when his family is growing up—when his financial obligation to his family is at its greatest!

**CHOOSE EITHER OF THESE GREAT PLANS! MAIL THIS APPLICATION TO AFA TODAY!**

# BREAKS THE BENEFIT BARRIER!

## APPLICATION FOR AFA MILITARY GROUP LIFE INSURANCE

United of Omaha

Group Policy GLG-2625
United Benefit Life Insurance Company
Home Office: Omaha, Nebraska

Full name of member _____
Rank Last First Middle

Address _____
Number and Street City State ZIP Code

Date of birth Mo. Day Yr. | Height Weight | Social Security Number

Please indicate category of eligibility and branch of service.

☐ Extended Active Duty ☐ Air Force
☐ Ready Reserve or National Guard ☐ Other _____ (Branch of service)
☐ Air Force Academy ☐ _____ Academy
☐ ROTC Cadet _____ Name of college or university

Name and relationship of primary beneficiary

Name and relationship of contingent beneficiary

This insurance is available only to AFA members

☐ I enclose $10 for annual AFA membership dues (includes subscription ($9) to AIR FORCE Magazine).
☐ I am an AFA member.

Please indicate below the Mode of Payment and the Plan you elect.

| HIGH OPTION PLAN | | Mode of Payment | STANDARD PLAN | |
|---|---|---|---|---|
| Members Only | Members and Dependents | | Members Only | Members and Dependents |
| ☐ $ 15.00 | ☐ $ 17.50 | **Monthly** government allotment. I enclose 2 months' premium to cover the period necessary for my allotment to be established. | ☐ $ 10.00 | ☐ $ 12.50 |
| ☐ $ 45.00 | ☐ $ 52.50 | **Quarterly.** I enclose amount checked. | ☐ $ 30.00 | ☐ $ 37.50 |
| ☐ $ 90.00 | ☐ $105.00 | **Semiannually.** I enclose amount checked. | ☐ $ 60.00 | ☐ $ 75.00 |
| ☐ $180.00 | ☐ $210.00 | **Annually.** I enclose amount checked. | ☐ $120.00 | ☐ $150.00 |

| Names of Dependents To Be Insured | Relationship to Member | Dates of Birth Mo. Day Yr. | Height Weight |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Have you or any dependents for whom you are requesting insurance ever had or received advice or treatment for: kidney disease, cancer, diabetes, respiratory disease, epilepsy, arteriosclerosis, high blood pressure, heart disease or disorder, stroke, venereal disease or tuberculosis? Yes ☐ No ☐

Have you or any dependents for whom you are requesting insurance been confined to any hospital, sanitarium, asylum or similar institution in the past 5 years? Yes ☐ No ☐

Have you or any dependents for whom you are requesting insurance received medical attention or surgical advice or treatment in the past 5 years or are now under treatment or using medications for any disease or disorder? Yes ☐ No ☐

IF YOU ANSWERED "YES" TO ANY OF THE ABOVE QUESTIONS, EXPLAIN FULLY including date, name, degree of recovery and name and address of doctor. (Use additional sheet of paper if necessary.)

I apply to United Benefit Life Insurance Company for insurance under the group plan issued to the First National Bank of Minneapolis as Trustee of the Air Force Association Group Insurance Trust. Information in this application, a copy of which shall be attached to and made a part of my certificate when issued, is given to obtain the plan requested and is true and complete to the best of my knowledge and belief. I agree that no insurance will be effective until a certificate has been issued and the initial premium paid. I understand United reserves the right to request additional evidence of insurability in the form of a medical statement by any attending physician or an examination by a physician selected by United.

Date _____, 19 ____ _____
Member's Signature

7/73
Form 3676GL App

Application must be accompanied by check or money order. Send remittance to: Insurance Division, AFA, 1750 Pennsylvania Avenue, NW, Washington, D.C. 20006

## AFJROTC COMPETITION

*Air Force Junior ROTC cadets competed for a $4,000 scholarship recently in a unique nationwide contest sponsored by the Aerospace Education Foundation. These high school students stretched their imaginations as well as their knowledge about the Air Force as they sought to tell the story of USAF's proposed new strategic bomber. The result was a winning videotape production entitled . . .*

# 'Why America Needs the B-1'

**By Maj. Robert W. Hunter, USAF**
CONTRIBUTING EDITOR

"CREATE an original presentation that will project to the public the role and significance of the B-1 strategic bomber." That would be quite a challenge to lay before any Air Staff action officer or group of officers. Imagine, then, what a challenge it would be to a group of high school students who are much less familiar with aerospace weaponry and strategy.

Nonetheless, the challenge *was* given to Air Force Junior ROTC cadets throughout the nation through a contest sponsored by the Aerospace Education Foundation, an affiliate of the Air Force Association, with cooperation from the Air Force; Rockwell International, the B-1 prime contractor; and the General Electric Co., which will supply the B-1's engines.

The B-1 Presentation Contest, as it was known, added a new dimension to the academic side of the Air Force Junior ROTC program by supplementing and reinforcing the aerospace studies curriculum through the study and analysis that was necessary in order to enter the contest. In fact, several of the schools used the B-1 as the focal point for all of their aerospace studies in the Junior ROTC curriculum.

A total of 108 high school AFJROTC units entered the contest, representing thirty-four states, and dependent schools in four foreign countries.

*B-1 Contest winners, from left, Cadet 2d Lt. Charles Knight, Cadet Maj. Rick Clifford, Aerospace Education Instructor Lt. Col. Bryan J. Sifford, USAF (Ret.), Cadet Lt. Col. Rick Perraut, Cadet 2d Lt. James Brown, Cadet Capt. Lewis Tod Owens, and Cadet Maj. John LaBore.*

James H. Straubel, Executive Director of AFA, estimates that "because of the contest, more than 10,000 AFJROTC cadets, as well as their parents, teachers, and friends, have become knowledgeable about the threat and about the role of the proposed B-1 bomber in countering this threat."

Several of the competing AFJROTC units conducted surveys of the student body. The survey at Sam Houston High School in Texas revealed that seventy-seven percent of the students could not identify the B-1. The cadets conducted B-1 classroom presentations throughout the school that completely reversed the trend of student knowledge on the aircraft.

The unit at Cummings High School in North Carolina went directly to the public with a shopping center exhibit, printed handouts, and sidewalk interviews on the B-1 and related subjects and videotaped this action.

In Lynchburg, Va., Glass High School's unit conducted a well-organized public-opinion survey, one that involved every member of the cadet unit and drew the conclusion that there was little public awareness of the B-1 and a need for more education on it. All of these surveys gave more significance to the contest itself.

The contestants could use any medium or combination of media—written, visual, or audiovisual presentations; displays; posters. The

limitations on entries were strict—no live presentations . . . cannot exceed thirty minutes . . . not more than 4,500 written words . . . must be shipped fully assembled . . . can weigh no more than forty pounds. The variety of presentation formats made judging extremely tough.

Final judging fell to: Maj. Gen. Douglas T. Nelson, the B-1 Systems Program Director; Mr. Howard Hitchens, Executive Director, Association for Educational Communications and Technology; Maj. Gen. Robert N. Ginsburgh, USAF Director of Information; Mr. David Cochran, Vice President and General Manager, Aerospace Programs and Research Division, General Electric Co.; Maj. Gen. Ray B. Sitton, Deputy Chief of Staff, Plans, Headquarters, Strategic Air Command; Mr. J. Gilbert Nettleton, Chairman of the Board, the Aerospace Education Foundation; and Col. C. R. Carlson, Vice Commandant, Headquarters, AFROTC.

Out of this judging came the winner and the two runners-up. Previous judging had established twenty-four Honorable Mention awards and eight Regional awards (*see box for complete list of awards*).

On April 26, 1973, at a reception sponsored by AFA at the International Club in Washington, D. C., the winners were announced. On hand to accept the grand prize, a four-year, $1,000-per-year college scholarship, were members of the Kentucky 51st Squadron, Harrison County High School, Cynthiana, Ky. The scholarship may be given to any member of the squadron chosen by all squadron members. The 51st also won the right to choose one of its number to participate in an educational cross-country trip as part of the first prize.

Accepting the awards on behalf of the squadron was its cadet commander, Richard (Rick) Perraut. Cadet Perraut chaired a panel of his classmates in the winning entry—a videotape production on the theme, "Why America Needs the B-1." (Since that time, AIR FORCE Magazine has learned, Cadet Perraut has won an appointment to the Air Force Academy.)

The winning school is in its third year of AFJROTC and is located in a small town of 7,000 in the tobacco section of central Kentucky. Of the 473 male students in the school, 101 are AFJROTC members. Some thirty girls are expected to join this fall.

The school has a closed-circuit television network and a TV production facility, but none of the winning team had previous experience in front of or behind a TV camera. The winning project was done entirely by the cadets using the school facilities, mostly after regular school hours. Also present at the Washington, D. C., presentations were: Cadet John La Bore, one of the TV cameramen, and Cadets Rick Clifford, James Brown, and Tod Owens, three of the panelists. They were accompanied by their Aerospace Education Instructor, Lt. Col. Bryan J. Sifford, USAF (Ret.).

A comprehensive article on the winning entry, from the school newspaper, was inserted in the *Congressional Record* by Congressman John Breckinridge of Kentucky.

The first runner-up was a slide presentation by the Louisiana 41st Squadron, St. Paul's High School, Covington, La. The second runner-up was a videotape, integrating original photography, slides, and motion-picture footage, from the Florida 33d Squadron, Niceville High School, Niceville, Fla.

The top three entries will be on display at AFA's 1973 Aerospace Development Briefings and Displays to be held in Washington, D. C., September 17–20, 1973. ■

## B-1 Presentation Contest Winners

### Top Three Winners

| | |
|---|---|
| **FIRST PLACE** | Harrison County High School<br>Cynthiana, Ky.<br>**Prize:** $4,000 scholarship, educational cross-country trip, and distinctive plaque. |
| **FIRST RUNNER-UP** | St. Paul's High School<br>Covington, La.<br>**Prize:** Educational cross-country trip, and distinctive plaque. |
| **SECOND RUNNER-UP** | Niceville High School<br>Niceville, Fla.<br>**Prize:** Educational cross-country trip, and distinctive plaque. |

### Regional Winners

**(Prize: Inscribed and mounted B-1 scale model)**

| | |
|---|---|
| **REGION 1** | Rutherford B. Hayes High School<br>Delaware, Ohio |
| **REGION 2** | Cummings Senior High School<br>Burlington, N. C. |
| **REGION 3** | Irmo High School<br>Irmo, S. C. |
| **REGION 4** | Niceville High School<br>Niceville, Fla. |
| **REGION 5** | Harrison County High School<br>Cynthiana, Ky. |
| **REGION 6** | St. Paul's High School<br>Covington, La. |
| **REGION 7** | Del Rio High School<br>Del Rio, Tex. |
| **REGION 8** | Valencia High School<br>Placentia, Calif. |

### Honorable Mention

**(Prize: Color reproduction of original B-1 painting)**

S. D. Lee High School
Columbus, Miss.

Ottawa Township High School
Ottawa, Ill.

S. R. Butler High School
Huntsville, Ala.

Del Rio High School
Del Rio, Tex.

Valencia High School
Placentia, Calif.

Walter M. Williams High School
Burlington, N. C.

Holy Cross High School
San Antonio, Tex.

E. C. Glass High School
Lynchburg, Va.

Harrison County High School
Cynthiana, Ky.

Fort Walton Beach High School
Fort Walton Beach, Fla.

Pine Forest High School
Fayetteville, N. C.

Cummings Senior High School
Burlington, N. C.

St. Paul's High School
Covington, La.

Niceville High School
Niceville, Fla.

M. C. Williams High School
Germantown, Tenn.

Rutherford B. Hayes High School
Delaware, Ohio

Bossier High School
Bossier City, La.

North High School
Fargo, N. D.

Minot High School
Minot, N. D.

Parkway High School
Bossier City, La.

Irmo High School
Irmo, S. C.

Clintondale High School
Mt. Clemens, Mich.

London Central American High School
APO New York

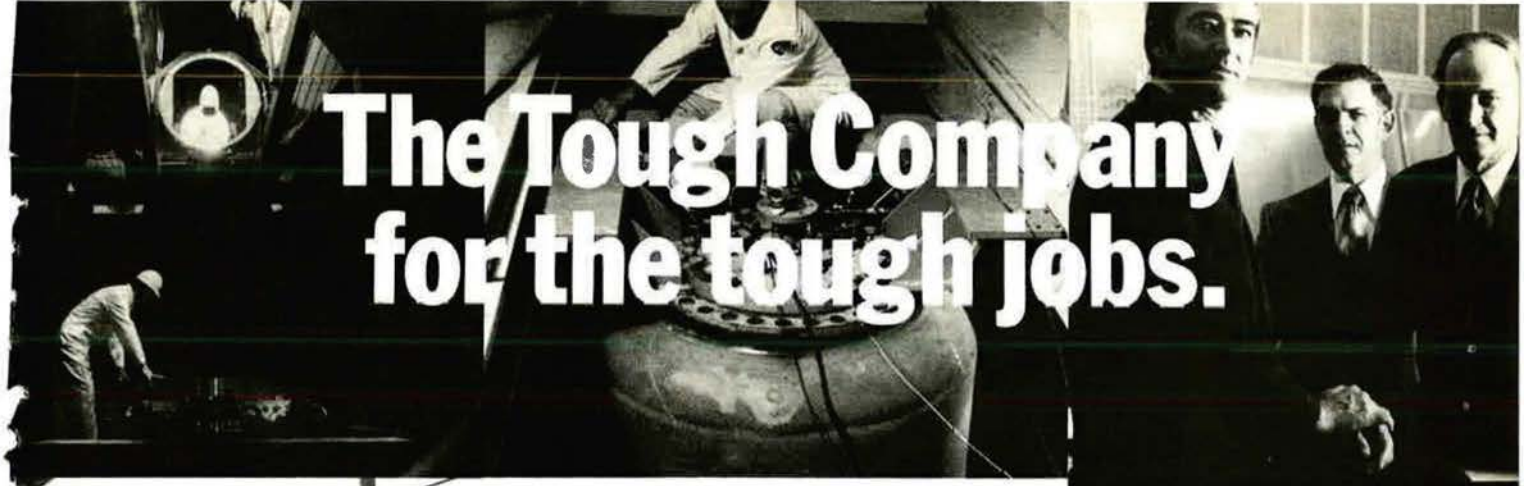
Bellevue High School
Bellevue, Neb.

Bob Stevens'

# "There I was..."

*When the work's all done at evening,*
*When they've beat the Zeke's attacks,*
*And the morrow is a stand-down,*
*Then the fighter jocks relax.*

*And if, around the squadron bar,*
*Some overly unbend,*
*They'll leave that last long runway--*
*Fighter pilots to the end.*



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A boastful claim? Not really. If you are one of our present customers, you know it is true.

We're an aggressive and eminently successful company that is on the move.

We know our business, and our business is sensor and systems production for national defense, earth resources measurement and environment control.

We're accelerating the state of the art across the full electromagnetic spectrum from sound through light in electro-acoustics, microwave, electro-optics and real-time data processing.

We are recognized for our achievements in multi-spectral sensor systems development and integration.

Come see us if you seek a company that delivers—from design through production—in the fields of:

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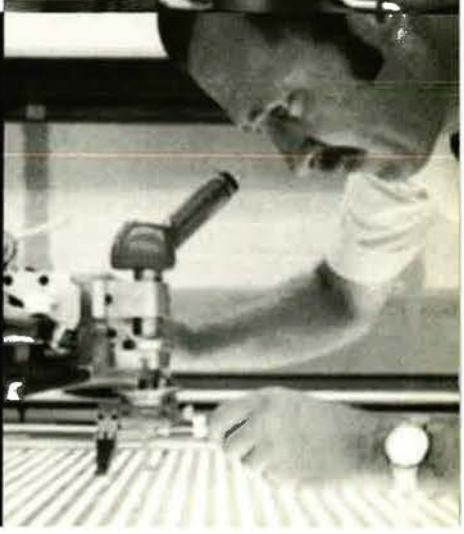
- missile-launch detection
- aircraft detection
- countermeasures
- submarine and ship protection
- command and control
- real-time data systems

Call us collect and we'll arrange a visit at your convenience.

Our company operates under a management by commitment program that works. We will do what we promise. And we promise no surprises.

Our business is aimed at solving the tough job.



## AEROJET ELECTRO SYSTEMS COMPANY

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Phone (213) 334-6211

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# Visual simulation at half the cost... or less: McDonnell Douglas VITAL II.

The VITAL II visual simulator uses a computer-generated image in your flight simulator to provide an accurate out-the-window view of any and all airports you want your pilots to know.
And while it does the job better, it does it for about half the price, maybe only a third of TV/model type systems.

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This compact, self-contained system is easily installed right in your cockpit simulation room. You'll have minimum interruption to your simulator training during installation. And you won't have to add staff, either.

You can start to increase efficiency, cut training costs, and give your pilots the best possible cockpit simulator instruction with VITAL II. For more information or a demonstration, contact Mr. Gordon Handberg, McDonnell Douglas Electronics Company, 2600 N. Third St., St. Charles, Mo. 63301. Telephone: 314/232-0232, Ext. 2058

MCDONNELL DOUGLAS

We bring technology to life.

VITAL II has been ordered for use by: Pacific Southwest Airlines, Federal Express, Air Canada, Flying Tiger Line, Eastern Airlines, and Swissair.