

JANUARY 1974/\$1

AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE

THE YF-16

ONE OF USAF'S TWO NEW LIGHTWEIGHT
FIGHTER PROTOTYPES



ALSO IN THIS ISSUE: AEROSPACE REVIEW 1973/74
BY JOHN W. R. TAYLOR, EDITOR, JANE'S ALL THE WORLD'S AIRCRAFT

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THIS MONTH

- 4 Vietnam—The Tinderbox Is Drying Out
An Editorial by John L. Frisbee
- 10 The Scalpel, Not the Cleaver / By Claude Witze
- 24 Jane's Aerospace Review 1973/74 / By John W. R. Taylor
- 32 Defense and Negotiation / By Colin S. Gray
- 38 Secretary McLucas Looks at Pressing Air Force Needs
By Edgar Ulsamer
- 45 The Stalemated Search for Our MIAs / By William P. Schlitz
- 50 YF-16: On Time, On Track, On Budget / By Edgar Ulsamer
- 55 Reflections of an Early Refueler
By Brig. Gen. Ross G. Hoyt, USAF (Ret.)
- 60 AFA Advisers and Advisory Councils for the Coming Year
- 62 What AFIT Has for You / By Capt. Don Carson, USAF
- 69 Judge Advocate General Retention Goes Critical / By Ed Gates

THIS MONTH'S COVER . . .

The YF-16, General Dynamics' entry in USAF's Lightweight Fighter competition, made its public debut last month and is scheduled to start its year-long flight-test program this month. See p. 50.



THE DEPARTMENTS

- 6 Airmail
9 Unit Reunions
10 Airpower in the News
10 The Wayward Press
14 Aerospace World
23 Index to Advertisers
45 MIA/POW Action Report
66 Airman's Bookshelf
68 The Bulletin Board
69 Speaking of People
70 Senior Staff Changes
72 AFA News
77 This Is AFA
80 There I Was



Circulation audited by
Business Publications Audit

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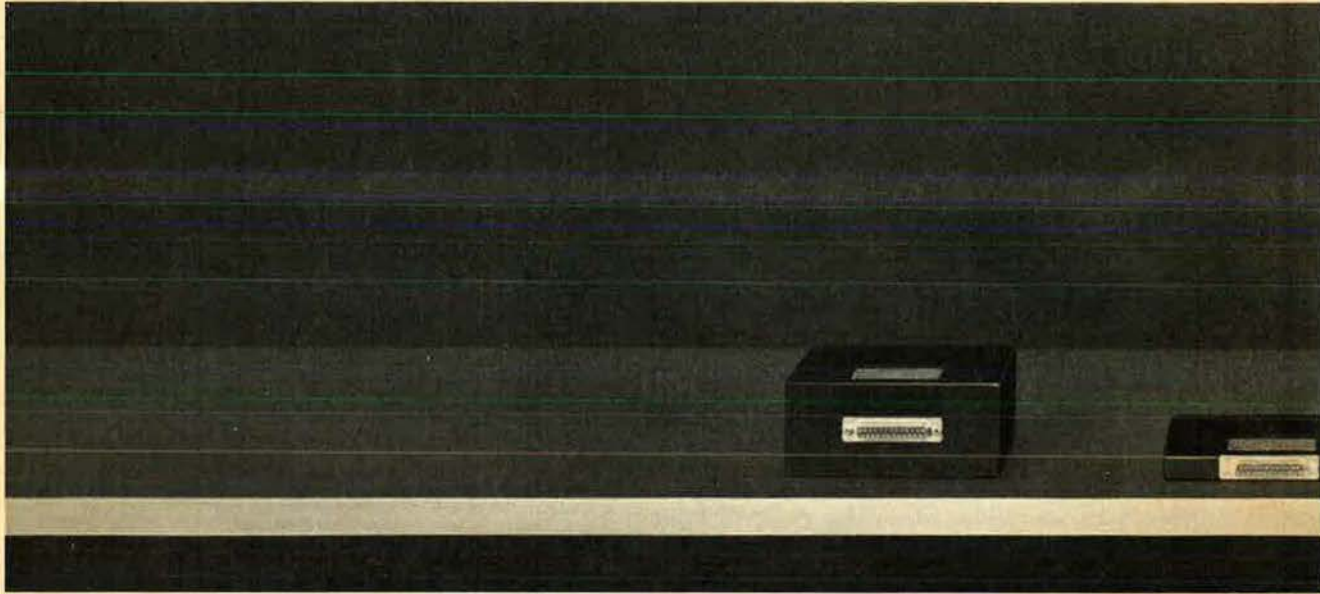
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AIR FORCE Magazine (including SPACE DIGEST) is published monthly by the Air Force Association, Suite 400, 1750 Pennsylvania Ave., N.W., Washington, D.C. 20006. Phone: (202) 298-9123. Second-class postage paid at Washington, D.C. **Membership rate:** \$10 per year (includes \$9 or one-year subscription); \$24 for three-year membership (includes \$21 for subscription). **Subscription rate:** \$10 per year; \$2 additional for foreign postage. Single copy \$1. Special issues (Spring and Fall Almanac Issues and "Military Balance" Issue) \$2 each. **Change of address** requires four weeks' notice. Please include mailing label. Publisher assumes no responsibility for unsolicited material. Trademark registered by Air Force Association. Copyright 1974 by Air Force Association. All rights reserved. Pan-American Copyright Convention.

CHALLENGE:

Find a company with more off-th



It's a rigged challenge.

The Shuttle program calls for new combinations of proven technology, so no one has exactly what's needed on the shelf. But we probably come closer in our fields of expertise than anyone else. Because our off-the-shelf technology lets us propose ideas that are business as usual for us, and science-fiction for anyone else.

The son of ERTS meets the mother of invention.

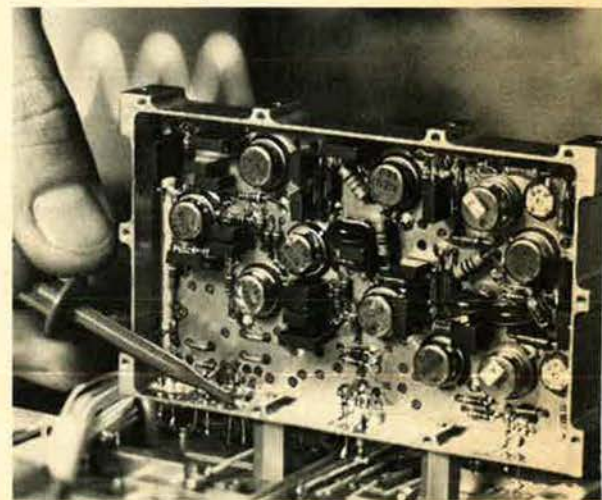
The necessity in the Shuttle program is to keep costs down by using proven designs. One example: We have a transponder fondly called "son of ERTS" after our transponder which was son of Apollo. It utilizes experience gained and technology developed the hard way: by winning more space transponder contracts than any other company. And electronics on every manned U.S. space program.

But that doesn't mean we're going to rest on our laurels and assume that we deserve Shuttle contracts. We keep working, improving, testing, and evolving, so that we can keep ahead of the requirements with equipment that looks conservative because it has successful history instead of just promise.

You ain't seen nothing yet.

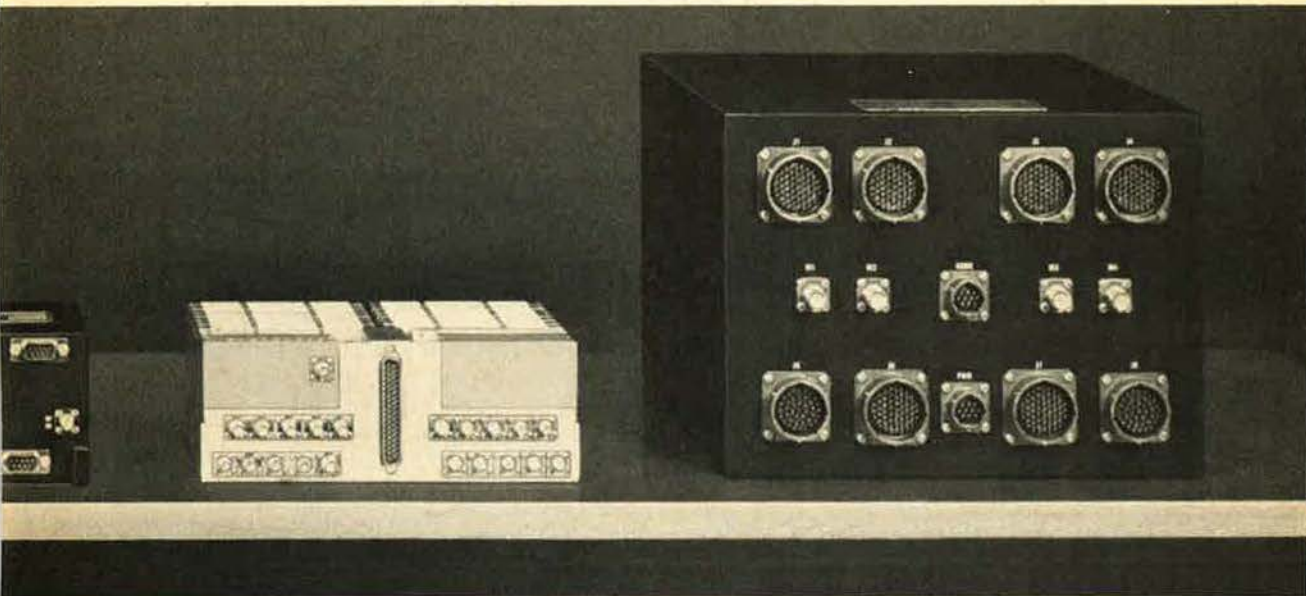
If you think the transponder, multiplexer-demultiplexer, data bus controller, signal condi-

tioner, and signal processor above are our products for Shuttle, call (602) 949-2277. We'll tell you about the data bus we built with our money to test out theories for the information management system as a whole. We'll thrill you with our off-the-shelf technology for the SGLS transponder, and explain why we're ready to produce electronics for almost every nook and cranny of the Shuttle system.



We're using our own money to put transponders on a die series of microminiature modules are under development for Shuttle transponders and the payload interrogator. As a result, we're able to propose solutions we have proven will work. Some of the circuits are exactly the same as those used on the Apollo program. Others were developed for GEOS, the Force's SGLS and Viking programs. Progress one step at a time: it saves money and goof-ups.

shelf Shuttle electronics than us.



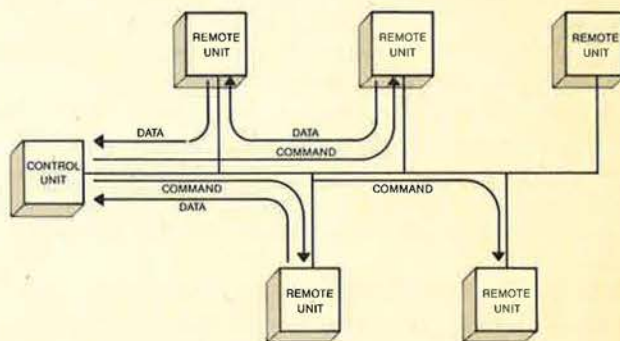
Our finale is an explanation of how within the company we can produce CMOS, LSI's, compete with production documentation that makes repeating success easy and inexpensive.

How to win contracts when you can't dictate the specs.

There's another reason we expect to win Shuttle contracts, without getting to write specs that insist on our large "M" within a circle on every piece of equipment. We're approaching Shuttle from as wide a viewpoint as possible, talking with the people working on the project and listening as well. We're asking a lot of questions, to help us understand each interpretation of the mission requirements. And we're working with our own money to see how each item fits within its subsystem and system. Some items we don't pitch, because they're outside our areas of expertise. And Shuttle isn't intended to be a learning experience. Others are being investigated far beyond what's expected, so we'll be sure that the system works... the first time.

It's important. To us and to you. For us it's money. For you it's the easy way to choose equipment that lets you rest easy.

What proof? We have 37 gobs of it. Proof that Motorola equipment works. Proof we're ahead of the game. Proof of our experience. So if you have any doubts, call us at (602) 949-2277.



Almost anyone could make a black box for the data management system that plugged into the one in front and the one behind. But by looking at the system as a whole, by working on the problems before the Request for Proposal, we're able to find ways to get the system to match its mission requirement within budget restraints. And that's a lot harder to do if you're only studying just a few boxes. So we didn't.



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VIETNAM—THE TINDERBOX IS DRYING OUT

By John L. Frisbee

EXECUTIVE EDITOR, AIR FORCE MAGAZINE

AS THE dry season begins in Vietnam, informed defense officials are concerned that the long-expected Communist offensive against South Vietnam is under way.

Preparations for the offensive began in January 1973, before the ink was dry on the cease-fire agreement, and have been carried on in flagrant violation of that agreement. In the ensuing eleven months, North Vietnam built a network of all-weather roads extending deep into South Vietnam, constructed a dozen airstrips near the DMZ, put in a POL pipeline, threw up elaborate and well-stocked supply depots in the South, and pock-marked the territories they hold with SAM and AAA sites.

The 150,000 to 200,000 North Vietnamese troops who remained in the South after the cease-fire have been augmented by more than 50,000 additional soldiers. The greatest concentration of men and supplies has been in the northern provinces. But there has been a recent buildup of probably 50,000 troops along the Cambodian border only 100 miles north of Saigon.

In considerably less than a year, North Vietnam has created a logistics and operating base in the South far larger than in the four years of preparation for the 1972 invasion, when US air interdiction held them in check. Critics of the effectiveness of US airpower, please note.

The extent of North Vietnam's buildup is not a matter of conjecture. It is documented by enough reconnaissance photographs to paper the Pentagon. But only a few have been dribbled out to the public. As a result, the American people, including many in Congress, are unaware of the extent of North Vietnam's preparations and how serious the situation is.

Well-informed military observers believe that North Vietnam's strategy this time is to begin with scattered attacks on high-value areas so as to disperse South Vietnam's defenses. These relatively small operations, already begun, will then be followed by a massive 1972-style drive into the northern provinces from bases in Quang Tri, coordinated with attacks further south.

There is a reasonable degree of confidence that South Vietnam can handle an enemy drive east from the Central Highlands, designed to cut South Vietnam in half, or south from the Cambodian border toward Saigon. The northern provinces are a different story. There, the sheer mass of enemy infantry, armor, and artillery may be too much for the South if Hanoi's MiGs, SAMs, and AAA neutralize South Vietnam's airpower, which they probably can do. The VNAF simply

does not have enough F-5Es, air-to-air combat experience, or ECM capability. And remember that the northern prong of the 1972 invasion was defeated only because US and VNAF air held the line while the ARVN regrouped and organized its counterattack.

If the battle in the northern provinces develops as now expected, the US will be faced with unpleasant alternatives. The War Powers Limitation Act aside, the President probably still is prohibited by the Church Case amendment of last summer from committing US forces to combat in Southeast Asia. Without such commitment, there is high likelihood that South Vietnam—a country for which we have sacrificed 50,000 lives and \$100 billion—will be at least partially dismembered and probably doomed to future attacks.

Should the President ask Congress for permission to intervene, as Dr. Kissinger has assured us he would and if it were granted—a very large "if"—we could ill afford the losses and huge ordnance expenditures of a drawn-out campaign. Drawdowns to reequip the Israeli Air Force and to support the Vietnamization program have brought our tactical air forces too close to the bottom of the barrel.

There remains a third alternative—a swift, large-scale bombing attack on the heartland of North Vietnam. It would almost certainly halt an offensive, just as Linebacker II brought a cease-fire a year ago, and it would do that with fewer casualties on both sides than would result from a protracted war in the South. If US airpower is to be used again in support of South Vietnam, this course of action is the only one that makes sense.

North Vietnam's leaders are quite aware of the efficacy of US airpower as it was used in Linebacker II. What they don't believe is that we will—or can—do it again. That disbelief might be raised to a level of uncertainty if all the shocking facts were laid out for the Congress and the people. Uncertainty about the willingness of a powerful opponent to use overwhelming force is a major ingredient of deterrence—and deterrence is what we are talking about.

A burden of responsibility lies on both the Administration and the Congress. The Administration has been reticent about releasing information on the extent of North Vietnam's illegal preparations for renewed war. The Congress, by its action of last summer, has deprived the President of the most powerful of diplomatic tools—airpower—as a means of fostering real peace in Vietnam.

We had better take another look—and a close one—before it is too late.

The Air Force A-7D
A classic in its own time



VOUGHT SYSTEMS DIVISION
LTV AEROSPACE CORPORATION



Airmail

The Exciting "Six"

Gentlemen: "Flying the Six," by Capt. Donald D. Carson, in the October '73 edition, is a fine article on one of the best-performing fighter aircraft in the world, as attested to by some of the foremost authorities on fighter aircraft.

I have had the opportunity of flying the F-106 since 1962 and, in addition, have been very closely involved with ADC's Dissimilar ACT program since 1968. I would like to address that portion of the F-106 training program.

We have long had in-being programs that provide realistic training in Dissimilar ACT. In addition to initial and continuation programs, ADC F-106 pilots are trained to intercept and defend strike forces before they are considered qualified to provide worldwide air defense. Consequently, F-106 pilots are widely recognized as among the best trained air-to-air pilots in the Air Force.

Navy Squadron VF-1 of Miramar NAS, Calif., said: "The F-106 and the ADC pilots who fly it are second to none in the ACT arena and can contribute significantly to the quality of F-14 ACM training."

The aircraft has been flown against almost every current US fighter and some foreign fighters. In most cases, given equally capable ACT pilots, the F-106 has demonstrated better maneuvering capabilities. However, the training of the ACT pilot still makes the biggest difference. It is significant that ADC F-106 pilots devote 100 percent of their training to air-to-air weapons employment.

The reliability of the F-106 has improved steadily over the years. I believe two basic reasons contribute to this record: the elimination of the so-called "bugs" from the F-106, and the dedication of USAF F-106 maintenance crews. During ADC's last five, one-week Dissimilar ACT deployments to Miramar NAS, only two sorties have been lost to air/ground aborts. An F-106 squadron usually deploys six aircraft with limited maintenance support and schedules from fifty-six to sixty sorties per five-day period.

Also, during TAC exercises Coronet Organ IX, Nellis AFB, Nev., August 13-18, 1973, ADC deployed twelve F-106 aircraft and flew 147 sorties (265 hours) and provided F-106 aircraft for every scramble and airborne order requested by the TAC Integrated Air Defense Commander. This far exceeded the programmed fraggied sortie rate of 1.5 per day. The extra sorties were deemed necessary to counter the threat from numerically superior adversaries.

I know why Captain Carson is excited about having flown the "Six." Maj. Edward A. Woelfel
Colorado Springs, Colo.

Gentlemen: I noted with interest and a great deal of pride your article on the F-106.

What is missing is the behind-the-scenes efforts made by a few between 1968 and 1972 to allow these capabilities to begin existing today for the F-106 aircraft system.

These were years of very tough bargaining in the air defense mission area. Trade-offs for dollars, with other sophisticated weapon systems in the operations and maintenance budget area, and the Class V and IV modification funds arena, was a constant effort with daily changes in programming occurring. These areas were constantly being trimmed and, as an older weapon system not as directly involved in SEA as others, every penny spent on the F-106 was viewed at all levels with a very critical eye.

Had it not been for the foresight of Maj. Ross Utt, of ADC, with his extreme knowledge of the MA-1 fire-control system and his very tenacious, dedicated attitude, I doubt very seriously if any of the innovations to the F-106 would be forthcoming today. Major Utt, in this day and age, is probably as knowledgeable or more expert on the MA-1 system in the F-106 than anyone in either the Air Force or industry.

Another ADC major, William Mathis, now in USAF Headquarters, could be considered the second greatest contributor to this F-106

program. His also extreme and complete knowledge of the MA-1 system, along with Utt, afforded the primary technical team in ADC that presented enough reality to all levels in the Air Force to have them realize these things had to be done if we expected the F-106 weapon system to perform in the modern state-of-the-art atmosphere.

If not done, it was obvious the F-106 would become, in the near future, nothing but a very expensive static display, with a kill capability much less than desired or required to defend in a sophisticated air defense environment. These changes would also affect down time for maintenance, which would allow a greater number of aircraft available on a day-in-day-out basis to perform the mission of ADC. Parts consumption would be tremendously improved, with the increased hours before failure on the new solid-state miniature molecularized components to be used.

Others who contributed directly to the success of these many changes, which will make the F-106 a viable weapon system for a few more years to come, were J. O. Lincoln, Ken Ward, and Norm Strait of the F-106 System Management Office at SAAMA; James Lassiter of the fire-control systems at WRAMA; Marvin Altman (electronic engineer) and Jake Pahel both of the Engine and Accessories Branch, ADC; and Lt. Col. Kenneth Scott (now retired), Maintenance Engineering Weapons System Division Chief in ADC.

Here it must be mentioned that had it not been for the very aggressive backing of Lt. Gen. Arthur Agan, USAF (Ret.); Lt. Gen. Thomas K. McGehee (recently retired Commander of ADC); Maj. Gen. William S. Harrell, USAF (Ret.), all of ADC; and Lt. Gen. William Snively, then in AFLC, none of these programs would even have come into the F-106 system.

There were many others in ADC, AFLC, and USAF Headquarters who assisted these programs, but the personnel mentioned herein were the ones who fought tremendous odds at all levels, with

enacious attitude, long enough to assure programming and actual hardware purchase and installation.

Many times these programs were up for cancellation due to budget shortages, new weapon systems innovations, etc. Each case was met head on by the people mentioned, with a positive attitude, which in each case won through until we are at the point we have reached today.

Often these articles show the end result (such as your October article on the F-106), with little credit given to the hard, long, dedicated hours put in by a few to assure the end results spoken about in your article.

This letter is not to degrade or in any way detract from your fine article, but to put the credit for the fine end results squarely where it truly belongs.

Thank God, in today's passive attitude, for people in the Air Force such as Majors Utt and Mathis, Generals McGehee and Snively, in fighting overpowering odds at times to get the results our country needs and must have. It is hoped their replacements will always, in the years ahead, have the tenacity to fight, as they did, for the things to assure a constantly ready air defense capability within the USA and its associated outer perimeters.

Col. Walter R. Waller, Jr.,
USAF (Ret.)
Colorado Springs, Colo.

• *Thank you for the update on the men behind the many programs to modernize the F-106. From talking to pilots who fly the "Six," it seems your efforts were not in vain. Air defense planners are fighting the very same obstacles today that you faced in modernizing the F-106. Few leaders wish to push for a modernized air defense force until it is needed. By then, it is too late. Your efforts as Director of Maintenance Engineering at Hq. ADC during 1968-72 and those of the men mentioned have extended the useful life of the F-106 for several years. Hopefully, by then we will see the much-needed equipment for a modern air defense network.—THE EDITORS*

Unnamed Officer

Gentlemen: As a subscriber to your magazine, I am appalled that the distinguished looking naval officer on page 74 of your November '73

issue was not identified. He is Vice Adm. William D. Houser, Deputy Chief of Naval Operations (Air Warfare).

Cdr. William R. Allison, USN
Fighter Squadron Seventy-Four
FPO New York

• *We appreciate Commander Allison's note. It simply is not possible for us to identify all of the senior officers of the other services, whose presence we welcome at the annual Aerospace Development Briefings.—THE EDITORS*

The Wayward Press AIR FORCE Magazine Dept.

In the fourth paragraph of our December '73 editorial, "The Middle East: Retrospect and Prospect," appears the following sentence: "Another factor [in Israeli Air Force losses to Arab SAMs] was the ratio of Arab-operated SAMs to IAF fighters, which was about nine times higher than that of North Vietnamese SAMs to US strike aircraft in Southeast Asia, though the concentration of SAMs was not as high around Hanoi and Haiphong." The last phrase of that sentence should have read: ". . . though the concentration of SAMs was not as high as around Hanoi and Haiphong."

This correction is published in the interest of accuracy, and as a deterrent to the barrage of ARMs (Angry Rebuttal Messages) that might justly be fired at us by US aircrew members whose appointed rounds during the Vietnam War included Downtown deliveries.—THE EDITORS

Retirement System Arguments

Gentlemen: As an AFA member who read with interest the "Opposing Arguments" letter [by Maj. Robert W. Hunter] in the October '73 issue, I congratulate you on providing a forum for the expression of opinion widely argued and discussed by members of the Air Force but rarely displayed for the public record. Since negative reaction to the DoD Proposed Nondisability Retirement System has largely been unofficial and private (understandable since few people like to openly oppose official DoD proposals), I enjoyed seeing in print arguments I had heard so often.

I heartily agree that the time for full and complete discussion of this system is before implementation, not after. To that end, I would add the following comments to Major Hunter's questions:

Quoting from the pamphlet, *The Proposed New Military Nondisability Retirement System*, which accompanies the mandatory briefing given Air Force personnel:

"Furthermore, it's now a matter of law that future increases will occur in military pay automatically as civilian pay levels rise."

Comment: As a law, this can be changed just as the current statutes concerning retirement can be changed. Additionally, on two occasions since this law's passage, the President has acted to delay the pay raise, a precedent that may be followed in the future, especially in view of the current economic climate.

Concerning the comparison of the "excessively liberal" military retirement system with civilian retirement benefits, the pamphlet explains:

"The current system was designed in the days when military pay levels were significantly lower than civilian pay levels. At that time, a more liberal retirement system could be justified."

Comment: Was the retirement system liberal merely because military pay was low or were there other cogent reasons, such as limited number of years of availability for duty, hazardous nature of work, and enlistment and retention incentives? Perhaps the comparison of civilian and military retirement benefits is an apples-and-oranges comparison. More suitable comparisons might be made with the retirement systems of paramilitary occupations such as police, firemen, and FBI, or comparison with other limited number of years of availability occupations such as airline pilots and professional athletes, or even comparison with other federal government retirement plans.

Concerning the Social Security contribution, the pamphlet notes:

"This means that the government provides one and a half pensions for the same period of service."

Comment: A person who is issued a Social Security account at age eighteen for summer or part-time employment and contributes to that account during a military and subsequent careers until age

Airmail

sixty-five has paid into that account for forty-seven years. The fact that twenty or even thirty years were in the military service should surely not cause a reduction in those benefits earned over a working lifetime.

A final thought centers around the argument presented by General Brown in testifying at the congressional hearings on flight pay. He mentioned that the current flight-pay legislation had violated an implied contract with those who anticipated flying careers. I think that was a strong argument. Similarly, it can be argued that the DoD Proposed Nondisability Retirement System violates an implied contract with all military personnel anticipating full careers under the present retirement system.

Capt. Michael E. Alverson
Alexandria, Va.

Comparison of "Averages"

Gentlemen: I was interested in the letter from Capt. Michael J. Karaffa that appeared in your November '73 issue. He was commenting on the comparison between military pay and civilian pay in terms of "averages." Captain Karaffa took a strong, emotional position to support his belief that the so-called average comparisons were invalid.

Generally, averages are not good benchmarks. For example, his frequency of remote duty isn't average for the military when considered in terms of all services and total personnel. His overtime with no pay complaints fall on deaf ears. Most civilian companies follow the same procedures. Salaried employees rarely receive overtime for anything. And many civilian employees work long hours, too.

No one can challenge the hardship and danger associated with the war-zone environment. Captain Karaffa is among the thousands to be commended for service beyond that required in peacetime. However, he should be careful with his averages. Compared to all service personnel, only a small percentage were involved in SEA. The majority serve in other, nonhostile locations.

Since he is a dedicated profes-

sional, it's a bit surprising to see Captain Karaffa gripe about pay comparisons and complain about his employers—Congress. In this part of the country, we're surrounded by plenty of average military retirees who enjoy their pensions, many as an extra salary, while most of us average civilians are just trying to break even.

R. H. McBride
St. Petersburg, Fla.

Single Salary System

Gentlemen: We were pleased to read the article on page 95 of the November '73 issue of AIR FORCE Magazine ["How About a Single Salary System for Military Pay?" by Ed Gates]. We have studied the single salary system for military pay for a considerable period of time and are starting to work on this much-needed improvement on a step-by-step basis. . . .

So often the military man is assumed to be receiving a healthier portion of his active-duty pay than he actually receives. Consequently, retirement finds him very short of cash.

Our Association will continue to work on this system and will most certainly appreciate any suggestions you have as to the procedure we should take. Later on, we will expand our effort, utilizing many of the ideas [presented] in the article.

Again, many thanks for bringing this subject to the surface in such an excellent manner.

Brig. Gen. Hallett D. Edson,
USA (Ret.)
Executive Vice President
Nat'l Assn. for Uniformed
Services
Arlington, Va.

Precairous Détente

Gentlemen: The so-called détente with the Communists is a patent fraud. The Communists are merely taking two steps backward so they will later be in a strong enough position to take three steps forward. This is in complete accord with their dialectical thinking, as derived from Hegel and Marx and as practiced by Lenin, Stalin, and their successors.

Brezhnev is now explaining this to his Eastern European stooges, who have—in criticizing the "détente"—slipped a bit on their dialectics. To interpret the momentary retreat of the Communists as a change in their basic objectives

indicates an inexcusable ignorance of the Communist mind by our policy-makers. . . .

One can easily see that to strengthen our enemy while simultaneously weakening our position will only equip and invite the enemy to pursue his aim of conquering the world and communizing it with even greater force and violence than before. Moreover, scrapping our strength while enhancing the enemy's strength drastically weakens our bargaining power in diplomatic efforts to settle the issues off the battlefield.

Also, such disparity in relative strengths will ultimately enable the enemy to effect our final surrender on the installment plan by extracting a concession at a time from us by employing and/or threatening to employ superior military, diplomatic, and economic position in a series of crises of his own making.

It is worth noting that the détente abandons a billion people to permanent enslavement and will ultimately result in the enslavement of the other two billions of people of the world, which includes two hundred millions of Americans.

Col. James Ervin Norwood
USAF (Ret.)
Waco, Tex.

Flight of the Albatross

Gentlemen: We appreciate the photograph and story (page 36 September '73 issue) of our flight in the Grumman Albatross July 4, 1973.

It is my pleasure to advise that the Fédération Aéronautique Internationale has [recently] confirmed an altitude record of 32,883 feet (2,000 feet higher than we first recorded). We believe this record to be the first posted by an Air Force Reserve crew. Perhaps readers would confirm or deny this?

We are also interested in any books written on the history of the Albatross, long the workhorse of the Air Rescue Service.

Lt. Col. Charles H. Manning
301st Aerospace R&R Sqdn
(AFRES)
Homestead AFB, Fla. 33030

Fifth Air Force Book

Gentlemen: I am preparing a book called *Flying Buccaneers: The Story of Kenney's Fifth Air Force* for Doubleday in New York.

This will be a large book, with a couple of hundred photographs

and I would like to hear from all fifth Air Force veterans who would be willing to contribute personal recollections, answer questions, or scan photos and documents.

I'm particularly anxious to contact people who were with the 43d Bomb Group in the old B-17 days, the 3d Attack Group, and the 475th Fighter Group.

General Kenney is assisting in the preparation of this book. I hope to make it a worthwhile record of a great organization, but need the help of the people who were there.

Steve Birdsall
20 Royal St.
Chatswood 2067
Sydney, Australia

Physical Fitness

Gentlemen: A group of Pittsburgh organizations and individuals have organized a campaign to make American youth as good as they look. The program is being sparked by studies that show American youth doesn't have as much physical strength or stamina as their European counterparts.

I am an Air Force veteran of physical training and have discov-

ered that the present physical training is almost nonexistent.

I compared, for example, the continued training given during WW II with that given today, and it is obvious that our peacetime Air Force is far inferior to our wartime forces in physical fitness.

When I recall the daily program of calisthenics in 1942—plus one of the following: cross-country runs, obstacle course, combative-type exercises, grass drills, and many other types of conditioning exercises—I see that the present type is limited to a few hours of softball or volleyball.

I ask for a return to the program of physical fitness during WW II, for if we are to keep the peace by keeping strong, it seems that our men should maintain a physical fitness that at least parallels their fitness in war.

Oscar J. Bernstein
Pittsburgh, Pa.

366th Fighter Squadron

Gentlemen: I need your help. In my search for aviation items I have obtained a picture of the 366th Fighter Squadron taken in 1943, complete

with roster of members. If any member of this unit will get in touch with me, I will mail him the picture prepaid.

I am building a file on the Martin B-26 Marauder and the Curtiss AT-9, and would appreciate hearing from anyone who flew or worked on these planes.

R. L. Adkins
3015 Royal
Pueblo, Colo. 81005

UNIT REUNIONS

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The 32d annual reunion of Aviation Cadet Class 42-B of Mather and Luke graduates will be held February 22-24, 1974, in San Francisco, with headquarters at the Marines' Memorial Club. If you have not been contacted, request details from

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Phone: (714) 640-1516

or

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The Logistics Support Corporation (LSC), an affiliate of Boeing, is seeking qualified veterans or persons who are now separating from the military to service and maintain new 707 tankers in Iran. LSC is under contract to the Iranian Air Force to provide training for aerial tanker operations, beginning in mid-1974.

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Airpower in the News

By Claude Witze

SENIOR EDITOR, AIR FORCE MAGAZINE

The Scalpel, Not the Cleaver

Washington, D. C., December 3

The House of Representatives has approved an appropriations bill for the Defense Department and has sent it to the Senate. For Fiscal 1974, it provides \$74.5 billion, down \$2.8 billion from what the Administration requested and \$900 million less than last year's outlay. Chairman George Mahon, of Texas, had predicted his committee would slash \$5 billion from the budget, but it did not. A year ago, it did cut \$5 billion from the Fiscal 1973 request.

There was a two-day debate in the House, but—in the absence of peace in Vietnam, Cambodia, and the Middle East, and the closing of local gasoline stations—there was little appetite for challenges to the military requirement. Rep. Joseph P. Addabbo, of New York, tried to cut \$3.5 billion out of the bill, without regard to where the savings would be made, but his amendment lost, 250 to 118, and the appropriation was passed, 336 to 23.

It is interesting that one of the congressmen who opposed the Addabbo slash was Rep. Bertram L. Podell, also of New York. Mr. Podell is a liberal and a man previously aligned with forces opposing what most liberals view as the military-industrial complex. He still has strong feelings, he said in the debate, that we spend too much on military forces and not enough on "people and cities, education, health, and housing." Mr. Podell continued, in a tone of voice that he had acquired in the past several weeks:

"However, during the last few months, we witnessed a war in the Middle East. There were some enlightening revelations during that war. We found the people of Israel acting as a proving ground for American military hardware."

The enlightenment appears to have been cleared to the liberal faction that has been seeking unilateral disarmament by the United States. Mr. Podell was specific about what he has learned:

"Hardware [from the US] was incapable of meeting advanced Soviet technology. I was disturbed that w

The Wayward Press

Just as one man's treasure is another's trash, one editor's big page-one story is another's bit of news trivia.

We have pointed out before in this space that newspapers are put together by people, and what you read in the morning inescapably reflects the opinions or biases or background of the men who write and edit. As well as the women, who sometimes add an ingredient of their own. Veterans in the business maintain, with easy justification, that there's no such thing as objectivity in handling the news. They prove it, by quoting the newspapers.

The recent unpleasantness in the Mideast has provided a few examples. They will be offered here, not in an attempt to prove anything about opinions or biases or background, but to illustrate how honest editors, all convinced that they are fair and highly professional, can differ. And, let there be no doubt about it, their differences at their work have an impact on public understanding of current events.

Let us accept, at the outset, the common understanding—by most newsmen and Spiro Agnew himself—that the *New York Times* and the *Washington Post* are two of the most prestigious newspapers in the country. And, because of the size and makeup and location of their circulation, two of the most important newspapers. Certainly both of them are required reading here in the nation's capital, found on the desks of thousands of the most important people in our government each morning.

In chronological order, we will examine how they presented three stories about the Mideast conflict in mid-November:

November 14: The editors of the *Post* had a pessimistic piece of news from Jerusalem, and they gave it a prominent play on page one. It carried a one-column headline in column one—rating it second in news value only to President Nixon's grilling by fifteen Republican senators who had questions to ask about Watergate.

The *Post's* Jerusalem story was written by its own reporter, Alvin Rosenfeld. Mr. Rosenfeld said in his lead: "Israeli Premier Golda Meir today called the Oct. 22 Suez cease-fire line with Egypt 'non-existent' and ridiculed the idea that Israeli forces should withdraw to positions held at that time."

Reporter Rosenfeld went on to say Mrs. Meir told her parliament, "No one can now identify the positions at the time of the original cease-fire." He speculated with the possibility of "new difficulties in implementing the US-sponsored agreement that Israel and Egypt signed."

The *Post* story, including a runover on page 12, filled about thirty-six inches of type and carried this gloomy headline: "Israel Rejects Fallback; Mrs. Meir Says Cease-fire Line Does Not Exist." The portion on page 12 was accompanied by another dispatch from Cairo headlined: "Egyptians Say Israel Seeking New Fighting." The outlook, obviously, was not good.

did not have an answer to the SAM-6 and still have not even seen it. We have seen the SAM-7, and our Phantoms were being shot down by equipment we were not able to cope with.

"I do not think this is the time to cut our military budget."

Congressman Podell expressed apprehension about some other things:

"Additionally, there is no money in this appropriation bill to replenish that which was expended by the Pentagon during the Middle East war. I refer to the \$1.5 billion taken out of existing stockpiles of weaponry."

There is no record that Mr. Podell ever expressed concern about what came out of the stockpiles in support of the war in Vietnam. There was a difference, as any military logistician can testify.

Mr. Podell said he sees the "possibility of an imminent flare-up in the Middle East" and repeated that this is no time to cut the military budget.

Mr. Podell had a lot of company, almost all of it persuaded by the Russian success at arming the Arab nations. Long before the House debate, it was evident that the war raised new questions about our readiness. Such organizations as the Federation of American Scientists and the Members of Congress for Peace Through Law achieved new levels of silence. One unidentified man, described as a Democratic liberal on the defense appropriations subcommittee, was quoted as saying, "If it hadn't been for the war [in the Middle East], my guess is that we would have cut around \$6 billion."

As we go to press in early December, it is evident that Congress (1) considers any other subject sec-

ondary to the so-called energy crisis, and (2) is not sure, after its strong surge of support for the Israeli cause, how to react if the Nixon Administration now puts pressure on Tel Aviv to make concessions to the Arab nations. With the stock market in distress, industry apprehensive, and gasoline in such short supply that few Cadillacs will hit the road to Miami this winter, the reaction could be sympathetic. No less an authority than the New York *Times* reports it has found a "senior foreign-policy official" who believes "we are prepared to lean on Israel for a reasonable Middle East settlement." All in all, the outlook is better than it was a month ago.

Anyone who doubts this should read the *Congressional Record* to pick up the information overlooked by the newspapers. There is a lot of it. The publication is heavy with discussion about the oil problem. This is intermingled with signs of a slow realization that the Arab nations are not helpless when it comes to response to our position in the Middle East. There was considerable distress, for example, over the fact that the Pentagon invoked the Defense Production Act to commandeer 19,700,000 barrels of petroleum. None of those who objected to this step tried to calculate, in their speeches, how much of 19,700,000 barrels was needed to ferry Phantoms to Israel and operate the airlift that carried tanks and ammunition stocks across the Atlantic to Tel Aviv. There were calculations on how much fuel was used to fly Mr. Nixon to Florida, but none about the fuel requirements of the Sixth Fleet in the Mediterranean, bolstered in the face of the Soviet threat.

In the midst of the House discussion, Defense Sec-

On the same morning, the *Times* had a dispatch from its own reporter in Jerusalem, whose name is Terence Smith. After the dateline, Mr. Smith wrote: "Premier Golda Meir told the Israeli Parliament today that she believed Israel and Egypt would be able to overcome their differences and carry out the American-sponsored cease-fire agreement along the Suez Canal." The lady was quoted as saying she saw no difficulty if Egypt observed the spirit of the accord "as strictly as we do."

The headline writer on the *Times*, who has a professional kinship with his counterpart on the copy desk of the *Post*, came up with this eight-column line: "Mrs. Meir Says She Believes Israel and Egypt Can Resolve Truce Differences." The news editors on the *Times*, who did not know the *Post* had an entirely different concept of the facts prominent in its place on page one, put their own account, the optimistic one, on page 18. The Smith story was about four inches shorter than the Rosenfeld version. A bigger story, in the opinion of the *Times*, and worth page one that morning, was an account of how newspapermen had been barred, by the Israelis, from passing roadblocks in the highway to Suez. If the *Post* had this news, it was not impressed.

November 18: In this Sunday paper, the *Post* editors used a two-column headline on page one for what they

considered the big war news of the day. In mid-page: "Israelis Building Barrier in Canal; Egypt Protests." The story was put together in the newspaper office "from news dispatches," which means that a rewrite man was handed a fistful of copy from wire services, each piece considered inadequate if allowed to stand alone, and told to grind out a lead worth the page-one play.

The lead was a good one. It said, "Israel is pushing thousands of tons of dirt into the Suez Canal, apparently in order to build a land bridge across the closed waterway." The Egyptians, in Cairo, the rewrite piece said, were not happy and called the Israeli bulldozing job a "very serious violation of the cease-fire." The *Post* managed to get thirty inches of type out of the yarn, which must have included every morsel provided by the assorted sources.

There is not much to say about what the *Times* did with the Suez causeway story that morning, because the editors did not evaluate it as more than barely fit to print. They used less than seven inches of type, off the Associated Press wire, at the bottom of a column on page 27. The headline: "Newsmen Say They Saw a Causeway Being Built at Suez." Comparing this cautious approach with the one used in the *Post*, which proclaimed that the Israelis had a construction project under way, sug-

gests a nettlesome query for any real newspaperman to put to a Sulzberger: Don't you believe newsmen are reliable sources?

November 26: This was the day the story broke about some Arab hijackers who took charge of a Dutch airliner—a Boeing 747, no less, with 288 persons aboard—and forced it to fly a crazy pattern around the Mediterranean area. This was a hot one for the *Times*. The editors ran a sixteen-inch story, starting with a two-column headline on page one. The story was datelined Beirut and written by a special correspondent, Juan de Onis. The headline said, "Arabs Hijack a Dutch Jet Carrying 288 in Mideast." To the editors on the *Post*, who had no staff byliner from Beirut, there was no choice but to have another rewrite done "from news dispatches." Their story was about the same length as the one in the *Times*, but not considered worth space on page one. It made page 14.

What we have demonstrated here is that newspapers are not monolithic. They differ, according to their own lights. And the US Constitution, for which we all are thankful, ensures their right to continue in this path. It does seem, however, that they could afford to be more humble when passing judgment on how other people make decisions.

Trash or treasure, it is the same stuff.

Airpower in the News

retary James R. Schlesinger told a press conference there is no intention of reducing fleet operations anywhere in the world. At the same time, the Department has cut fuel consumption by 125,000 barrels a day. Dr. Schlesinger says he will not apologize for "any requirements that we may levy on the available store of fuels." He is confident the public will support him on this stand.

More important, the Defense Secretary raised the possibility that the US may be forced to expand its nuclear deterrent forces if the SALT II negotiations with Russia are not successful. The gist of his message was that Moscow has attained equality; that equality must not be permitted to become superiority as the USSR exploits the new missile technologies.

On this point, the Secretary seems to be at some odds with the House Appropriations Committee. In its report, delivered to the chamber on November 26, there is this paragraph:

"There is some concern that our nation's security, from the strategic standpoint, may have deteriorated during the past four or five years. . . . Program changes have been made on the part of our potential adversaries over which we have had little or no control, and no amount of spending on our part would have prevented these gains. . . . The fact that the Soviet Union is advancing its nuclear missile technology into the areas of multiple independently targeted reentry vehicles (MIRVs) and that the Chinese are beginning the construction of ICBMs is the natural result of an improving technology within these nations and are not the result of shortcomings in our defense program. There is no assurance that the addition of large numbers of strategic missiles or antiballistic missiles to our inventory would make us more secure."

PENTAGON APPEALS HOUSE CUTS

At press time, Deputy Defense Secretary William P. Clements appeared before the Defense Subcommittee of the Senate Appropriations Committee to appeal for restoration of \$1.1 billion of the \$2.8 billion cut by the House from the Fiscal 1974 Pentagon budget.

Mr. Clements named eight systems, considered most critical, and argued that funds should be provided contrary to the opinion of the House. They are the Site Defense for Minuteman missiles, the Navy's Sea Control Ship, the Harpoon missile to attack ships at sea, the SANGUINE submarine communication system, the SCAD armed decoy, USAF's AWACS (Airborne Warning and Control System), the SLBM Phased Array Radar missile warning system, and the Air Defense Command and Control System (AN/TSQ-73).

The Deputy Secretary again stressed that because of inflation the House bill represents, in buying power, a cut of \$5 billion, not \$2.8 billion.

What the committee recommended reflected this approach, and it was accepted by the House. Digging out the facts that persuaded the committee would be a herculean job. This year's hearing transcripts are the longest and most complicated in this reporter's twenty years of monitorship on Capitol Hill. There are ten volumes and tens of thousands of pages in the record. All of them should be dumped in the lap of the next critic who says Congress does not adequately examine the Defense Department budget.

Of items recommended by the committee and accepted by the House, these are of particular importance to USAF:

- There is \$448.5 million for R&D on the B-1 bomber. This is \$25 million less than requested.

- There is \$876 million for the purchase of sixty-eight F-15 fighters. The request was for \$918.5 million to buy seventy-seven aircraft.

- There is \$151.6 million for twelve F-111F attack aircraft. USAF did not request this order.

- There is \$33.1 million for continued R&D on the Airborne Command Post; \$37.3 million had been sought. Another \$32.3 million for the purchase of a third Boeing 747 for this mission was denied altogether.

The Navy was rebuffed on its Trident submarine project. The bill, as sent to the Senate, includes \$867 million for construction and \$519.7 million for R&D on the nuclear missile. In total, the bill cut \$253.9 million from the Administration request. The committee said it sees no urgency; it is "concerned about the high degree of concurrency in this program" and finds "little valid reason" to proceed at an accelerated pace. It also discounts the program as a bargaining chip in the SALT talks.

Another major action was the blocking of an Army plan to build a prototype ABM system to protect Minuteman missile locations. The committee argued that the project is prohibited by last year's SALT treaty and called it "a program without a home." The Army had requested \$170 million. A total of \$25 million was allowed for advanced development efforts on components for the Site Defense system.

The defense subcommittee paid lengthy attention to the military manpower program. After all, sixty percent of the budget falls in this category. The report says Congress should support the volunteer-force concept for another year, but the committee harbors doubts about its success.

The military services will have to cut their size or quality, the report warns, and, at that, the volunteer force idea probably will work only in times of peace. There is great concern expressed about deteriorating quality in the armed services. The report cut almost \$274 million from the amended budget request of \$22.7 billion for financing military personnel.

The House report also laments the affiliation with the volunteer-force concept of a growing number of social and educational programs.

"The mission of the Department of Defense," it says, "is not to be a social-welfare agency, but to maintain strong combat forces." In the floor debate there were flashes of heat on this subject, with comments about "wet nurses" in a business that is supposed to produce tough fighting men.

It is entirely possible that developments on the fragile fronts of at least three continents will further alter congressional viewpoints. There will be supplementary requests for funding. How big they will be and how they will fare is a decision that may be made in capitals other than Washington, D. C.

Conversation Pieces

*Technically intriguing items
from TRW, guaranteed to add luster to your
conversation and amaze your friends.*

Stars and Atoms The molecules and atoms we have here on earth are made up of large volumes of space flecked with tiny dots of matter. For example, if you were sitting in the top row of a large football stadium (e.g., the Los Angeles Coliseum), the upper tier of seats would represent the orbit of a marble-sized electron. The atom's nucleus would be a BB sitting on the fifty-yard line. Everything in between the two would be empty space.

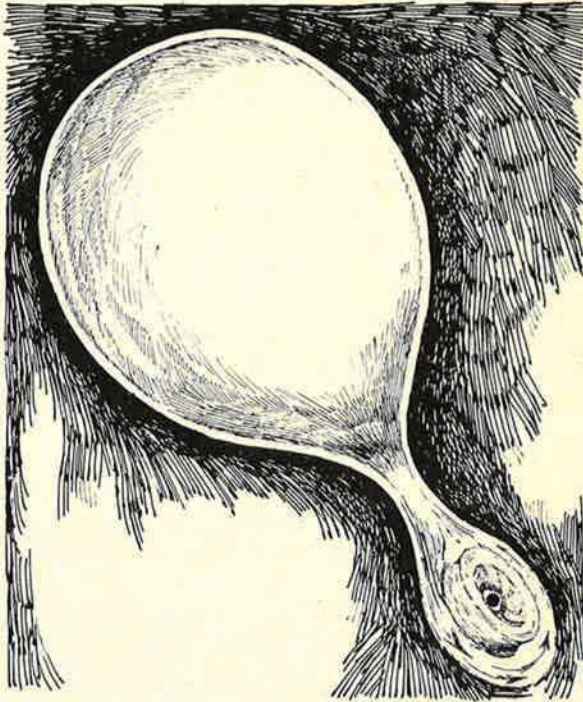
In the interior of stars, matter can be much more dense. For example, when a large star runs out of hydrogen fuel, the immense forces of gravity which have been held at bay by thermonuclear burning within the star suddenly become dominant. As Fred Hoyle puts it, the star has to pay all of its back gravitational taxes at once. The forces of this violent, almost instantaneous collapse are sometimes so great that the electron whizzing around the stadium is driven into the BB sized nucleus on the fifty-yard line. The two opposite charges cancel one another to form a neutron. Then, under the crushing force of gravity, the entire stadium fills up with marble-like neutrons.

Matter of this density exists in the heavens in the form of neutron stars or pulsars. In effect, pulsars are giant atomic nuclei in which the interatomic spaces of matter here on earth have been spectacularly reduced by gravitational collapse. We can learn about the structure of matter in such stars from the high energy radiation they emit.

Imagine now a stellar collapse so violent that the marble-like neutrons themselves are smashed together by the gravitational crush. The matter produced by such a collapse is unimaginably dense. The gravitational field of the resulting stellar object is so intense that no light (or any other kind of radiation) can escape its surface. Hence it is called a black hole. If you shined a flashlight directly on a black hole, you would see nothing for the photons of light would be sucked down its gravitational drain, never to return to your eye.

While black holes cannot be observed directly, their effects on stars unfortunate enough to be near them can be seen. Cygnus X-1 (see illustration) contains the first black hole tentatively identified. The hole is an invisible but dominant component of a binary pair of stars. It is sucking the material of its visible companion into a rotating disk. The violence of the transfer and shredding action heats up the atoms being sucked out of the visible star until they emit x-rays near the black hole, thus indirectly revealing its presence.

Today many physicists are interested in astronomy because much that we have to learn about the fundamentals of matter and energy can only be learned from the stars. That is why TRW Systems is building the High Energy Astronomy Observatory (HEAO) for NASA. The information this observatory will gather beginning in 1977 may well cause us to revise major portions of contemporary physics.



Cygnus X-1. Kip Thorne of the California Institute of Technology performed calculations leading to this model of the black hole. Our illustration is based on a painting of his model by Lois Cohen of the Griffith Observatory.

For further information, write on your company letterhead to:

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One Space Park, Redondo Beach, California 90278

By William P. Schlitz

ASSISTANT MANAGING EDITOR, AIR FORCE MAGAZINE

WASHINGTON, D. C., DEC. 4

From the manned Skylab project is expected to come the greatest single inventory and investigation of earth's resources ever conducted by man.

In fact, the data base established by the Skylab missions is so extensive that US scientists and those of the other eighteen countries participating are still laboring to devise techniques to analyze the thousands of photographs and miles of electronic tape.

Research projects stemming from this mass of information are likely to continue years into the future.

As this is written, the third and final manned Skylab mission has gone so smoothly that the plan is to stretch it to a maximum of eighty-five days, which will make it the longest mission in the history of

manned spaceflight. The crew on Skylab are astronauts Gerald Carr, Commander; Edward Gibson, scientist pilot; and William Pogue, pilot and a colonel in the Air Force.

They are involved in testing everything from new high-energy foods for spaceflight to studying the life cycle of the gypsy moth. That's right, the life cycle of the gypsy moth.

According to agriculture scientists, if the little critters can be reared in huge numbers in the weightlessness of space, an answer might be found to control an entire class of insect pests.

It seems that the gypsy moth life cycle calls for a hibernation period of about 180 days, thus making it difficult to breed large numbers of the insect under laboratory conditions. (If sufficient numbers of the

sterilized moth can be loosed to mate with those in the wild, reproduction will cease.) With the hibernation period reduced under weightless conditions, it should be possible to rear large numbers of the pest.

This is no small project; in 1973 the gypsy moth infested various areas of the northeastern US, and defoliated 1,750,000 acres of trees. If it spreads to the central and southern regions of the US it could pose a major threat to the nation's forest resources.



It seems certain that the energy shortage is with us to stay and that we'll be hearing much more about restrictions on fuel use and other steps to conserve our resources.

The Air Force already has agreed to initiate research into a more efficient method of generating electrical power from coal, with less pollution.

The method USAF plans to use "involves extracting electrical energy from a high-temperature ionized gas—similar to the flaming exhaust of a rocket or jet engine—by directing it through a magnetic field, a process called magnetohydrodynamics (MHD)," the Air Force said.

Under a contract from the Department of Interior's Office of Coal Research, the tests will take place at Air Force Systems Command's Arnold Engineering Development Center in Tennessee. An MHD generator was built there a decade ago as an electrical power source for a wind tunnel originally designed to simulate flight conditions for spacecraft and missiles encountered during reentry, Air Force said. The generator, largest of its type in the world, no longer is needed for this work.

It is believed that, under certain conditions, a higher percentage of thermal energy can be extracted from the combustion of coal than is now the case with conventional



Technicians work on a full-scale, wooden mockup of the YC-14, Boeing Co.'s entrant in the Air Force's Advanced Medium STOL Transport competition. The two ovals attached to the wings' leading edges represent the aft end of engines mounted to exhaust over wing and flap surfaces—a new concept for STOL. Continued DoD funding of the AMST program is currently in question.

steam-generating plants. Another factor is that high-sulfur coal can be used without also spewing large amounts of sulfur dioxide into the atmosphere.

Such an MHD plant is currently in operation in the Soviet Union and supplies Moscow with part of its electrical power.

On another tack, the Navy is awaiting the results of the sea-trial test of a coal-derived liquid fuel it used to run one of its destroyer's boilers.

The test is part of Project Sea-coal, a program to find an alternate for the petroleum-based fuels that now power Navy ships and planes. The coal-derived fuel was supplied by the Interior Department's Office of Coal Research.



A significant new source of power should be available in 1980 when the US's first large-scale, demonstration fast breeder nuclear electric plant is scheduled to go on line.

A contract estimated at about \$90 million recently went to Westinghouse Electric Corp. to supply the nuclear part of the new facility. In all, the project is expected to cost a whopping \$700 million, with

James W. Plummer has been nominated to be Under Secretary of the Air Force, the post previously occupied by John L. McLucas, now Secretary. Mr. Plummer comes to the Air Force from Lockheed Missiles & Space Co., where, as a vice president and general manager of the Space Systems Div., he has been involved in the development of satellite systems for the armed forces and NASA. A former naval officer who served aboard the carrier USS *Enterprise* in World War II, Mr. Plummer has been awarded USAF's Meritorious Achievement Award for his contributions to the Discoverer space program.



James W. Plummer

some 370 electric systems around the nation pledging \$245 million of the total.

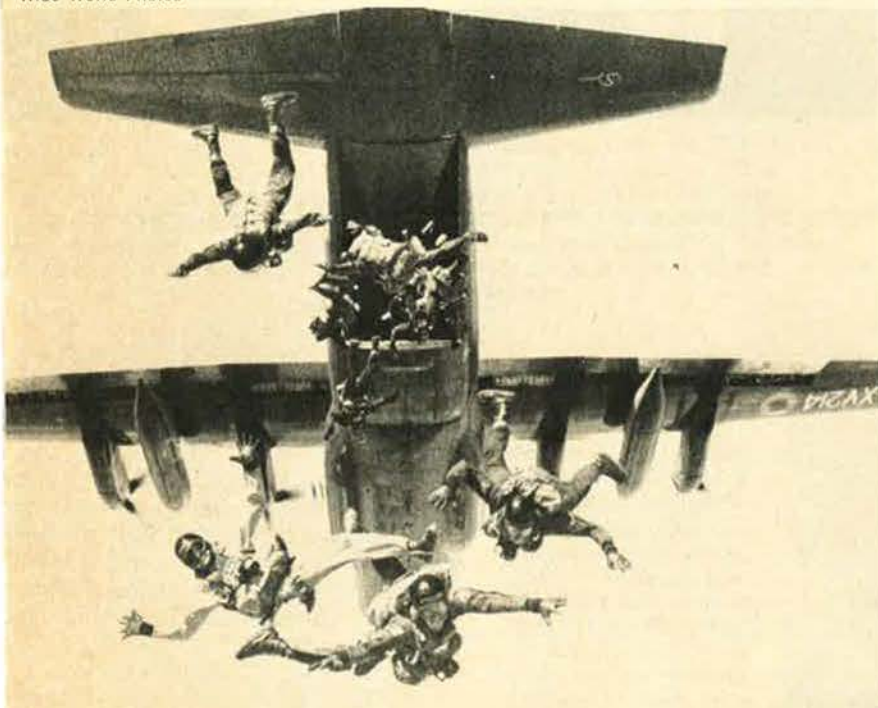
To be called the Clinch River Breeder Reactor Plant and operated in Tennessee by TVA, the plant will have a capacity of up to 400,000 kilowatts of power.

The object of the huge project is to demonstrate the value and environmental desirability of the fast breeder reactor concept as a practical and economic option for gen-

erating electric power, AEC said.

The Commission also said that, concurrent with the new project, it was continuing development of liquid metal fast breeder reactor technology on a priority basis to assure the country of another option for an unlimited supply of clean energy.

—Wide World Photos



Happy-go-lucky, the Falcons demonstration parachute team of the RAF spills from an Argosy transport in a team jump. The fourteen-man group is made up of instructors from RAF's Parachute Training School.



A medical specialist of a US Disaster Assistance and Relief Team inoculates a Pakistani refugee to prevent cholera in the wake of the floods that desolated the country last fall.

Aerospace World

USAF is currently developing a unique new communications system—a single channel that will allow up to several thousand users "instant access to send, receive, or share information anywhere in a combat theater," Air Force Systems Command revealed.

The project, dubbed SEEK BUS, is being run by AFSC's Electronic Systems Division, L. G. Hanscom Field, Bedford, Mass.

While the project is still in the engineering development stage, SEEK BUS lab equipment was used recently to demonstrate the system's feasibility during the AWACS exercises in Europe and during the West Coast Air Defense Test. Operational military hardware is promised by 1977-78.

Essentially, the number of users sending on the system is limited only by the number of time slots available for transmission. Hence, a radar picket aircraft, for example, would be given enough broadcast time to report the position, speed, heading, etc., of any aircraft it detects. There is no limit to the number of receivers.

Each user's receiving equipment is designed only to process the broadcast information pertinent to his mission.

The unique feature of SEEK BUS is that there is no central message center or switching facility, and, therefore, data distribution "is reliable, secure, and jam-proof," AFSC said. "For the first time, commanders at all levels will have access

to up-to-date information on known friendly and enemy activities."

Useful over a wide geographical area, SEEK BUS will also extend information dissemination via aircraft or satellite relays.

The key to SEEK BUS, according to AFSC, is that the users' equipment is synchronized to operate on an exact time schedule with all other elements in the system.



Much less esoteric than sophisticated electronic gear, our old friend the balloon has brought other progress in the field of communications.

Westinghouse Electric Corp. has



Col. John W. Blanton took command of the Air Force Academy Prep School this past fall, succeeding Col. Glenn R. Alexander, who recently retired. Colonel Blanton had previously served as the School's Executive.

been testing a balloon-borne system that can broadcast radio, television and other modern telecommunications over a wide area.

Suspended two or three miles aloft, such a transmitting device could substitute for the fifteen or so conventional broadcast and microwave towers that would be needed for that much coverage. The system could be important in bringing modern communications to emerging nations or other areas lacking up-to-date transmission facilities. Economy would be an important factor, as well.

The balloon, called an aerostat, currently is being tested on Grand Bahama Island and is designed to withstand such severe weather con-



Capt. James H. Scott has been named the Air Academy Junior Officer of the Year for 1973. He is in charge of the Cadet Store retail organization. His management saved USAF an estimated \$50,000



Westinghouse's aerostat is being investigated as a means of broadcasting TV, radio, and other modern communications over a wide area. The system might have application in providing communication services in emerging nations and other areas hampered by lack of such facilities. Grand Bahama is the scene of the tests.

ditions as hurricanes, the company says.

From a tethered aerostat can be simultaneously transmitted AM and FM radio beams and VHF and UHF television channels. Other capabilities include several thousand channels of telephone, ship-to-shore and mobile radiophone, telephoto, and other types of communication.

The aerostat can also be used to transmit aircraft and ship navigational radio beacons.

Aircraft safety is provided by restricting flights in the aerostat's

vicinity and illuminating the craft and its tether.



The Air Force has long recognized the use of aircraft simulators to cut training costs and fuel consumption, as well as providing pilot safety.

Now, USAF's first total helicopter simulator—a duplication of the Sikorsky CH-3E—is in operation at Hill AFB, Utah, under direction of MAC's 1550th Aircrew Training and Test Wing.

It is a wonderful machine indeed. Not only does it duplicate any helicopter maneuver, but the CH-3E simulator also "subjects its occupants to vibrations, wind gusts, braking action, and inherent helicopter shuffle," according to the Air Force Systems Command, which developed the concept with the help of Reflectone, Inc., Stamford, Conn. Even helicopter flight sounds are duplicated.

On-the-scene monitoring of student pilots is permitted via the device's on-board instructor station, through which up to 175 helicopter malfunctions can be fed into the system. The CH-3E simulator can record missions of up to an hour and score a student's control capabilities through a teletype printout.

The machine is expected to save \$7,200 per student and decrease training time from four months to three.

Also in the works is a second such simulator, one that will duplicate the operation of the heavier HH-53C helicopter.



The Air Force is weighing the feasibility of a third generation of the X-24 lifting body that would be souped up to hit speeds of Mach 5—3,500 mph. (A lifting body is an aircraft that derives lift from the shape of its fuselage rather than from wings, as on a conventional aircraft, thus allowing it to better cope with the heating associated with high speeds.)

The X-24B, under a joint USAF/NASA program, has been undergoing flight tests at Edwards AFB, Calif. Its first rocket-powered flight took place on November 15.

The Air Force is basing its decision whether to build a third-generation X-24 on a study of the X-24B conducted by Martin-Marietta Aerospace Corp.'s Denver Division. The study is concerned with

PRESIDENT JOE SHOSID PRESENTS 1973 AFA/AFSC SCIENCE AND ENGINEERING AWARDS

AFA President Joe L. Shosid addressed the Air Force Systems Command Science and Engineering Symposium Awards Banquet at Kirtland AFB, N. M., on October 3. At the conclusion of his address, he presented 1973 Air Force Association/AFSC Science and Engineering awards to those who have made outstanding contributions to our technological base. This is the eighteenth year that AFA has presented these awards.

In his presentation, Mr. Shosid outlined the most recent AFA activity in support of R&D, including a recapitulation of National Convention action focused on the need to boost the national R&D effort to a level at least equal to that of the Soviet Union. Mr. Shosid pointed out that AFA Convention delegates drafted, passed, and forwarded to the Congress and other people in decisive positions a total of nine resolutions dealing with R&D matters.

Award recipients, each of whom received a plaque and an honorarium, were:

- **Capt. James D. Barry**, Air Force Avionics Laboratory, Wright-Patterson AFB, Ohio: Most Outstanding Achievement of the Year in the Field of Science, for his contribution, "Carbon Monoxide Laser from Helium-Air-Methane Mixture."

- **Capt. Philip E. Nielsen** and **Capt. Gregory H. Canavan**, both of the Air Force Weapons Laboratory at Kirtland AFB, N. M., Second Most Outstanding Achievement of the Year in the Field of Science, for their joint work, "Laser Effects Calculations."

- **Joseph J. Marous** and **Dennis Sedlock**, Aeronautical Systems Division, Wright-Patterson AFB, Ohio: Most Outstanding Achievement of the Year in the Field of Engineering, for their study, "Dynamic Data Editing and Computing System."

- **Capt. Alton F. Grandt, Jr.**, Air Force Materials Laboratory, and **Dr. Joseph Gallagher**, Air Force Flight Dynamics Center, both at Wright-Patterson AFB, Ohio: Second Most Outstanding Achievement of the Year in the Field of Engineering, for their investigation of "Procedures for Infinite Life Design of Mechanical Fasteners."

- **Dr. Robert W. Thomas** and **Benjamin A. Moore**, both of Rome Air Development Center, Griffiss AFB, N. Y.: Most Outstanding Achievement of the Year in the Field of Studies and Analyses, for their contribution, "Unique Reliability Analysis Capability."

- **Thomas E. Dixon**, **Richard H. Anderson**, **Capt. Robert F. Couch, Jr.**, and **Lt. Col. William H. Newhart, Jr.**, all of the Office of the Assistant for Study Support, Kirtland AFB, N. M.: Second Most Outstanding Achievement of the Year in the Field of Studies and Analyses, for their study, "Designing to System Performance/Cost."

The goal of the annual symposium is to present current information on outstanding AFSC achievements in the areas of science, engineering, and studies and analyses. Program participants were scientists and engineers from AFSC, and the audience included scientists, engineers, and R&D managers from the Department of Defense, other government agencies, industry, and universities.

—JCM



USAF 1st Lt. John O'Donnell and his horse, Gort, are doing their best to conserve fuel at Myrtle Beach AFB, S. C. Security Policeman Terry Della Rosa can expect to see other unusual modes of transport if the fuel crunch is as severe as is feared.

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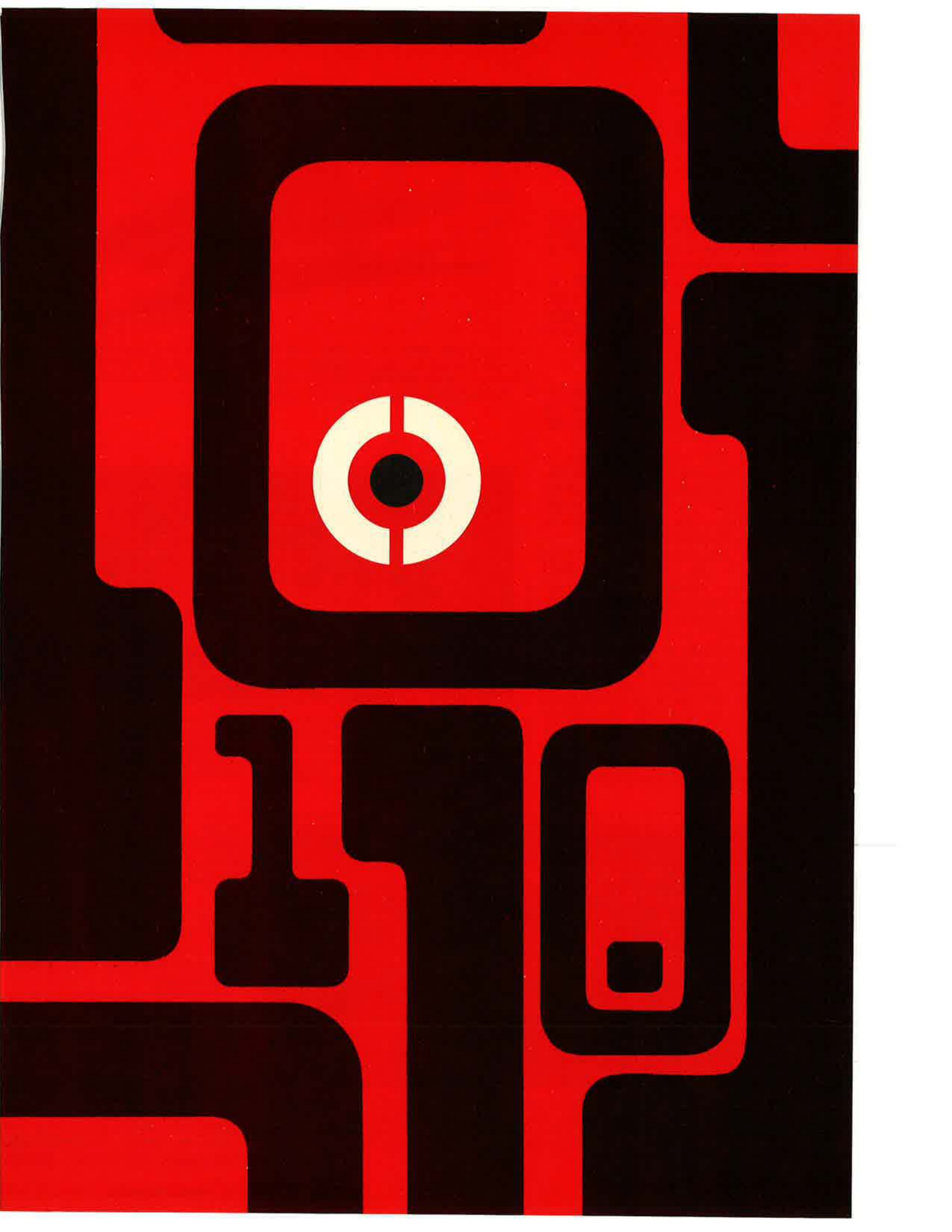
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Aerospace World

such modifications as the installation of the YLR-99 rocket engine, which could boost a lifting body to speeds of Mach 5.

Other modifications would include extending the craft's fuselage and span, and adding reusable thermal protection material to protect the airframe from heat.



Who says that the spirit of adventure has waned in America? Try a coast-to-coast, hot-air balloon trip.

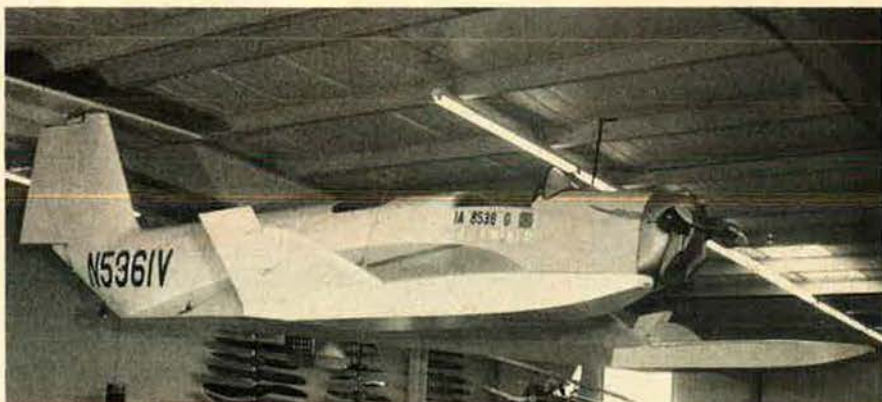
This past autumn, Malcolm S. Forbes became the first man in history to accomplish the feat when he floated his sixty-five-foot-high craft from Coos Bay in Oregon to the Chesapeake Bay.

The transcontinental journey ended in the drink off the coast of Gwynn Island, Va., where Mr. Forbes and his twenty-four-year-old son were picked up by a local fisherman.

The odyssey of Mr. Forbes, who when not ballooning around the country publishes the financial journal that bears his name, took a little over a month. The venture almost had a disastrous finish when the balloon descended on some power lines on Gwynn Island, off the coast of Virginia's eastern



A joint USAF/NASA project, the X-24B lifting body flight-test program got under way last summer at Edwards AFB, Calif. The Air Force is currently considering the feasibility of building yet a third-generation X-24 capable of attaining speeds of Mach 5 (3,500 mph).



Another unusually configured aircraft is the X-112 Experimental Aerofoil Boat, currently on display at the Experimental Aircraft Association Air Education Museum, Franklin, Wis. Designed by aeronautical scientist Dr. Alexander Lippisch of Germany, the craft was first "flown" in 1963 and became airborne at thirty-five mph. An updated version is being tested.



Now on display also at EAA's Franklin, Wis., museum is a World War II German Junkers Ju-87R-2 Stuka dive-bomber. This and many of the era's winged killers are characterized by their stubby yet graceful lines. This particular Stuka was shot down in North Africa by the British in 1941 and is one of only three known to still exist.

shore. The intrepid balloonists saved that situation, but "swallowed a lot of salt water" before being rescued.

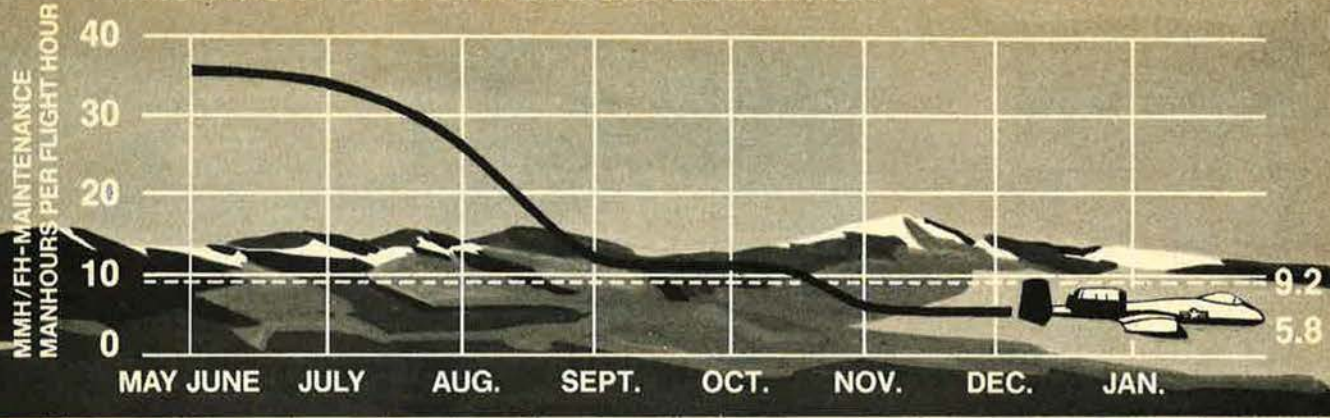


The AEC has declassified all technology developed in military nuclear-reactor programs, except that used in nuclear subs and surface vessels.

Under the declassification is the nuclear ramjet technology developed between 1955 and 1964 in a program dubbed Project Pluto.

During Pluto, AEC's Lawrence Livermore Laboratory developed and successfully ground tested a nuclear reactor designed as a heat source in ramjet propulsion systems to power extended-range high-speed, low-altitude missiles.

MONTHS OF PROTOTYPE FLIGHT EVALUATION



1972

1973

The A-10 was designed specifically for close air support missions; to get in close in support of our troops on the ground and visually acquire, track and kill moving targets with a single pass.



By design, the A-10 incorporates many maintainability and supportability features.

These decrease maintenance man-hours and time required for inspection, trouble shooting and repair. Simply unbutton the skins for easy access to control systems, fuel systems, hydraulics, wiring, avionics. Non-handed components (examples, the vertical tail, elevators, inboard flaps, pylons, land-

ing gear, nacelle inlets and aft sections), built-in test and fault isolation, quick disconnect mounts and fittings provide easy component replacement while reducing the spares inventory and size of deployment kits.

The A-10's low MMH/FH performance (charted above) was demonstrated during Air Force evaluation of the prototypes. Allowing for additional maintenance time on subsystems turned back to Air Force depots for repair and less experienced personnel, this actual data provides positive assurance of our meeting the specified 9.2 MMH/FH on the production aircraft—the lowest operating cost of any front line aircraft in the Tactical Air Command inventory.

The A-10's quick turnaround time is important to its CAS effectiveness. Combat servicing—ordnance stores and 30mm ammunition loading—can be accomplished quickly and safely—with engines running.



On the ground as in the air, it becomes clear. The A-10 was designed to cost—the lowest cost of any front line aircraft in the Tactical Air Command inventory.

For CAS combat effectiveness, there simply is no other contender.



FAIRCHILD
INDUSTRIES

The A-10: By design, lowest in cost, less costly to maintain.



Aerospace World

Flight tests were canceled in 1964, when DoD indicated no further interest in Pluto.

AEC noted that with the declassification, high-temperature reactor technology developed under its direction would now be available for peaceful uses.



According to the National Aeronautic Association, NASA scientists have seriously studied one of nature's quietest flying creatures—the owl—in an effort to develop quieter aircraft.

It seems that the owl's serrated wing allows the pop-eyed hunter to fly silently in the still night air.

Wind-tunnel tests sponsored by the space agency are attempting to determine the "effect of serrated



This past fall witnessed another phenomenal circumstance in the careers of Air Force brothers MSgts. Edward J. (left) and Ronald C. Alm: They served together for the third time. This time Edward taught communication skills to Ronald at the Air Force Communications Service NCO Academy, Richards-Gebaur AFB, Mo. The Sergeants hail from Hampton, Va.

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rotor edges on the noise level of a simulated jet engine compressor. The serrations reduce noise because of their effect on airflow over blades. The comb-like edges break up the airflow into many tiny vortices, and the smaller vortices smooth the air behind the wing, inhibiting the formation of the noise-generating wake."

NASA has high hopes also for serrated edges in prop and helicopter-blade technology.



The recall from temporary deployment in the Western Pacific of sixteen B-52 Stratoforts brings to 116 the number of the bombers returned to the US in recent months.

Redeployment of the aircraft to Dyess AFB, Tex., and March AFB, Calif., is in line with the planned withdrawal of SAC forces from the Pacific, USAF said. The movement involved about 700 crewmen and support people.

Other previously returned B-52s have been assigned to Fairchild AFB, Wash., Mather AFB, Calif., Barksdale AFB, La., and Robins AFB, Ga. KC-135 tankers have also been redeployed.

With this latest move, about twenty-five B-52s remain on Guam and about fifty in Thailand.



The Air Force successfully launched the first in a test series

Planning A Change Of Address?

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At what is now Richards-Gebaur AFB, Mo., in 1943, when the Army Airways Communications Service was converted to a command (now the Air Force Communications Service), Col. Lloyd H. Watnee became its first Commander. Serving in the area of Air Force communications must run in the family. See photograph and caption below.



But for the crewcut looking very like his father is Lt. Col. (Colonel selectee) Lloyd H. Watnee, Jr., who is Air Force Communications Service Deputy Director of Plans, Richards-Gebaur AFB. Incidentally, there is also Lloyd H. Watnee III, age fourteen.

of missiles using a new guidance system designed for short-range, air-to-air combat.

Called SHAG, for Simple High-Accuracy Guidance, the new system is composed of a guidance package in the missile and a data-processing unit in the aircraft.

The missile firing took place at Tyndall AFB, Fla., and involved an F-106 fighter equipped with an elec-

tro-optical, helmet-mounted sighting device developed by Honeywell. SHAG guided a modified AIM-26 missile to a BQM-34 Firebee drone.



NEWS NOTES—Died: **Gen. Joseph R. Holzapple**, USAF (Ret.), in November. A veteran of operations in both Europe and the Pacific during World War II, the General

had a long and distinguished Air Force career capped by his assignment as Commander, USAFE, in 1969.

An **Air Force Recruiting Service** ten-minute film on navigation, "Out on the Edge of Beyond," was given a special jury award at the recent **San Francisco Film Festival**. The Recruiting Service has copies available for viewing.

Speaking of recruiting, the Air Force has put out a call for **staff** and **technical sergeants** to become recruiters. Check your Consolidated Base Personnel Office for the benefits of such duty and application procedures.

In this regard, DoD reports that USAF has been **consistently over 100 percent** in its monthly recruitment effort. USAF usually leads the other services in the number of high school graduates it enlists, hovering near the 100 percent mark.

Two new aircraft—**Northrop's F-5E International Fighter** and **McDonnell Douglas' F-15 Eagle**—both completed their one-thousandth flight in November. ■

Index to Advertisers

AFA Insurance	78 and 79
AiResearch Mfg. Co., Garrett Corp.	Cover III
American Telephone & Telegraph Co., Long Lines Dept.	37
Auerbach Associates	22
Boeing Aerospace Co.	9
Fairchild Industries, Inc.	21
Glenn Illustrators	67
McDonnell Douglas Corp.	Cover IV
Motorola Inc., Government Electronics Div.	2 and 3
Northrop Corp.	71
Sperry Rand Corp., Sperry Flight Systems	Cover II
Sperry Rand Corp., Univac Defense Systems Div.	18 and 19
TRW Systems Group	13
Vought Aeronautics Div., LTV Aerospace Corp.	5

The Editor of *Jane's All the World's Aircraft* sweeps global horizons in this review of the year just past and preview of the aerospace world of 1974. Among the subjects discussed are the continuing seesaw battle between SAMs and aircraft, possible roles for a lightweight fighter, the status and prospects of the SSTs, trends in aircraft development, and the growing interdependence of the world's aerospace industries. AIR FORCE Magazine is privileged to begin another year with . . .

JANE'S

AEROSPACE REVIEW 1973/74

By John W. R. Taylor

EDITOR, JANE'S ALL THE WORLD'S AIRCRAFT

A SURBITON, SURREY, ENGLAND VIATION is making few deliberate attempts to excite the general public in the 1970s. The world air-speed record of 2,070.102 mph set by a Lockheed YF-12A has gone unchallenged for nearly nine years. Men no longer fly at more than 4,500 mph in research aircraft like the North American X-15 or venture to the moon in Apollo spacecraft. Discussion does not focus on what might be possible technologically, but what nations and airlines can afford. Governments, the press, and the public question increasingly the wisdom and the cost of everything the industry proposes.

It is a dangerous tendency. For example, the YF-12A's speed record might have little obvious significance, as the aircraft was only a prototype interceptor, now long abandoned. But from the YF-12A was developed the strategic reconnaissance SR-71A, the fastest aircraft serving with any air force and

a potent tool for observing events such as the recent Arab-Israeli war and subsequent cease-fire.

Soviet counterpart to the unarmed SR-71A is the armed MiG-25. One of the last designs of the late Artem Mikoyan, this is a formidable combat type. During the past year, it has continued to over-

Skylab, greatest space achievement of 1973, included several extravehicular activities.



The Lockheed SR-71, which first flew nine years ago, is still the world's fastest military aircraft.



fly countries like Iran on reconnaissance missions, without fear of interception, and its NATO name of "Foxbat" is guaranteed to produce spine-chilling reaction wherever it is mentioned. The USAF acknowledges its preoccupation with the problem by commissioning General Dynamics/Pomona to work on an advanced air-to-air missile, which is designated XAIM-97A, but is known generally by the explicit name of Seekbat. As if to emphasize what is required of such a weapon, test pilot Alexander Fedotov took a MiG-25 in a zoom-climb to a yet-unconfirmed 118,897 feet in the summer of 1973, topping the present official height record by the best part of a mile.

Other records set by Fedotov in the MiG in 1973 include a speed of 1,618.73 mph around a 100-km closed circuit. Pulling high G-forces, he flew a tightly banked turn that began at a height of 52,500 feet and ended at 65,600 feet. For good measure, he also climbed to nearly 115,500 feet carrying a two-ton payload.

New Reach for the Interceptor

No records can be claimed for what happened off Point Mugu, Calif., on 13 June 1973, but Foxbat seemed far more vulnerable afterwards. So did the Tupolev Backfire, Russia's new variable-geometry, supersonic strategic bomber, now entering squadron service.

In a final contractor's test of the US Navy's latest airborne defence

system, an F-14A Tomcat fighter took off to search for a BQM-34E Firebee target drone over the Pacific. The drone, augmented by radar to simulate Backfire and fitted with an on-off noise jammer, was located 126 miles from the F-14A, on a collision course at an altitude of 52,000 feet and speed of Mach 1.55. The F-14A, flying at 45,000 feet and Mach 1.45, began tracking the Firebee, locked on and launched a single AIM-54A Phoenix missile at that extreme range. During flight, the Phoenix reached a high point of more than 100,000 feet before passing the drone in a dive, within the lethal radius of its warhead.

There has never been a more convincing demonstration of how performance can be built into an interceptor's fire-control system and missile armament, rather than into the aircraft itself. However, the F-14A is still a lot of aeroplane, powered by two 20,900 lb st turbofans, carrying two men, and with all the sophistication of swing-wings to boost its cost to a reported \$13.9

million for each of the first eighty-six aircraft, on which the manufacturer (Grumman) lost money.

Despite this high unit cost, Iran seems likely to buy at least thirty Tomcats to cope with the Foxbat menace. US Navy orders are unlikely to end with aircraft No. 334, as now planned; and it will be difficult for other air forces to ignore an aircraft which, as *Flight International* commented, "will combine the punch of half a dozen Phantoms with a docility in the circuit not approached by other carrier-borne fighters for twenty years."

The USAF already has its own new fighter in the shape of the single-seat, fixed-wing F-15A Eagle. This may lack a few of the capabilities of the Tomcat; in particular, its current air-to-air weapons are advanced versions of the now-aged Sparrow and Sidewinder. On the credit side, its cost is very much lower, and it comes from a company with all the experience gained from producing more than 4,000 Phantoms, without any visible end to the run.

Lightweight Fighters and SAMs

If it is possible to reequip with an aircraft that has overall capabilities less than those of the Tomcat, why not go further and trade speed and weapon load for greater numbers? This is the argument that prompted the USAF's Lightweight Fighter (LWF) programme. Its protagonists point to the claimed success of India's tiny Gnats in combat with Pakistani supersonic MiG-19s, Mirages, and F-104s. Their views appear to be supported by events in the Middle East in October 1973, as Israel might have been seriously embarrassed by numerical losses of Phantoms and Skyhawks, however good the indi-

—Tass Photo



In 1973, Soviet pilot Fedotov set three records in the MiG-25.



AEROSPACE JANE'S REVIEW

vidual aircraft, had the fighting continued. Never has there been a clearer warning of the need for adequate numbers of first-line combat aircraft; but how far can this be offset against sophistication and cost?

The General Dynamics YF-16 and Northrop YF-17 that will be flight-tested competitively later this year, under the LWF programme, are hardly unsophisticated, but they are small and relatively inexpensive. Aerodynamically, they are advanced; and their maximum speed of Mach 2+, allied to manoeuvrability, a 20-mm multi-barrel gun, and the latest infrared homing missiles, should give them the kind of dogfight capability that was proved essential in Vietnam.

Against fighters like the MiG-21, in a similar weight and speed bracket, the YF-16 and YF-17 might achieve brilliant results. But neither has flown at the time this survey is being compiled, whereas the MiG-21 is already a twenty-year-old design. What should we see in Soviet Air Force insignia if Russia staged another of its showcase flypasts of new military air-

craft over Moscow after a gap of seven years?

In any case, one must bear in mind just why the Israelis suffered such severe losses in the recent Yom Kippur war. Thanks to availability of the indigenous Shafir close-range IR air-to-air missile, they seem to have fared well in air combat. They were prepared for the familiar SA-2 "Guideline" and SA-3 "Goa" surface-to-air missiles fired by the Arabs, but the new, mobile, SA-6 "Gainful" clearly surprised everyone by its effectiveness. Newsreel films showed Phantoms and Skyhawks literally being "swatted like flies"; others were lost to shoulder-fired and vehicle-mounted SA-7 "Grail" IR homing missiles, fired in dozens against individual aircraft.

The surprise nature of the SA-6 will not persist, as examples captured by Israeli forces, complete with their radars, were flown immediately to the US for detailed study. Inevitably, this will add to the already elaborate countermeasures equipment that must be carried by aircraft designed to penetrate the

airspace of Russia, its allies, and friends. The LWF might have its supporters for defensive fighting, but who would dare to advocate simplicity for an attack aircraft?

This question may imply a lack of confidence in Fairchild's "low and slow" twin-turbofan A-10A, developed to meet the USAF's A-X requirement, with the emphasis on heavy weapon load and survivability. Only experts with access to the fullest intelligence data could say with certainty whether a 450-mph top speed, an armoured "bath-tub" cockpit, and the other undoubted attractions of the A-10A offer sufficient protection now that even small countries can deploy anti-aircraft weapons as deadly as the SA-6 missile.

Subsystem/Payload Trade-Offs

Weight available for weapons is being eroded increasingly by the need for added equipment. During a visit to McDonnell Douglas at St. Louis after the 1972 AFA Convention, the writer spotted an unfamiliar projection on the port wing leading-edge of a Phantom. What was it? His guide had never noticed it before. Later enquiries identified the object as Tiseo (target identification system, electro-optical), a Northrop-supplied vidicon TV camera with a zoom lens to aid identification of airborne or ground targets at long range.

Another device developed for use by the Phantom is the Westinghouse AN/ASQ-153 Pave Spike pod. Housing, among other things, a TV tracking sensor, laser designator/ranger, and stabilisation subsystem, Pave Spike can acquire, track, and designate tactical targets from a manoeuvring F-4D or F-4E at stand-off ranges commensurate with laser-guided ordnance. With it, claims Westinghouse, the pilot can choose the particular member of a bridge or part of a ship that he wishes to hit with a "smart" bomb or missile.

The Anglo-French Jaguar may

The TF-15A two-seat version of USAF's new F-15 air-superiority fighter, which will join TAC this year.



look a lot smaller and less complex than a Phantom. It was, however, conceived specifically for close-support duties in the NATO environment in Europe and promises to be a tough, hard-hitting "pilot's aeroplane." Simplicity is more apparent than factual. The RAF version has a Ferranti laser rangefinder

and marked target seeker in its blunt nose. At the other end, a slim box-like structure on the tail-fin houses ECM to tell the pilot when he is being illuminated by ground radar. Such equipment is sprouting on a variety of RAF combat types, and represents only the visible tip of a vast ECM and ECCM programme

The Fairchild Republic A-10A was designed specifically for close-support work, with emphasis on heavy weapon loads and high survivability.



Equipment on the RAF Jaguar tactical fighter includes a nose-mounted laser rangefinder and tail-mounted ECM pod.



that rivals airframe design in importance, but is seldom publicised.

Maximum external weapon load of the Jaguar is five tons, allied to a pair of the heavy-calibre (30 mm) guns that Vietnam proved indispensable against air or ground targets. Speed at height is Mach 1.5, with Mach 1.1 practicable at sea level, and an attack radius ranging from 357 miles to 818 miles, dependent on fuel load and mission profile.

RPVs and the Penetration Problem

After the experience of Vietnam and Suez, no strike force is likely to attempt penetration of heavily defended enemy airspace without being preceded by such aircraft as Grumman's EA-6B Prowler, which are equipped to locate, identify, and jam enemy electronics. Nor is it sufficient to jam or confuse. The proven effectiveness of US Shrike and Standard ARM antiradiation missiles has made such weapons an essential aid to a strike force.

This is one of the areas in which RPVs (Remotely Piloted Vehicles) can be expected to contribute increasingly; and it is interesting to note that one version of Ryan's BGM-34B is equipped as a pathfinder. Its elongated nose package, supplied by Philco-Ford, contains a laser designator and low-light-level TV (LLLTV) camera, with which it can locate and lock on to a target and signal the position to other RPVs carrying missiles or smart bombs.

Defence suppression in this way is a task for which the RPV is well suited; another is the ever-vital duty of tactical reconnaissance. At the moment, the US appears to be showing immensely more imagination in this field than any other nation. (This will be obvious to anyone who studies the seven-page Teledyne Ryan entry in the newly-designated "RPVs and Targets" section of the 1973-74 *Jane's*.) It is matched in the "piloted" sector by the superb results achieved in the closing stages of the Vietnam War

AEROSPACE JANE'S REVIEW

by USAF A-7D and F-111 wings, as readers of this magazine will know.

Such lessons are of special importance to NATO air forces in Europe, as they are committed to a similar tactical role. Nobody is ever likely to begin throwing strategic nuclear weapons, but there is always the danger of a situation similar to that of the 1930s when Hitler nibbled away the Saar, the Rhineland, and the Sudetenland, without provoking retaliation. One might envisage an enemy "biting off" an area like the north of Norway without strong reaction from NATO . . . but what would be next? There must be a stage at which tactical forces would be committed, long before an all-out, strategic nuclear exchange became inescapable.

The Jaguar is designed for just such a situation. So is Britain's Harrier, still the only operational V/STOL jet, with the Spanish Navy joining the RAF and US Marines in selecting it for combat use. Yet, after five years of first-line service, the RAF still fails to provide the Harrier with the V/STOL tactical airlift support that would permit its unique advantages to be exploited fully.

European and Far East Fighters

Instead, the major proportion of available defence funds is being put into the MRCA (Multi-Role Combat Aircraft), developed in partnership with Germany and Italy. Current plans envisage production of some 800 MRCAs, of which the RAF will acquire 385, initially to

replace the Vulcan and Buccaneer in overland strike and reconnaissance roles. Later, the air defence version will succeed the Phantom; finally, Buccaneers will be replaced on maritime strike duties.

In the Luftwaffe, MRCAs will replace F-104Gs and Aeritalia G91s in battlefield interdiction, air superiority, and reconnaissance roles. The German Navy will also take some of the 322 aircraft allocated to that nation, for strike missions against sea and coastal targets, and reconnaissance. Italy's 100 MRCAs will replace F-104s and G91s for air superiority, ground attack, and reconnaissance.

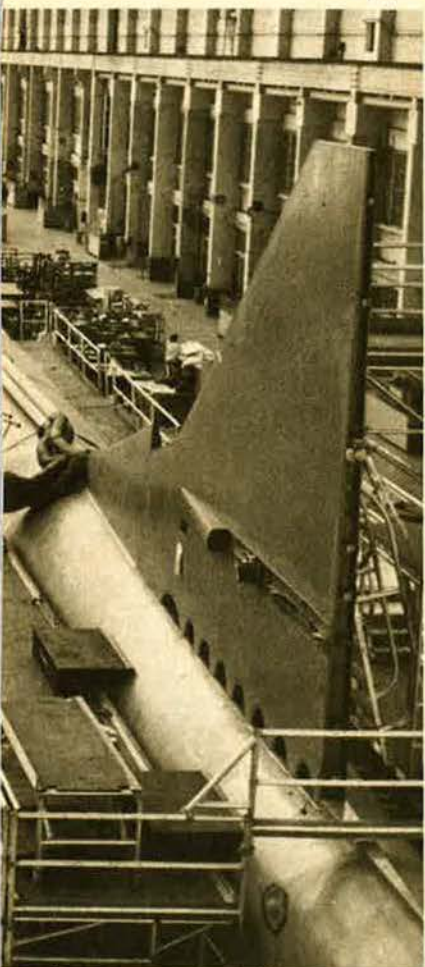
Can one type of aircraft really replace everything from a four-jet strategic bomber to a Mach 2.2 interceptor? Long experience of multi-role designs (notably the F-111, of which the MRCA is a smaller counterpart) is not encouraging. On the other hand, Hermann Schmidt, Chairman of the German Defence Committee, said of it last summer: "Financial arguments are irrelevant to the partners because no alternatives exist. Neither the Viggen, the Mirage F1, the A-7, the F-14, nor the F-15 covers even a major part of the MRCA's capabilities, let alone all."

A quarter of the entire German aircraft industry is involved in the MRCA project. The RAF will hardly exist as a viable force in the late seventies if the type fails to live up to its promise. The first flight of the first prototype, soon to take place at Manching in Germany, will initiate one of the most critical test programmes of all time.

With such an aircraft in production simultaneously with the French Mirage F1, the British Hawker Siddeley Hawk and Franco-German Alpha Jet close-support/trainers, the Jaguar, and advanced versions of the Harrier, Europe seems well set to maintain the worldwide export sales that continue so satisfactorily with types like the Mirage III/5 and Strikemaster. It remains to be seen whether or not the Japa-



Concorde SST production line at Aérospatiale's Toulouse plant.



nese will persist with costly development of the Jaguar-like Mitsubishi FS-T2-KAI close-support version of their T-2 supersonic trainer as a further stage in the creation of self-sufficiency in defence equipment. Yugoslavia and Romania remain intent on doing so in partnership, and at least 200 of their twin-jet Juroms are expected to be built for light strike missions. First flight of the prototype, powered by Rolls-Royce Viper 623 turbojets, seems imminent.

Only the US, Russia, and China seem interested any longer in piloted aircraft for long-range strategic attack—or perhaps it would be more true to say that only they can afford such interest.

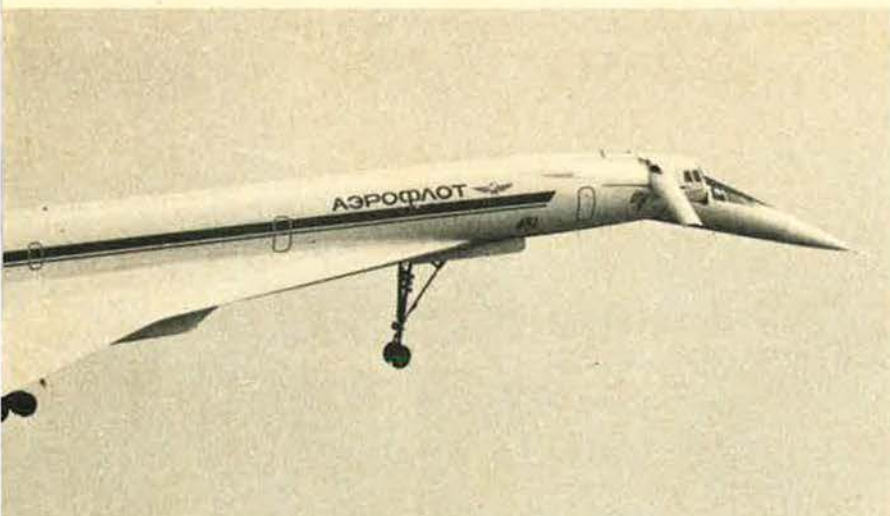
China's growing industry seems still to be concentrating largely on what might be termed Chinese copies of Soviet designs. Manufacture of well over 1,000 MiG-17s (known in China as F.4s) and an estimated 1,500 MiG-19s (F.6s) is thought to have been followed to date by at least 1,300 MiG-21s (F.8s) and considerable numbers of Tu-16 twin-jet strategic bombers, of which deliveries are continuing at the rate of four or five a month. A new twin-jet development of the

F.6, designated F.9, is reportedly flying, for possible ground-attack tasks. After studying the F.6s supplied to Pakistan, nobody should doubt that China has the ability to produce high-quality aircraft in whatever numbers may be needed.

Concorde and the Tu-144

Turning to commercial aviation, it is clear that, politically and economically, the Concorde is Europe's counterpart to the B-1 bomber. Despite proven technological soundness, this pioneer SST remains a prime target for politicians, anti-pollutionists, and amateur economists. Two years ago, the Anglo-French manufacturers could quote a list of seventy-four options to buy from sixteen airlines, half of them North American. Today, firm commitments total a mere fourteen aircraft, for British Airways (five), Air France (four), CAAC of China (three), and Iran (two). Pan Am, TWA, and other major operators have pulled out of the programme, perhaps to their peril. It is inconceivable that western businessmen will be content to travel subsonically when Aeroflot begins to offer supersonic services with the Tu-144, as it will next year. Any shortcomings brought to light by investigation of the accident to the second production Tu-144 at the 1973 Paris Air Show will have been solved by then. The accident itself reflected the inadvisability of demonstrating a relatively unproven redesign in public, rather than any inherent fault in the aircraft.

Nobody sees the Concorde as a direct maker of fortunes for its operators, and some work remains to be done before it enters transatlantic service; but few prophets were enthusiastic about the Boeing 707 and 747 in their generations. In Washington last September, Sir George Edwards, Chairman of Brit-



The USSR expects to put its Tu-144 SST in service next year. Any problems brought to light by the Paris Air Show crash should be corrected by then.

AEROSPACE JANE'S REVIEW

ish Aircraft Corporation, commented:

"Does anyone really believe that having got this far—and it has taken us nearly thirteen years—we are going to drop Concorde? Does anyone really think that having got an aeroplane which can do what Concorde has already proved it can do—and which, as next week will show, can fly its promised payload direct across the Atlantic—that we are now going to pack it in?"

The author of this special report, John W. R. Taylor, has been Editor and Compiler of Jane's All the World's Aircraft since 1959. Earlier he spent seven years with Hawker Aircraft Ltd. in design work and technical writing, and eight years as Editorial Publicity Officer of Fairey Aviation Group. Mr. Taylor has had published some 160 books and many articles on aviation. He is a Fellow of the Royal Historical Society and of the Society of Licensed Aircraft Engineers and Technologists, and an Associate Fellow of the Royal Aeronautical Society.

"People ask will Concorde pay? It is the travelling public who will answer that. . . . They're going to recognise the plain fundamental fact that the choice is between the airlines which offer Concorde and those which don't and therefore take twice as long.

"I have no doubt that, as a result of that choice, Concorde will attract high load factors and will go on attracting high load factors—well above—probably thirty percent above—its break-even point on the North Atlantic of about fifty percent.

"There has been much talk about the environment. This aeroplane in its present form has a noise level about the same as current subsonic jets such as the 707, DC-8, and VC10. It's an interesting speculation that whereas we have successfully got our noise level down to theirs, they haven't yet got their smoke level down to ours, because the current smoke level of the Concorde is zero."

Aerospace Interdependence

Cancellations of orders for aircraft like Concorde hit the industries of many countries. Nearly 100 US companies contribute to the

Anglo-French SST, and this is far from unusual. Fokker of the Netherlands states that roughly forty percent of the components of each of its F.27 Friendship and F.28 Fellowship transports are manufactured in the UK, earning more than \$240 million of foreign exchange for Britain over the past fourteen years. And Hawker Siddeley's highly promising new HS 146 quiet 70/102-passenger transport has four American turbofans as a start.

This interdependence of the world's aerospace industries is no western prerogative. Russia buys its military jet trainers from Czechoslovakia, and has its An-2 transports, Mi-2 helicopters, and M-15 agricultural aircraft built exclusively in Poland.

There is considerable merit in creating strong aerospace industries in allied or friendly nations, especially when their products are complementary rather than competitive. It is a lesson to be learned by smaller nations as well as the giants. One can only hope, for the sake of the companies involved, that it will not be taught too roughly by the European A-300B Airbus and Dassault Mercure wide-bodied transport programmes, which are proving slow starters so far as airline

The 200- to 345-seat A-300B Airbus, developed under a European cooperative programme, is regarded as one of the brightest hopes for the 1970s.



orders are concerned, in competition with already established transatlantic types.

This should not suggest that only nations as rich and powerful as America and Russia ought to produce major types of combat and commercial aircraft. Concorde, Harrier, Mirage, and other successful designs reveal Europe's technological capability; while companies in several parts of the world have learned the difficulty of competing with Beech, Cessna, and Piper in what might seem the "easier" general aviation field.

Here, again, the answer is Ralph Waldo Emerson's "better mousetrap," as exemplified by the BD-5 Micro sportsplane devised by that remarkable character Jim Bede, of Cleveland, Ohio. His tiny BD-5 was regarded variously as a toy or a potential killer. Yet more than 4,000 sets of plans and kits of this aircraft were sold to amateur would-be constructor-pilots in a few months, a production version is envisaged, and a jet version is flying, with a top speed comparable with that of Battle of Britain fighters. Few people are scoffing any longer.

To survey more than the major developments of the past year in so few pages is impossible, and it would be premature to devote more than a passing reference to the Space Shuttle, which promises to revive something of the excitement of Mercury, the X-15, and Apollo toward the end of the present decade. The aerospace industry of the world is currently so active that more than one million words of new typesetting were required to cover its programmes adequately in the new, 1973-74 edition of *Jane's All the World's Aircraft*. There could be no better riposte to anyone who suggests that the aerospace industry has passed beyond the brief, exciting era of pioneering and adventure to an evermore in which aircraft are mere mass-produced vehicles ranking dully with family cars, kettles, and colour TVs. ■

Not all of 1973's interesting developments were by big companies. Jim Bede of Cleveland, Ohio, has produced a jet version of this BD-5 sportsplane.



The French Dassault Mercure is a short-haul transport with a seating capacity of 116 to 155. So far, the only customer has been Air-Inter.



THE STRATEGIC ARMS LIMITATION TALKS

In the context of the Administration's policy of détente, the author discusses the utility of military power, the lack of clarity in definition of US nuclear strategy, and the shortcomings of SALT I. Continuing negotiations of SALT II should be freed from an arbitrary negotiating timetable until answers to several strategic questions can be agreed upon, he concludes, in this examination of the relationship between . . .

DEFENSE AND NEGOTIATION

By
Colin S. Gray

TO REMAIN coequal in the exclusive class of superpowers is hard work. Diplomatic virtuosity does have its place, but it cannot substitute for military muscle or for political will. Slippage from a position of preeminence tends to be imperceptible. Moreover, the process of slippage is easily rationalized by reference to factors beyond American control.

It is my contention that the Nixon Administration, in the name and often the language of classic *Realpolitik*, has adopted a foreign-policy posture that includes many of the most heinous sins of a Wilsonian idealism. To be specific:

- Hoist on the petard of its own rhetoric (for example, the era of negotiation), the Administration has agreed to participate in processes of negotiation, in SALT and over European security, that have and will weaken Western defenses.

- Agreements were signed (SALT I) that contributed to an unfavorable strategic imbalance, and which the Soviet leaders must have interpreted as indices of American willingness to settle for what terms were available, under pressure.

- The process of détente, as the *pièce de résistance* for the defense of a beleaguered Administration, has been accorded pride of place over political and military substance.

It is certainly true that Mr. Brezhnev and his bureaucratic allies have invested their political future in better relations with the United States, but it is necessary to ask of friends in

the Kremlin exactly what their friendship is worth. Détente serves the Soviet Union very well, because it enables gains to be made at minimal risks. Americans might care to ask themselves why it was that the Soviet military did not oppose the SALT I agreements in any very serious fashion. As Malcolm Mackintosh has argued in *Problems of Communism*, September-October 1973, "the [Soviet] military realized that its requirements were going to be met and therefore modified or abandoned its earlier reservations." That SALT I was a bad agreement for the United States is now hardly debatable. Even participant/defenders of SALT I are compelled to uphold it in terms of the putative "even worse" futures from which SALT I may have delivered us.

Détente Means What?

Détente is a *good* term, but it is somewhat devoid of specific detail. After all, better relations with an aggressive competitor are usually obtainable, at least for the short term, if the price of political and military acquiescence is paid. For a foreigner, like this author, it is tempting to excuse official pusillanimity on the ground that it *must* reflect an irreversible public mood in the United States. Hence, the Nixon Administration has done all that the climate of opinion would permit.

I decline to adopt this line of argument. The Nixon Administration has neglected to confront the American people with *the facts* of

Soviet military advances, of Soviet political commitments, and of the shifting sands of the United States negotiating positions on strategic weapons and on European security. This is hardly surprising, since one of the necessary political arts is the ability to parade choice as wisdom and, to a limited degree, as necessity.

Critics of this Administration should reject any characterization of their position as being opposed to détente. In principle, no one is opposed to détente, any more than to such other generalities as peace and justice. However, the apparent features of the processes of détente include the following: exclusive attention to government-to-government relations; legitimization of Soviet imperial sway over Eastern Europe, *in perpetuo*; cooperation in expanding the range of Soviet strategic options; cooperation in reducing the element of balance in the military confrontation in Europe; acquiescence (at the very least) in a military stalemate in the Middle East, in the face of Arab aggression and imminent Israeli victory; and, central to the remainder of this article, a disinclination to contemplate serious strategic alternatives to the prevailing credo of stable mutual deterrence.

Any brief itemization of error lends itself to charges of oversimplification. This danger is here accepted. None of the charges leveled implicitly in the above sentence has been formulated lightly. Strategic analysts, with long records of sophisticated scholarship, now head the United States Department of Defense (James Schlesinger) and the Arms Control and Disarmament Agency (Fred C. Iklé). It remains to be seen whether their understanding of strategic and negotiation problems is able to overcome the short-term political interests of the Administration, and the strategic dogmas and assumptions that produced SALT I.

The Utility of Force

The kind of strategic options that one believes it desirable for the United States to obtain and retain depends crucially upon his understanding of the nature of the international political system. Many analysts are convinced that the era of close attention to the *High Politics* of security and survival is now drawing to a close. Instead, it is argued, the great industrial powers must increasingly focus their attention upon the problems of economic development and monetary stability, of environmental pollution, of energy supplies, and of overpopulation.

Such a conviction rests upon the bedrock assumption that the (believed) attainment of a stable strategic balance ensures that strategic weaponry will be more and more decoupled from *real* political concern. Some analysts are

even going so far as to claim that arms control is of sharply declining significance. If strategic arms are of only the most minimal political importance, then clearly arms-control processes must similarly decline in prominence. A few former arms-control enthusiasts have even gone on record as disapproving of protracted, formal strategic dialogue in the guise of arms-control negotiations, on the ground that this endeavor furnishes "bargaining-chip" arguments for the latest models of military hardware.

It is no exaggeration to claim that there is a growing belief among the *corps d'élite* of former arms-control advocates that the very nature of international politics is changing from a context wherein the bad old military competitive mode was dominant in the intentions of officials, to one wherein the bases of military competition are eroding away. The claim is not merely that strategic weaponry is now irrelevant to the living concern of foreign policy-makers, but also that international political processes are becoming less and less competitive. At the extreme, Louis Halle asks, "Does War Have a Future?" (*Foreign Affairs*, October 1973), and decides that the answer is overwhelmingly negative.

It is, of course, possible that the predatory behavior of states should be viewed as past history. However, the careful analyst might be excused the expression of some cautionary observations. The believed (and usually proven) state of balance between the offense and the defense in armaments has not passed unreflected in foreign-policy practice, the waxing and waning of a sense of community between putative adversaries has influenced the scope and degree of competitive activity, but recorded history offers no persuasive arguments in support of the claims that interstate competition may be expected to wither away in the foreseeable future.

The evidence provided by interstate relations today is, at best, ambivalent. Mr. Brezhnev is able to sustain the superpower détente not because the *objective* factors of Soviet economic weakness, the disutility of the threat of force, and a common (with the United States) understanding of the measuring of values that should guide statecraft allow him no choice. Rather do better relations with the United States pave the high road to the advancement of Soviet competitive interests. Détente, as currently pursued, is retailable because it offers specific gains in a context wherein minimum alarm is generated abroad. Soviet leaders are pragmatists. Whether it be in the Middle East, over European security, or in the region of strategic armaments, they are able to improve their competitive position against future need—at negligible cost.

Having been told that it is doing no more

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than recognizing the march of history, the American public may awaken at some point in the 1980s to discover that the era of confrontation had never really been banished (being implicit in the structure of international politics), but that this time the roles of the 1950s and early 1960s have been reversed. The Soviet Union, not the United States, would enjoy a limited first-strike counterforce capability, and that, in terms of overall strategic weight, a local conventional military imbalance would be reinforced by the general perception that the United States was in a condition of parity-minus.

It is my contention that, as the events of October 1973 should have reminded us, the problems of military competition, of the range of strategic options acquired, and—at the most apocalyptic level—of waging nuclear war itself, must be taken seriously. Benign neglect will be paralleled by the malignant attention of others.

Arms and Diplomacy

It may or may not be true that the ratio of strategic power between the superpowers is of profound political importance. What is true, beyond question, is that if the scholars who now proclaim the severely devalued currency of strategic power should change their minds, the only personal price they will have to pay will be the suffering of some professional skepticism at such a *volte-face*. The lead time for a declaration of altered opinion is the length of time it takes for an article to be written and published. However, the officials who accepted the conceptual framework supporting the notion of an apolitical strategic balance cannot register their conversion so rapidly. A lead in many of the indicators of relative strategic power, once surrendered in sophisticated recognition of an absolute notion of enough being enough, may not easily be recovered.

Resting upon the assumptions only that (a) the world is and may fairly be expected to remain a dangerous arena, wherein accidents may occur and interests may deliberately be challenged, and (b) that the relationship of major tension (with the Soviet Union) embraces an adversary-partner to whom all matters are *political*, it would seem to be only prudent to assume that strategic weapons and arms-control negotiations should be viewed as being diplomatic instruments. The purpose in waging the nuclear arms race, albeit regretfully, is simply to increase one's diplomatic leverage and hence one's freedom of action.

The question that strategists and officials must ask themselves is, "What do we wish our

Being paraded in Red Square is the Soviet Union's SS-9, the biggest operational ICBM in the world. Upcoming is the still-bigger SS-18.

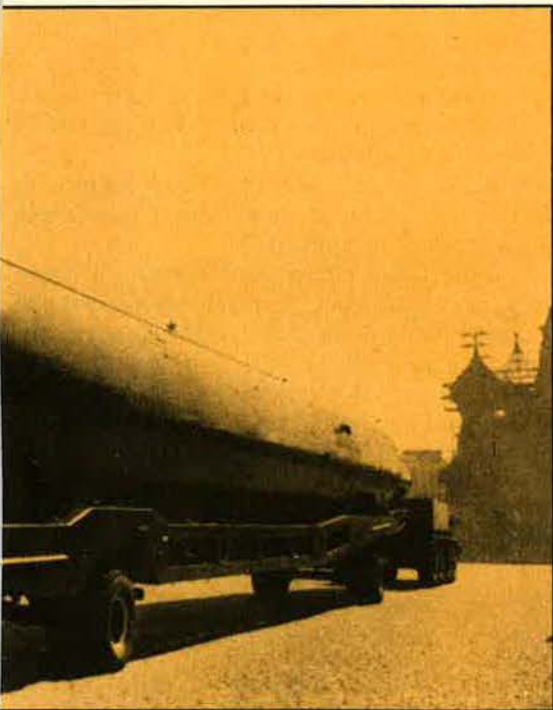


A strong adjunct to the Soviet Union's massive missile force is its intercontinental-range bomber fleet. Here, a four-engine Mya-4 Bison.

strategic forces to be able to do?" Some of the *desiderata* may be technically and/or financially infeasible. However, financial feasibility must of course depend upon how badly one desires to attain a certain capability; in other words, it is a matter of priorities.

What Is US Strategy?

It is of the utmost importance that the question of political feasibility be addressed. On matters of strategic and arms-control doctrine, the Administration betrays utter confusion. The Mutual Assured Destruction (MAD)



leitmotiv of late McNamara days is dead, yet it has still to receive a decent burial. Mr. Nixon (and presumably Henry Kissinger) have blessed the notion of a flexibility of strategic targeting options, Dr. Iklé is on record as favoring some undisclosed fundamental alternative to MAD (*Foreign Affairs*, January 1973), and Dr. Schlesinger has offered unequivocal support for a "limited counterforce" capability. In other words, as the shifts in United States offers during the course of SALT I indicate, we may fairly characterize strategic doctrine as confused.

It is reasonably clear both that the Adminis-

tration, taken as a whole, does not accept a MAD-only declaratory posture, and that targeting philosophy is far more flexible than many supporters and critics have assumed. Furthermore, the time is long overdue for political judgment, technological feasibility, and strategic logic to coalesce into a settled doctrine that could both guide the American delegation at SALT II, and that could inform the overall direction of weapons research and development. An administration that knew its own mind would have more likelihood of convincing skeptical congressmen of the desirability of following a more balanced offense/defense path in weapons development than would an administration that is almost apologetic and is certainly self-contradictory when it comes to the promotion of different weapon systems.

A Counterforce Strategy

A Senate that could sensibly approve the Jackson Amendment should be amenable, given time and effort by officials and extra-official strategists, to arguments demonstrating the prudential utility of a National Command Authority (NCA) ABM deployment—as sanctified in SALT I—and of a much-enhanced, hard-target counterforce capability. "Emulate my neighbor" is not a very appealing strategy, but skeptical legislators might care to ask themselves why it is that the Soviet Union, with an economy only half the size of the United States, deems it important both to push the state of the military-technological art across the board, and, in particular, to acquire the basis for a massive, if still limited, counterforce capability.

Technological inertia or internal bureaucratic games *may* be the appropriate answer. But can we afford to *presume* that these developments, which are in the public record—they are no gleam in a "gap-monger's eye"—do not reflect careful political judgment? I suggest not.

Unless many members of the Congress and of the Administration are able to discard their counterforce allergy, the Soviet Union—through the instrumentality of MIRVed SS-9s and SS-18s—is going to acquire a strategic option for the forcible if limited disarmament of the United States, for which the United States will have no parallel reply. Whether or not we deem this asymmetry in strategic options to be significant, it is difficult to dismiss as insignificant the fact that the Soviet leaders evidently view a limited counterforce capability as worth acquiring.

To assert the value of a counterforce option that stops well short of a preclusive disarming

capability is to challenge the strategic verities of the past decade. I can conceive of a wide variety of scenarios, of differing degrees of implausibility, in which the ability credibly to threaten a portion of the adversary's strategic forces may be of considerable diplomatic advantage. *All scenarios* of nuclear war are, to a degree, implausible. Unfortunately, history has a knack of surprising us. Cuba in 1962 and the Middle East in October 1973 were not exactly events long heralded. Even a profound skeptic must surely accept that it is extremely dangerous for the United States to acquiesce in the unfolding of a strategic future wherein the Soviet leadership could, not unreasonably, believe that it had a strategic advantage of political significance.

SALT II

The United States cannot solve her strategic problems in the context of SALT II. On past and present performance, it would appear that the SALT process has a net negative effect upon the search for a sensible strategic posture. Desirability is subordinated to negotiability. In principle, there is no reason why SALT could not lend support to rival strategic forces that were in rough military and political balance. In practice, the requirements of détente have been defined in such a way that the content of the agreements has been deemed less important than the fact of agreement. The almost indecent haste with which SALT I was concluded in Moscow, in May 1972, may yet have a parallel in SALT II—given the one-year deadline for a follow-on agreement announced in the course of Mr. Brezhnev's visit to the United States in 1973.

Mr. Nixon and Dr. Kissinger would seem to believe that the serious business of the world is conducted in a very personal diplomacy. This is unfortunate in the SALT context, because an internally consistent strategic posture that meets a calm and unhurried American identification of possible future need is unlikely to emerge—save by chance—as the product of last-minute horse trading at an international summit. Given the present strategic doctrinal confusion both within and outside the Administration, it is difficult to see how a consistent and resilient arms-control negotiating position could be determined. With competing criteria for an adequate deterrent, how can the Administration decide what is and what is not negotiable?

The interests of the United States and her allies would be well served were SALT II to be discontinued for a year or more, pending the resolution of outstanding intellectual problems in the strategic field. Politically, this is totally infeasible, so I will not devote space to

itemizing the advantages of a negotiating sabbatical. However, it is not visionary to urge that the artificial deadline of mid-1974 for the completion of a follow-on SALT agreement be dropped, and that the Administration, the Congress, and the extraofficial arms-control community consider very seriously the following strategic questions:

- What are the advantages and the disadvantages of acquiring a limited but substantial counterforce capability?

- What, if any, are the disadvantages to the United States of the Soviet Union *alone* acquiring such a capability?

- Under what circumstances would a more-than-token National Command Authority ABM defense yield significant advantages to the American people?

- Assuming that politicians and opinion leaders appraise the strategic balance in rather crude terms, what, if any, are likely to be the political consequences of a ratio of strategic power plausibly retailable as being unfavorable to the United States?

- On the basis of the record of SALT I, what lessons may be gleaned concerning American and Soviet arms-control negotiating behavior?

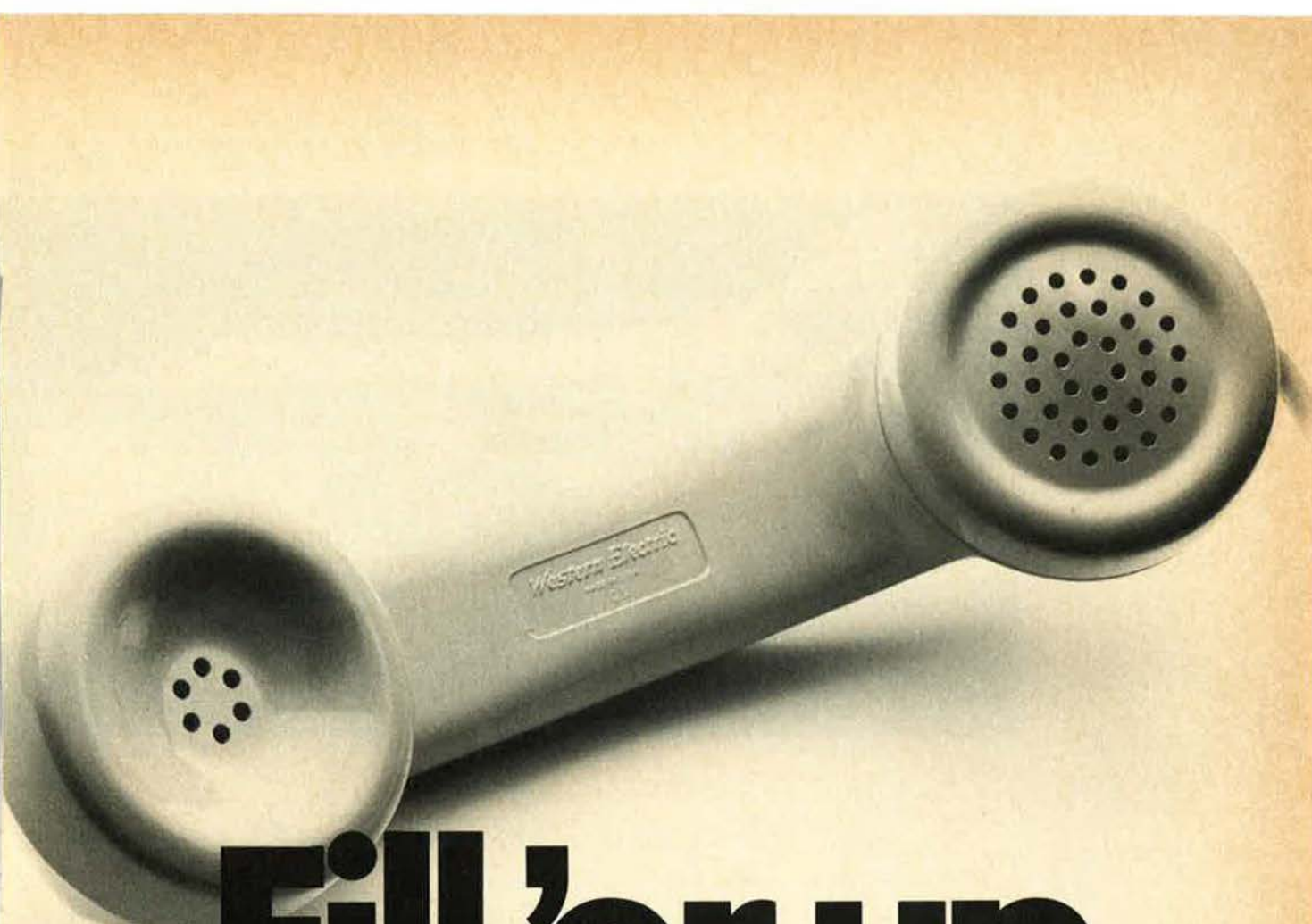
- Given our assumptions concerning the likely structure and functioning of international politics for the foreseeable future, what do we require of our strategic forces?

- In what ways would it seem that Soviet requirements differ from our own?

- What caveats, if any, are suggested for our arms-control negotiating strategy and our defense policy, in the light of the above?

The purpose of a very active strategic debate would not be to frustrate the ambitions of arms-control enthusiasts. Rather would it be to ensure that some, at least, of the illusions that have contributed to the emerging strategic imbalance of the 1970s would be shown up for the folly that they are. The result should be a negotiating posture for SALT II that would rest upon firm assumptions, that would not so easily be subject to *ad hoc* erosion, and that would contribute to a genuine strategic stability. The Soviet delegation would be informed that the day of strategic monologue had passed. Soviet reticence on numbers of ICBMs and on strategic concepts would no longer be acceptable.

The classic trinity of arms-control objectives—to reduce the danger of war, the likely damage in war, and the costs of defense preparation—could all be advanced by a thorough-going attention to the considerations raised in this article. It were far better for wishful thinking to be identified in debate, than in the practice of international political/military competition. ■



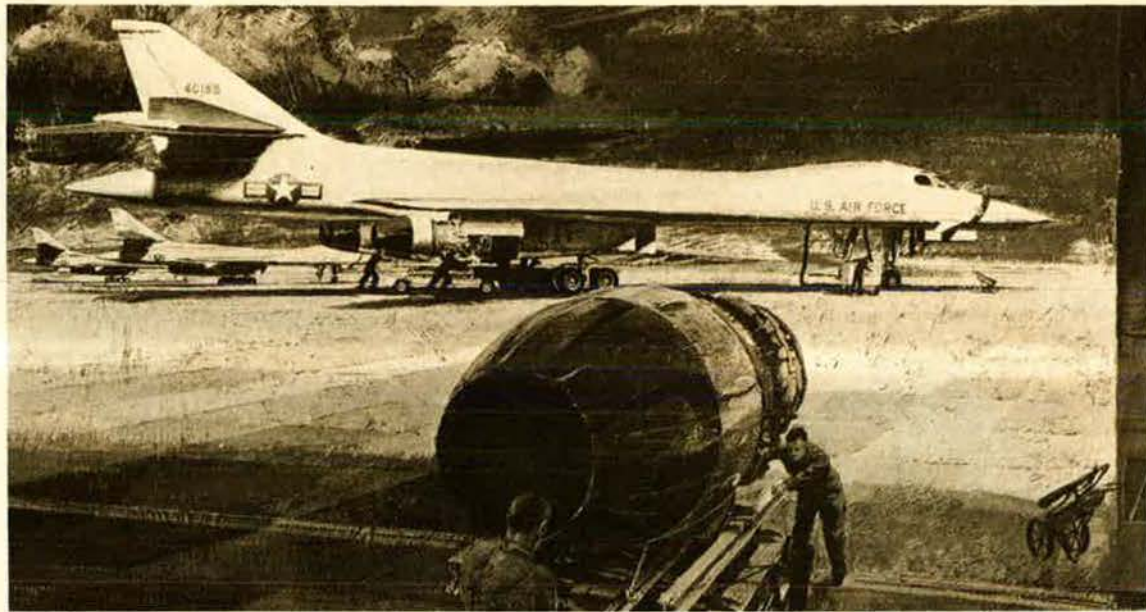
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Secretary McLucas says that restructuring of the B-1 program is being considered and may involve the addition of a preproduction phase.



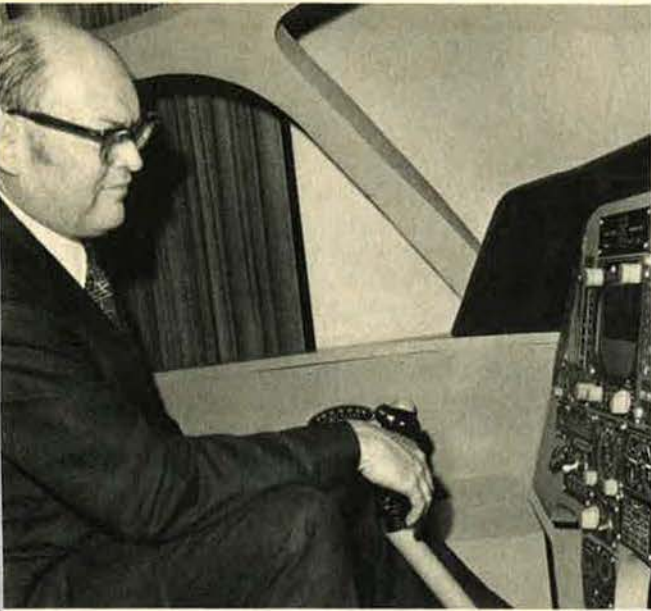
Space offers unique advantages for such military missions as early warning, command control, communications, navigation, reconnaissance, and related functions. The Air Force, the principal user of space satellites, is currently intensifying its unmanned space programs, as outlined by Air Force Secretary John L. McLucas in an exclusive AIR FORCE Magazine interview. Dr. McLucas also focused on possible changes in the B-1 program, USAF's shrinking R&D budget, and the need to modernize the Air Force's aeronautical test facilities . . .

SECRETARY McLUCAS LOOKS AT PRESSING AIR FORCE NEEDS

By Edgar Ulsamer

SENIOR EDITOR, AIR FORCE MAGAZINE

Air Force Secretary McLucas is shown in a mockup of the B-1's cockpit. He rates the probability of production go-ahead higher than in the past.



THE United States “sees” almost instantly any intercontinental ballistic missile regardless of where and when it is launched and also knows where it is going. What’s more, this worldwide monitoring capability has been tested over a number of years and has proved “very reliable and highly credible.” This high degree of credibility, in turn, enables the National Command Authority to react rapidly and decisively on such warning information, according to Air Force Secretary John L. McLucas.

“The basic objective of our early warning satellites,” which provide that information, Dr. McLucas told this reporter, “is to keep track of missile activities going on around the world; these satellites are deployed in such a way that they can see missile launches anywhere and at any time. The system reports in essentially real time any missile launches and gives an indication where the missile is going. This worldwide capability provides precise, unambiguous information about test launches or an actual attack.”

Early warning satellites consist of so-called integrated satellites, meaning spacecraft using a number of different sensors that augment one another. These sensors detect and track missiles and also monitor nuclear explosions in the atmosphere and space. While it might be possible to attack these warning satellites, it would seem impossible, at least on the basis of presently available technologies, to do so with any real chance of surprise; the system would presumably detect interceptor missiles fired against it hours before the aggressor could reach the satellites’ high orbital altitudes.

Almost ten years ago, Secretary McLucas told AIR FORCE Magazine, the Air Force started the development of a nuclear-armed antisatellite system at the request of former Defense Secretary Robert S. McNamara. Known as Program 437, this system was premised on Secretary McNamara’s belief that the United States “needed assurance that if the Soviets or anybody else started playing around with our satellites, we should have the ability to do likewise. Of course, the subsequent prohibition against the use of nuclear weapons in space caused us to change our position on this matter.”

USAF's Space Budget: More Than \$1 Billion Annually

The Air Force, Secretary McLucas revealed, spends more than \$1 billion annually on military space programs. Control over most USAF space activities is exercised by its Satellite Control Center at Sunnyvale, Calif., an agency of AFSC's SAMSO. The Center operates ground stations scattered around the globe, which relay information to and from the individual satellites “so that we can, in effect, control a worldwide satellite network,” according to Dr. McLucas. “We do have in the works a new approach, a satellite relay system that would give us the same kind of controls, but, instead of ground stations, would use space stations or satellites.” The advantage of the space-based control system, the Secretary explained, is “that it gives us more communication channels to a given satellite,” and, by eliminating the need for ground stations on foreign territory, the political and military vulnerabilities of the control system will be reduced significantly.

Now under development by Hughes Aircraft Co. is such a system, the Satellite Data System (SDS), part of the Air Force Communications System (AFSATCOM). SDS will eliminate some of the ground stations.

The Air Force in Space

Although formerly the government’s executive agency for all military space programs, the Air Force, under a 1971 Department of Defense directive, is no longer the sole service with space responsibilities. But while service responsibility for new programs is now considered on individual merit, the Air Force remains the principal designer, manager, and operator of space systems. “The only decision to date—as a result of the change of 1971—that involved a service other than Air Force is



Here's what the western US and Mexico look like to a USAF satellite with resolution of one-third of a mile.

the [Navy's] Fleet Satellite Communications System (FLTSATCOM). But even in this instance, DoD agreed that the Air Force should act as the Navy's subcontractor to actually contract to build and manage the system and put it into orbit. The Navy is in charge, of course, in the sense of procedural operations, but we provide the routine management function such as station keeping."

Because the Air Force has the people, know-how, and facilities, Secretary McLucas said, "it would not make sense for the Navy to duplicate all this at high cost." While any service that can convince the Department of Defense that it has a good case can be granted a given space mission, it is likely that the Air Force will continue "to perform the actual work," he suggested. This is likely to include space launches, since there are no plans to build new launch facilities.

Cooperation with the Navy on FLTSATCOM extends beyond routine management matters, Dr. McLucas pointed out. Although primarily designed to serve a large number of Navy ships and aircraft, the system will also carry Air Force transponders, which are part of the Air Force Satellite Communications System (AFSATCOM). The Navy satellites, Dr. McLucas revealed, are to become operational in about two or three years. Four satellites will form the system and be spaced around the equator at ninety-degree intervals to provide broad coverage.

Concurrent with the Navy's initial interest in FLTSATCOM as a means of providing reliable communications with the fleet, the Air Force was probing the design of AFSATCOM to assure "worldwide control of our strategic forces," Secretary McLucas explained, adding that "by joining up with the Navy, we will be able to use these four platforms in space for our own transponders and, thereby, be able to control our strategic forces in all areas of the globe except the polar regions. These gaps, which result from the equatorial placement of FLTSATCOM, will be closed by AFSATCOM, which is to incorporate components of the Satellite Data Relay System, some of whose spacecraft are in polar orbits.

"By combining the capabilities of the two systems, the Air Force will be able to communicate with its strategic forces, be they bombers, other aircraft equipped with satellite terminals, or an airborne command post, anywhere in the world." This combined system will have the additional virtue of intrinsic redundancy. If one satellite fails, others can take its place. In the case of FLTSATCOM, for instance, only three out of the four in orbit are actually needed.

The redundancy that assures reliable opera-

tions automatically makes the two systems fairly survivable, Dr. McLucas pointed out. "The two systems can be categorized as medium-survivable. We have not gone all out and tried to do everything we can think of because that would cost too much; besides, it is more important to develop the needed communications capabilities expeditiously rather than come up with a design that will last forever," he said.

Present trends point clearly toward multiple uses of spacecraft. "I think the kind of redundancy that is gained from using piggyback arrangements [putting different transponders and other components aboard individual satellites], and thereby making each satellite a space bus of sorts, makes good sense," Dr. McLucas said.

Secretary McLucas expressed strong support for efforts to assure the survivability of space-based military systems. "If we are going to rely on space communications, then we must insist that these systems be as reliable and survivable as possible. One side of that effort is redundancy; the other involves hardening of the satellites [against EMP—electromagnetic pulse—and other destructive radiation of nuclear explosions. Overpressure, the most lethal effect of nuclear weapons in the atmosphere, is not a factor in space]. It would seem certain that over a period of time more and more hardening will be incorporated into our space systems."

The Air Force, Dr. McLucas said, is working on SURVSATCOM, the Survivable Satellite Communications Development Project—a highly survivable communications satellite that can perform vital general-war command and control functions. The project involves two satellites, LES 8 and 9, which are being developed by Lincoln Laboratory and are scheduled for launch in Fiscal Year 1975.

Military experts and the scientific community remain divided over whether the survivability of space systems is better attained through hardening or through redundancy, according to Dr. McLucas. Because hardening runs up both costs and weight, he said, "I personally tend toward redundancy, but it will take more time and research to answer this question." Dr. McLucas agreed with the majority of USAF leaders that an attack on the US military satellites is not likely; such an act, of itself, would signal, categorically, the attacker's intent and could trigger a US response.

He nevertheless advocated "a fallback position through hardening and redundancy, especially in case of a relatively inaccurate attack. In the case of a head-on hit, of course, hardening would not help anyway."

Hardening or shielding involves a variety

of techniques to contain the energies of EMP in the outer shell of a spacecraft, design of the electronics to minimize damage from what EMP reaches them, and shutdown of on-board circuitry during the split second of EMP effectiveness.

Finally, the survivability is also being enhanced through the development of advanced optical space communications systems, including lasers and other techniques that are impervious to the communications blackout that accompanies the explosion of large nuclear weapons in space.

Position-Fixing and Navigation Satellites

It is axiomatic that the efficacy of military operations depends on the accuracy with which the forces involved know where they are, where they are going, and at what rate of speed. The more mobile these forces and the greater the accuracy and range of their weapons, the more urgent becomes the need for precise position-fixing and navigation. This has been recognized by a multiservice program that probes navigation-satellite systems and associated technologies. It will culminate—between the years 1977 and 1979—in a major navigation-satellite experiment to test and demonstrate satellite-navigation technology and its potential. In mid-1974, the Air Force will launch an experimental satellite to explore the complex phenomena of signal propagation and modulation in space, in concert with a special simulation facility that was placed into operation at the White Sands missile range last year.

The potential inherent in navigation and position-fixing satellites, Dr. McLucas pointed out, "is virtually unlimited and largely untapped. We have had some important lessons from the Navy's Transit Navigation Satellite system, of course, and we have run some hardware experiments that show what could be done with a multiple satellite system in terms of distance measuring techniques—TOA [Time of Arrival] and Time Difference of Arrival.

"What's involved here is precise measurement of how long it takes signals from different satellites, whose locations are known with high precision, to reach a point whose position is to be fixed, thereby establishing its location. We have demonstrated the feasibility of these techniques with aircraft for some time now and know that it can be done with extremely high accuracy. It seems entirely reasonable to predict that it should be possible to fix the location of any point on the globe or in the air with a three-dimensional accuracy of at least 100 feet. This, by itself, offers a

The Challenge of the All-Volunteer Force

Secretary McLucas concluded his AIR FORCE Magazine interview by stressing that the Air Force leadership's principal and overriding concern, "far more important than the R&D issue, is people. Because of our people-oriented program, we are getting all the people we need, and the quality [of the newcomers] is rising. By continued emphasis in this area, I feel confident that the Air Force will be able to make the all-volunteer force work and assure high-quality manning in the years ahead, at least so far as the active-duty force is concerned.

"So far as the Air Force Reserve is concerned, we will have to do a better recruiting job than has been the case so far. We have had a shortfall of about ten percent [since the all-volunteer force policy went into effect]. Possibly, we might not have paid all the attention to this problem we should have because we were so elated about achieving 100 percent on the regular force.

"Our personnel people are giving full attention to the problem, especially so far as improvements of the recruiting effort and different incentive approaches are concerned. We are confident that we will be able to improve the situation."

revolutionary potential for blind weapon delivery, standoff systems, and—to a degree—the elimination of weather and visibility as major factors in military operations."

While the feasibility of systems with these kinds of capabilities has been demonstrated convincingly, the "major remaining question is what constitutes the optimum hardware configuration," Secretary McLucas said. This boils

down largely to a decision on where to put the computer, into the spacecraft or the user systems, such as aircraft.

"You could either keep the satellites very simple and have big, complicated computers in each aircraft or other users, or you could build a very sophisticated system into the satellites and put only a small electronics package into the aircraft. We in the Air Force tend in the latter direction—that is, put the complexity into the satellites. We have had a somewhat competitive atmosphere with the Navy in this regard, with the Navy advocating one approach and the Air Force supporting another. But recently, all of us agreed on a compromise that resolved this problem, and we now have an approach that all services think is feasible. One could say that we have adopted a policy of compromise where we acknowledge that the Navy's disposition of satellites makes sense, provided they radiate Air Force-like signals. The present proposal is to place enough of this type of satellite into space to find out how the system can work best; subsequently, the idea would be to put up enough of them so that we can get worldwide coverage." This is likely to take between eight and ten years, according to Dr. McLucas.

The Air Force and the Space Shuttle

The Air Force is aware of the potential of manned military space missions, but knows that it costs a great deal more to operate a manned system than an unmanned one. The cancellation of the MOL program is a case in point. The Air Force considers it fortunate that "we don't have to foreclose the option of future manned space missions because of the national Space Shuttle program," a two-stage reusable space transportation system scheduled to reach operational status by the end of this decade. The system will be capable of delivering military and civilian payloads of up to 65,000 pounds into low earth orbit.

The Shuttle is, however, limited to orbital altitudes of about 200 miles. Another vehicle, usually referred to as the Space Tug, is needed to deliver payloads from the Shuttle's orbit to geosynchronous or other high-energy orbits. Present Pentagon estimates indicate that about fifty percent of all military payloads will require the higher orbits in the foreseeable future.

Secretary McLucas told AIR FORCE Magazine that NASA—the developer of the Space Shuttle—and the Air Force have agreed in principle that the latter should pay for and develop an interim Space Tug. The initial upper stage would be a minimum cost modification of an existing expendable stage that would meet most requirements during the period

when payloads are transitioning from current launch vehicles to the Shuttle. The stage will deliver payloads to high orbits, but will not be capable of retrieving payloads. The stage itself may be reusable.

This tentative agreement "has not been fully staffed throughout government, and, as a result, I don't know how far we will get with it," he said. The main reason why the Air Force supports this arrangement is that "we want to get on with a program of this type. It doesn't make sense to have the Shuttle and not be able to go the rest of the way," according to Dr. McLucas.

From the Air Force's point of view, the principal appeal of the Shuttle is that this system will make it possible to fix, refurbish, retrieve, and reuse expensive space systems operating within the Shuttle's orbital range. Obviously, extending this capability into high-altitude orbits would be equally desirable. But the high R&D investment associated with a recoverable, reusable, and possibly man-rated "upper stage" militates against such a program at this time, the Air Force Secretary said. "On a long-term basis, it can be shown that it would make economic sense to recover space systems from synchronous orbit, but I seriously doubt that this will happen any time soon."

The argument in favor of recovery of space systems, so far as the Air Force is concerned, must be tempered with a number of realistic considerations. One is that the longevity of space systems usually exceeds the original specifications with the result that, by the time many of these systems fail, their components, or even their basic concept, may be obsolete. Recovery of such older systems that have outlived their usefulness would not be economical or even desirable, Dr. McLucas pointed out.

"Simply put, the longer the life of a payload, the less productive it is to recover. Obviously, the most profitable recovery involves systems that fail as you put them up and where, by replacing a \$10 component that doesn't work, you salvage a multimillion-dollar spacecraft."

The B-1 Program Review

On July 12, 1973, Secretary McLucas reported to the Congress a slippage in the schedule of the B-1 program and, concomitantly, an increase in the R&D costs as well as a postponement of the program's key milestone—the production decision—to May 1976. Shortly thereafter, Dr. McLucas appointed, under the aegis of the Air Force's Scientific Advisory Board, a thirty-odd member review committee. Headed by Dr. Raymond L. Bisplinghoff, Deputy Director of the National Science Foundation, the Committee is currently completing its

final report on the program, covering both management and technical qualities.

The Committee's basic findings, conveyed orally, contained, according to Dr. McLucas, "some good news and some bad news." In the first category, he said, was the fact that the Committee's intensive, one-month study confirmed that the B-1 "looks like a good design, in the sense of being able to execute the mission assigned to the aircraft, and that it is within the state of the art." At the same time, Dr. Bisplinghoff and his panel of experts found the program "too success-oriented," meaning that, in the Committee's view, the B-1 effort is funded and phased in an "optimistic way." It is Dr. Bisplinghoff's opinion that it would take "a great deal of luck" for things to go the way we planned. "Given the perverse nature of inanimate objects, [Dr. Bisplinghoff] felt," Secretary McLucas said, "we are bound to run into some problems."

A third feature of the B-1 program that is being questioned by Dr. Bisplinghoff's committee is "the fact that it is not easy to see how we get from the first three test aircraft to the production aircraft. In the committee's opinion, there should be an intermediate step, a preproduction stage, in order to accommodate the changes that the flight-test program demonstrates ought to be made. This would enable us to test out these changes on the preproduction aircraft, *before* we commit ourselves to full production," Secretary McLucas said.

The Air Force views the findings and recommendations of the Committee as "quite realistic, especially so far as the recommendation for a preproduction stage is concerned," according to Secretary McLucas. The variance between the actual structure of the program and what's being sought now is anchored in differences in objectives. "Our original approach was geared to give us, at minimum cost, the answer to one question: 'Do we, in fact, have a B-1 design that we can go into production with?' This meant that we had to flight-test an aircraft that wasn't just a bare airframe, but included the kind of equipment, such as avionics, radar, and so on, that showed we could actually execute the assigned mission. If our objective had been to go into production quickly, we would not have taken the course we did.

"Our initial reaction to the Committee's recommendation is positive, because more than three years have gone by since we formulated the program, the B-52s have gotten older, people are getting more concerned about the obsolescence of these aircraft, and the likelihood of a decision in favor of a production go-ahead on the B-1 has increased. Three years ago, the time was not yet right for such a program

structure, but now we have a coalescence of opinions regarding full program go-ahead, and, therefore, Dr. Bisplinghoff's recommendation for a preproduction stage makes more sense. As a result, we are now pricing out such a change, and the B-1 Program Office is analyzing the specific recommendations to establish what should be adopted," Dr. McLucas told AIR FORCE Magazine. A decision should have been reached by the end of 1973, he added.

USAF R&D Shrinks While Soviet Efforts Increase

USAF's R&D budget has dropped, expressed in FY '74 dollars, from \$4.4 billion in 1968 to \$3.2 billion in the current fiscal year. "I am not sure that we can continue to function with an R&D budget of this type. Much depends, of course, on the outcome of SALT [whose phase II is to be concluded by the end of 1974]. If we don't reach any agreements with the Soviets about their pulling back from further development and deployment of strategic systems, then we will have to modernize and improve our defensive and offensive missile systems, as well as update other weapons. In such an eventuality, we would have to show greater progress and increase our R&D effort because we can't afford to be left behind. At present, the technical quality of our systems is still quite good, but if the Soviets continue with their high-level efforts [manifested by recent missile and MIRV tests], we might have to step up our own efforts," Dr. McLucas explained.

The Air Force Secretary was sanguine about the present level of military R&D providing "reasonable assurance against major technological surprise five or ten years from now." He emphasized the need for a "balanced approach to our R&D effort, unless there is good reason to panic, and I don't see that. I do see a definite need to maintain a very aggressive effort in the ICBM field, and we must somehow cope with the ECM challenge." While the Soviet weapons introduced during the recent Middle East war proved very effective, he said, they contained no technological surprise, and, after an initial period of adjustment, the US-supplied systems "proved quite effective."

In the tactical weapons field, the Air Force has made great strides in terms of smart weapons, "but they have to be deployed on a much larger scale than is the case at present. We don't have Europe stocked with these weapons to anywhere near the degree that we achieved in Southeast Asia. This must be remedied. Also, we have not applied these new technologies to nearly the extent that we could and should. Finally, we must recognize that any system embodying sophisticated components is susceptible to countermeasures. We have to

assume that there will be countermeasures, and we will have to concentrate our efforts on defeating them," according to Dr. McLucas.

In the related area of RPVs (Remotely Piloted Vehicles), Dr. McLucas cautioned that, in spite of the enormous potential of this technology, it might take years before the rank and file of the Air Force will fully accept the robot airplane. "We started out with RPVs flying photographic missions, and this, in time, has become a widely accepted mission. There are many other applications of equal promise, including high-altitude radio relay and a strike role. There are many missions where we can use RPVs to form something like a LORAN grid to guide missiles and other weapons to a target. We have already demonstrated that RPVs can be used to launch Maverick missiles against moving tanks; we have shown that they can be used for both high- and low-altitude photo reconnaissance; and we have proved their capability in the radio-relay area. The real issue is to get people to accept the RPVs. It is only natural for the Air Force to be biased toward the manned system, but it is also clear that there are missions that can be performed better with RPVs. I have no doubt that gradual acceptance of this fact will set in."

Needed: A New Approach to Aeronautical Test Facilities

A currently pressing Air Force concern is the inadequacy of certain of our national aeronautical test facilities, to meet modern needs. For example, the Arnold Engineering Development Center has some equipment dating back to World War II. This is costing the Air Force and others a good deal of money, because it requires more flight testing than would be otherwise necessary. Dr. McLucas disclosed that the Air Force and the Department of Defense are currently "working with NASA in order to come up with precise requirements for high Reynolds numbers [high-performance] wind tunnels as well as V/STOL wind tunnels and other facilities," to assess the performance of new aircraft and engine designs.

"We have more or less agreed on what's needed and what these new test facilities should be. It now becomes a question of putting enough emphasis on this matter. I believe that we can get the support we need on Capitol Hill once we can come up with a fully coordinated program."

The Air Force, traditionally, has advocated a government-wide, centralized approach to aeronautical test facilities in the belief that this would cut costs and permit more effective utilization and ease the funding of what, in effect, becomes a general national resource. ■

MIA/POW ACTION REPORT

It is almost a year since the signatures on the Paris accords were to have ended the Southeast Asian war and brought about the release of

the American captives. While the POWs have indeed come home, spasmodic fighting continues, and the accounting of our missing—a key

feature of the cease-fire agreement—is almost at a standstill. There seems small hope that a dramatic change for the better will come soon . . .

THE STALEMATED SEARCH FOR OUR MIAs



By William P. Schlitz

ASSISTANT MANAGING EDITOR, AIR FORCE MAGAZINE

ILLUSTRATIONS BY CLIFF PRINE

It was on Col. Scott Albright's birthday—December 13, 1968—that the word came: Capt. John Scott Albright II, Scott's oldest son and an Air Force navigator, was missing in action on a combat mission over the Ho Chi Minh Trails in Laos.

Soon after, like so many others concerned with the fate of sons,

husbands, and fathers swallowed up in the maelstrom of the Asian war, Scott Albright joined the National League of Families of American Prisoners and Missing in Southeast Asia.

Involved in attaining League objectives through the years that followed—first, to ease the condition of the men held in captivity and then

to help secure their release—Scott was more than a concerned parent. As a career Air Force officer, he had "been there." An experienced pilot, he himself had flown support missions in Southeast Asia. Also, he was more knowledgeable than most about the military and diplomatic quagmire that the war had become. Last autumn, Colonel Al-

MIA/POW ACTION REPORT

bright retired from the United States Air Force and was named the League's Executive Director, the loosely strung organization's top post. His son continues to be listed officially as MIA.

Now, as the first anniversary of the Southeast Asia cease-fire fast approaches, Scott Albright and others deeply committed to gaining an accounting of our missing men believe that inevitably, inexorably, those 1,300 Americans still carried as MIA in Southeast Asia are going to be "written off."

Scott Albright and many other family members are realists. They believe that the chance that many of the 1,300 missing have survived is extremely remote. They continue to hope, however, that some men will be found alive.

The Final Goal

When the several hundred American POWs were released and brought home early in 1973, the League had already set its sights on what it hoped was its final goal: An accounting of our missing, wherever they may have fallen in war-devastated Southeast Asia.

Of course, it was apparent that a number would never be found. Aircraft that had crashed in offshore waters might be impossible to locate. Impenetrable jungle would provide the final resting place for others.

But it was vowed that every effort toward the recovery and identification of the locatable American dead—including those already listed as KIA but unrecovered—would be made, and this undertaking was proclaimed as official US government policy. It was agreed that the least the country could do for the MIA wives and families was to find out what had happened to their men. At the outset, much optimism existed that this vast humanitarian act could be accomplished.

The diplomatic machinery for the accounting and recovery had been established. Under the January 1973 Paris accords that were supposedly to bring about a cease-fire in Southeast Asia, the North Vietnamese

government promised to assist in accounting for missing Americans and to bring its influence to bear in that regard in Laos and Cambodia, where many other Americans had been lost.

For its part, the US government had geared up for the recovery effort. Long before the so-called cease-fire was to go into effect early in 1973, the Defense Department was assembling the men and know-how to conduct search and recovery operations throughout SEA.

The planning was elaborate and thorough, and, with the coming of the cease-fire, the specialized unit—which came to be known as the Joint Casualty Recovery Center—set up its headquarters under the command of US Army Brig. Gen. Robert C. Kingston at Nakhon Phanom Royal Thai Air Base in eastern Thailand.

Numbering about 175 at any given time, this is a highly motivated group of men, including many volunteers. For search operations in the field, they are formed into teams, with a leader for each. He is usually backed up by a radioman, medic, and translator/interrogator. Also on the team are special-forces personnel skilled in cross-country navigation and survival, able to function effectively in the most hostile terrain.

Overall help in guiding the team is provided by specialists knowledgeable about specific geographical locales. Also along are demolition experts, responsible for defuzing unexploded ordnance or booby traps (the South Vietnamese forces have been known to have taken casualties at aircraft crash sites from such devices; no Americans have been killed that way yet).

Military security for these teams in the field is theoretically supplied by "indigenous forces"—which, in reality, so far has meant the South Vietnamese Army in those areas of South Vietnam it controls.

At Samae San, south of Bangkok, is the central identification laboratory manned by forensic pathologists, morticians, qualified crash investigators, graves registration teams, and other experts—all on



call when a crash or battle site is located.

Two extensive data banks are kept. One at the JCRC containing information about the circumstances under which an aircraft was lost and other details. The other data bank, at Samae San, contains medical histories and other facts that might contribute to an identification.

Frustration From the Outset

But despite all this expertise and many men of good intent from the



us about the fate of the many men *known* to have been taken alive by enemy forces. Neither have the remains of those who died in captivity been returned to their families.

Thus, in the year it has been operational, the JCRC has recovered and identified positively only nine American missing (the remains of about twenty more are currently under examination).

Simply, in the case of USAF MIAs, the JCRC is running out of crash sites to investigate. Of the total of about 1,000 such sites known to exist, only about five percent are in areas controlled by friendly forces. (JCRC teams have visited twenty-one crash sites and nine gravesites.)

In conjunction with the JCRC effort is also a program to reward the natives of various areas for information about crash and gravesites and the whereabouts of any MIAs.

According to a highly placed Defense Department official, the intransigence of the North Vietnamese and Viet Cong is politically motivated, and this has led to the appalling stalemate in the accounting.

The North Vietnamese, who had already agreed to the accounting under Article 8B of the Paris accords, have now in violation of the agreement tied the accounting issue to other demands. One concession they ask is the release of all civilian prisoners (many of them Viet Cong terrorists) held by the South Vietnamese. Another is the construction, and later total control over, a vast number of cemeteries all over South Vietnam, where North Vietnamese and Viet Cong dead would be buried.

Further, the North Vietnamese are insisting on free access to the cemeteries by any North Vietnamese kinfolk of the fallen. (Presumably, the actual use of these "cemeteries" would be to provide sanctuary and weapons caches for the Viet Cong, since they and the North Vietnamese have heretofore been short on sentiment concerning their war dead.)

Finally, the North Vietnamese

have linked the accounting question directly to the implementation of the cease-fire, to which they themselves have rarely conformed. (In effect, each time there is a clash between the South Vietnamese and their foes, which happens frequently, the cease-fire is "violated." Hence, according to the North Vietnamese, the cease-fire has not been implemented—a vicious circle with no solution.)

In the final analysis, even if the US succumbed to this political blackmail, it is debatable whether the South Vietnamese could be pressured to agree to the new demands.

This, then, has led to a dead end and the reason for the pessimism expressed by Scott Albright and other MIA families.

In other respects, how are the MIA family members standing up under the strain of all this?

An Uphill Fight

First, the organization that represents most of them—the League of Families—is facing an uphill fight. As anticipated, financial contributions to it "have declined tremendously" since the return of the released POWs last spring.

Even with expenditures reduced to the barest minimum, the League will run out of money by April or May of 1974 (League leaders have put out an urgent appeal for donations by members and other benefactors).

Funding is crucial, because League leaders are desperately trying to keep the MIA issue in the public consciousness—and are receiving scant attention from the media. (When fifty-three family members recently flew at their own expense into the Laotian capital city of Vientiane to present their case and receive a hoped-for list of American captives—which was not forthcoming—they had to compete for media coverage with the Mideast war, a Vice Presidential resignation, the firing of Archibald Cox, and the resignation of Attorney General Richardson, among other headline-grabbing events.)

It is at least one League mem-

military services, frustration at the JCRC has been evident from the start.

For, the reality of the situation is that the North Vietnamese have refused to abide by the agreement they signed in Paris. Other than the now *empty* twenty-one gravesites in Hanoi shown to visiting Americans and a short list of POWs who supposedly died in captivity, North Vietnam has not cooperated in any way in locating the missing or accounting for them. More dismaying, no attempt has been made to inform

MIA/POW ACTION REPORT

ber's rueful view that "the Israeli and Egyptian POWs received more media attention in six days than the American POWs did in six years," which might be less an exaggeration than it seems.

The League is currently conducting a letter-writing campaign directed at newspaper editors, columnists, and radio and TV commentators. Members are also being urged to write to their representatives in Washington.

Some League members are doing their share—and more. Mrs. Catherine Helwig *walked* the entire 750 miles from Buffalo, N. Y., to Washington, D. C., with an appeal to the Congress for a strong stand on the MIA issue. (Her son was believed to have been captured in South Vietnam in 1966, the last she has heard of him.) Mrs. Helwig's long march earned her a letter of reassurance from President Nixon that the MIAs would not be abandoned.

(Despite some criticism of the government, League leaders generally have high praise for the Administration's handling of the MIA/POW situation through the years. They particularly single out Secretary of State Henry Kissinger for the time and attention he has expended on the matter.

(Be that as it may, at least one Capitol Hill expert on MIA/POW affairs fears that what might be construed as abandonment of the missing might mean, in terms of the country's future, diminished trust of the people in their government and military.)

But the League of Families is plagued by more than financial woes and public apathy. There is growing sentiment that perhaps the League has done as much as it can, and, considering the facts, should disband now while its reputation for integrity and credibility is still intact. "Before we degenerate into a group of screeching fanatics," as one League leader put it.

In any event, the most serious problem currently confronting the League is the question of "status changes." The League's tenuous unity has heretofore been based on the mutual need of its members.



Perhaps, some members suggest, that "mutual need" is now at an end.

In many instances, the wives of men listed missing in action have come to the conclusion that their men are dead. These women have been living—for years in more than a few cases—in a legal and psychological limbo the complexities and pressures of which are impossible to relate here. They want to put down the dreadful burden of "not knowing" the fate of their husbands and get on with their lives, perhaps finding new mates to help raise their children.

On the other hand, many parents of MIAs, in a very human and jus-

tifiable way, are clinging to the hope that their sons are still alive somewhere in Southeast Asia. They don't want their sons declared dead until all hope has been extinguished.

Consider the case of a young woman who now believes that her husband has been killed, although he is still carried officially as MIA. She requests the government to re-view the evidence with the objective of a status change to "presumptively" killed in action. Her in-laws—her missing husband's parents—object. Consider the psychological strain on all concerned, especially the children.

The Injunction

In mid-1973, Dermitt Foley, the attorney brother of an MIA, filed a class-action suit on behalf of five MIA family members in a New York federal court to contest the constitutionality of the statutes under which the status changes can be made. Allegedly, the suit was filed to block what some family members believed were imminent "arbitrary and capricious" mass determinations of death of the MIAs.

The resulting temporary restraining order forbidding status changes has created another limbo and may even have opened a Pandora's box.

The case is still being reviewed, and will perhaps end up in the Supreme Court.

If those statutes, which date back several decades and give the Service Secretaries the power to make presumptive findings of death in the case of missing members of the armed forces, are declared unconstitutional, the impact could be serious. One possible effect is that the Congress might have to legislate new statutes to replace Sections 555 and 556, Title 37, of the US Code, the statutes presently under question.

In any event, in its restraining order, the court provided a way out for the wives, in that "primary next of kin" can notify their respective Service Secretaries in writing that they don't wish the Secretary to delay acting on available informa-

tion upon which he would otherwise act if it were not for the court ruling.

In other words, the wives could move for status changes, and about 100 MIA wives have chosen to do so thus far. (Psychologically, some wives can't bring themselves to make such requests; they feel that to do so is tantamount to declaring their husbands dead. In fact, of course, the Service Secretaries are burdened with this responsibility.)

Another reason for the suit that has international implications, according to Mr. Foley, is that a status change to KIA absolves North Vietnam's responsibility to account for the man under the Paris accords. (In the opinion of the US government, North Vietnam still would be charged with an accounting.) However, in view of that nation's current attitude, this argument is academic, whatever its logic.

But whatever the suit brings, it is a cold, hard fact that at some as-yet-undetermined point in the future, the status of our men missing in action in Southeast Asia will be changed to presumed killed in action. This is inevitable.

MIA family members could not but be aware of this; the rejoinder of many is, yes, but first make every effort to ascertain the fate of each and every MIA.

US government officials are pessimistic about chances that North Vietnam will come 180 degrees from its present attitude on the

missing men. But, Dr. Roger E. Shields, who is the top Defense Department liaison with the League, insists that DoD has no plan whatsoever to shut down the JCRC, and that the US government is pursuing "every avenue it can" to make the North Vietnamese fulfill their obligation. But, he cautions, "the key to the problem is in the hands of the other side."

US Alternatives

That being the case, what pressures can be brought to bear on the North Vietnamese? Here, again, the answer is equally grim.

Forget any use of US armed force. Politically, it is simply not possible and would be unjustifiably dangerous in view of recent crises.

How about friendly persuasion by China and the Soviet Union? Chances are nil. North Vietnam is in the fortunate position of being courted by both of those adversaries. Like the spoiled child of divorced parents, she can play one off against the other to get what she wants. Besides, North Vietnam is fiercely independent and would certainly resist taking orders.

How about the carrot of US financial aid to North Vietnam? In

the current political climate, there is little hope that enabling legislation could clear the Congress, and a great many Americans of varying political beliefs would object strenuously.

How about efforts at suasion of Laos, Cambodia, and North Vietnam by individual family members? This is one of the few routes still open to the League, and US officials privately say that it offers at least a glimmer of hope. Family members have already visited Vientiane to press for cooperation; there, they went directly to the people of Laos for help. Another trip to that country is being planned.

A letter has also been sent to Ton Duc Thang, President of North Vietnam, asking permission for a group of family members to visit Hanoi in personal quest of information about the MIAs. As yet, there has been no reply.

Observers see little chance of rallying world opinion to the degree that would bend North Vietnam to compliance with the Paris accords. But that might be of help. At least, it is worth taking a gamble on; League members say.

Doubtless, the National League of Families of American Prisoners and Missing in Southeast Asia will continue slugging in its effort to keep the MIA cause in the public eye, but the objective of discovering the fate of our missing men and bringing them home looks as distant as ever. ■

VIP CODE

One rainy morning in March 1970, we were working hard to rescue the crew and passengers of an Army helicopter that had crashed into a mountain peak in South Vietnam. The rescue was hampered by clouds, Viet Cong, and the poor condition of the survivors. The Air Force had an HC-130, A-1Es, and Jolly Green HH-3E helicopters in the effort. The Army had a ground team trying to climb up to the crash. The only communications common to all of us was the FM radio. We needed to agree on a frequency to use in coordinating our efforts, but were afraid to announce it on the air because of suspected enemy frequency monitoring. The pilot of the HC-130 came up with the answer: "All rescue stations, tune to Jack Benny's age plus three." We promptly switched over to 42.0 megacycles, coordinated our efforts, and rescued eight survivors.

—Contributed by Maj. David E. Vaughan, USAF

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



General Dynamics' YF-16 Lightweight Fighter prototype during rollout.

GENERAL DYNAMICS' ENTRY IN THE LIGHTWEIGHT FIGHTER COMPETITION

Innovation—in the sense of technology, cost-effectiveness, and program management—characterizes the Air Force Lightweight Fighter prototypes, the first of which is about to take to the air. Managed in a spartan, flexible manner, the program is moving into the decisive flight and evaluation phase . . .

YF-16

ON TIME, ON TRACK, ON BUDGET

By Edgar Ulsamer

SENIOR EDITOR,
AIR FORCE
MAGAZINE

EARLY in January of this year, a C-5 Galaxy will deliver to USAF's Flight Test Center at Edwards AFB, Calif., a prototype aircraft that—together with its competitor—is likely to sire a new breed of fighter planes that are small, light, agile, and—perhaps most important—much more economical to own and operate than any fighter in existence today.

The test aircraft is General Dy-

namics' YF-16. It is scheduled to start a one-year flight-test and evaluation program on or about January 18, 1974. The YF-16 competes with Northrop's YF-17 in the Air Force's Lightweight Fighter Prototype Program (see *October '73 issue, p. 64*). Each company is building and testing two aircraft under Air Force contract.

The YF-16's vital statistics are impressive. With a mission weight (combat ready after a 500-mile flight) of about 17,500 pounds, the single-engine Mach 2 fighter claims a combat radius about three times that of the F-4, is to accelerate

roughly twice as fast, and should permit turn rates about twice as good. The YF-16's average unit cost, based on a hypothetical production run of 300 aircraft coming off the line at a rate of between eight to ten a month, is to be no higher than \$3 million, in FY '72 dollars.

Program Director Lyman C. Josephs, a vice president of General Dynamics' Convair Aerospace Division, told *AIR FORCE Magazine* that "on the basis of our experience so far, we believe that we can meet the cost guidelines of the Air Force." This price is predicated on equipment similar to that of the prototypes, consisting in the main of the airframe, engine, head-up display, gun and gunsight, and a simple ranging device. The aircraft's cost could go up by as much as \$400,000, however, if ordered with all-weather avionics.

Col. William E. Thurman, Deputy for Prototypes, Aeronautical Systems Division, AFSC, told this reporter that for this program, the Air Force selected two contractors whose designs explore different technologies. "In the case of the General Dynamics airplane, we are exploring a single-engine design with a single vertical stabilizer and blended wing body to provide high lift as well as a fly-by-wire flight-control system. Both designs test what could be called the weak link in aircraft growth potential, the physiological limitations of man to withstand his G-forces."

In the case of the YF-16, the pilot's seat is tilted back to a thirty-degree angle, instead of the usual twelve to thirteen degrees. According to Air Force studies, this position, which is similar to that provided by a tilted-back chair, shortens the "fluid column" between the brain and the legs and, as a result, boosts the G-force tolerance of the average person by between one and 1½ Gs. There are indications, as yet not verified, that a reclining, raised-heel-line position also improves the pilot's tracking capability, according to Mr. Josephs.

Pilot reaction, to date, has been good, both to the YF-16's unconventional seating arrangement and to the side-stick controller, which permits more precise control inputs during combat maneuvers.

According to Colonel Thurman, it is likely that the Lightweight Fighter prototypes, along with the F-15, have approached the outer limit of sustained, high Gs that can be achieved by manned aircraft. He suggested that in the future "perhaps we should explore other elements of the performance envelope such as supersonic cruise or greater mission flexibility. But in order to establish how much further we can go in G levels of manned aircraft, we must first define man's limitation in the Lightweight Fighter."

High Thrust/Weight Ratios

The YF-16's thrust-to-weight ratio, according to Colonel Thurman, is about 1:1.3, or similar to that of the F-15. This quality, combined with a wing loading of about sixty pounds per square foot at combat weight, provides the aircraft with "an excellent cruise capability at altitude." General Dynamics spokesmen say that the effective wing loading is considerably less at high angles of attack because of the aircraft's body lift, induced in part by the strakes extending forward from the wing roots. Wind-tunnel tests performed by NASA, Mr. Josephs said, have shown that the aircraft can sustain an angle of attack of thirty-six degrees, claimed to be among the highest ever achieved.

A key element of the YF-16's good thrust-to-weight characteristics is its highly efficient engine, the F100, developed by the Air Force and Pratt & Whitney for the F-15. This engine is a turbofan that produces about 25,000 pounds of thrust with full afterburner. The Air Force left the choice between the F100 and the General Electric YJ101 turbojet engine up to the contractors, but thrust output of these powerplants dictated automatically that the former be used in a single and the latter in a twin-engine configuration. Northrop opted for the GE engine. Mr. Josephs

cited the following reasons for choosing a single turbofan engine for the YF-16.

- By going to a single engine, General Dynamics believes, it can build a smaller, lighter, and less expensive aircraft.

- Militating against the single-engine configuration is the widely held notion that aircraft of this type experience higher attrition rates than multiengine designs. "We think that this is a very emotional subject and, therefore, have painstakingly analyzed all available Air Force and Navy data. We found no evidence of significant differences between singles and twins overall. There is indication of a slight increase in attrition rates in peacetime so far as engine-related accidents are concerned, but the scatter is so great from one aircraft to the next that it is hard to make a case either way. In addition, the maintenance and operating costs of a single are less than for a twin and, therefore, make up for any slight margin so far as peacetime attrition is concerned," according to Mr. Josephs.

- There is evidence that air forces of some allied countries prefer twin-engine designs, but General Dynamics marketing experts believe that the cost advantages of a single-engine design and knowledge of the strong support the F100 is receiving in all R&D and maintenance areas might compensate, at least in part, for these antipathies.

- So far as the basic engine design is concerned, General Dynamics aerodynamicists believe that a turbofan's cycle (efficiency at various speeds and conditions) suits the mission of the Lightweight Fighter more than a turbojet. The company's experts believe that a single-purpose aircraft could "benefit from a turbojet engine because it offers some advantages with full afterburner. But if range combined with combat performance and mission flexibility are the driving considerations, the shoe is on the other foot."

(General Dynamics is considering use of the F401 engine, which is to power the Navy's F-14B fleet support fighter, for a Lightweight Fighter for the Navy. Although the Department of Defense named the Air Force as the lead agency in

Lightweight Fighter development for all services, the Navy's special requirements may call for a unique design. General Dynamics' proposed naval version of the YF-16 is elongated to accommodate the higher internal fuel volume desired by that service. This, in turn, caused the proposed change to the F401 engine, which produces more takeoff thrust than the F100 engine. For these reasons, and because of the beefed-up landing gear required for carrier operation, the Navy version of the aircraft would be both heavier and more expensive, according to Mr. Josephs.)

Fly-by-Wire and CCV

A pivotal innovation of the YF-16 is the use of a fly-by-wire flight-control system, which replaces the conventional mechanical linkage from the cockpit to the actuators of the control surfaces with redundant electronic channels. This in turn has permitted the use of CCV (Control Configured Vehicles) technology, a promising new design technique. CCV designs are aerodynamically less stable under certain conditions, but make up for this by "active" flight controls.

In the case of the YF-16, Mr. Josephs explained, "we have a negative margin of up to ten percent [instability] in the subsonic regime. This does not apply to supersonic flight, because there the center of pressure travels backward in the aircraft. We feel CCV gives us a significant increase in maneuverability and reduces the trim drag greatly, both supersonically and subsonically."

The choice of fly-by-wire and CCV, Mr. Josephs said, "was a natural one because we feel that the high degree of maneuverability specified for this aircraft makes use of these techniques essential. It is easier to optimize the control system with electronics than with mechanical linkages."

Both the Air Force and General Dynamics are confident that there are no undue risks associated with fly-by-wire designs because they are "well within the state of the art." Mr. Josephs pointed out that although the F-111, another Genera

Dynamics airplane, employs mechanical linkages, it "superimposes a triplex command augmentation system. Most of the time, the way the aircraft is being flown by the Air Force, the mechanical system is just going along for the ride.

"When the aircraft operates in the terrain-following mode, the operation is all fly-by-wire. The reliability of that system has turned out to be extremely good. So, we took this system and made some changes, added a few features, and came up with the quadrex [four-fold redundancy] fly-by-wire system for the YF-16." The fly-by-wire technology decreases both aircraft weight and vulnerability and increases maneuverability, he added.

The Air Force's Flight Dynamics Laboratory has already requested one of the two YF-16 prototypes, upon completion of the flight-test program, for continued research in the fly-by-wire and CCV area. The prospects for these technologies, in the view of General Dynamics, the Air Force, and NASA, are very bright because they make possible the design of smaller and lighter aircraft with higher performance.

"The next step will be in the directional plane by cutting the size of the vertical tail and adding some side-force devices. Ultimately, there may well be a system combining these qualities with vectored thrust [using thrust to change direction of the vehicle; experiments with thrust vectoring are currently being conducted with the British-built Harrier V/STOL aircraft by the Marine Corps]."

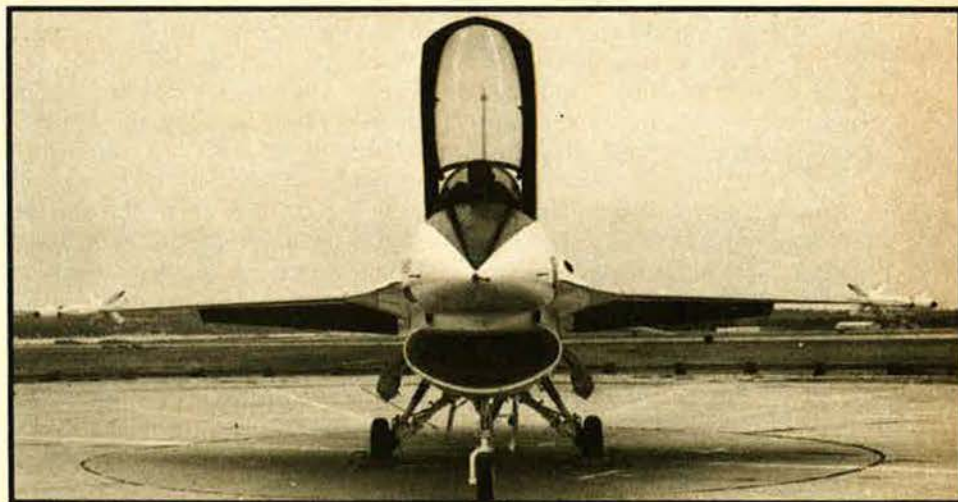
Combat performance of the YF-16, in Mr. Josephs' view, will be "excellent. In a dogfight, we believe, we will be able to handle anything that exists today or is on the drawing board."

On Cost and on Time

From the Air Force's point of view, one of the most welcome aspects of the Lightweight Fighter Program is the fact, pointed out by Mr. Josephs, that, "at the moment, we are considerably under budget and on schedule. Unless we run into serious trouble during flight testing, we think we will be able to com-

plete the program within the cost ceilings of our contract. The aircraft's empty weight is 400 pounds higher than what we proposed, but the reason for that is that, in the interest of economy, we picked off-the-shelf components, such as the F-111's servos. If we go into pro-

Various views of the YF-16, including the cockpit, show its blended wing body, meant to enhance body lift, as well as the prototype's tilted-back pilot's seat, which increases G-force tolerance. AFSC's Deputy for Prototypes, Col. W. E. Thurman, is pictured at right.



duction, we would use optimized subsystems rather than components designed for a much larger and heavier aircraft."

General Dynamics shares a key conviction with its competitor, Northrop: Whichever aircraft is chosen by the Air Force as the winner of the flight-test program, and thereby categorized a candidate for eventual series production, "has a real solid chance for overseas sales. Our research indicates that that market may be as high as 2,000 aircraft. Of course, there will be some competition from the F-1 built by Dassault and the Swedish Viggen, but, in the first instance, we are dealing with an older design, and, in the latter, with an aircraft that is bigger and possibly more expensive. Also, the NATO countries are likely to be interested in an aircraft backed by the US Air Force," according to Mr. Josephs. He added that if delivery time becomes a crucial issue to a foreign buyer, "we could compress the presently envisioned schedule considerably, probably down to two years from the time of production go-ahead."

Spartan Management

"The Lightweight Fighter Prototype Program is designed to encourage the inventiveness of the Air Force and its industrial contractors. The program is structured to show the contractors that the government is ready to accept and evaluate new ideas, will not impose any unnecessary constraints, recognizes the degree of risk associated with each new technical challenge, and accepts penalties associated with that challenge."

This is how Colonel Thurman summarized the Lightweight Fighter Program, which is being run by a full-time Air Force System Program Office staff of four people. These are the two program managers—one for the YF-16 and the other for the YF-17—an engineer, and a procurement specialist. This small staff, he explained, relies on experts in

AFSC's Aeronautical Division, the Air Force Laboratories, and NASA to help whenever needed.

The System Program Office's main job is "to identify problems and know how and where to find help in a crisis. There are, of course, two sides to this approach, and at times we are vulnerable by not having all the needed expertise on board. If we go into production, it may become necessary to expand the staff, but I don't think that it would ever swell to the levels of conventionally managed programs."

The central change from the conventional management approach of the program is that the contract sets only performance goals but no contractual specs. "The contractors have design responsibility. We are trying to manage the program only in terms of exceptions and leave the routine decisions up to them," according to Colonel Thurman. The contract does not impose military specs on the contractors, but since they are geared up to do business that way, they did so anyway, he added.

The free hand given the contractors covers the basic development schedule. "They set their own," Colonel Thurman emphasized, adding, "it simply is not in the interest of this program to exert competitive pressures in terms of schedule. As a result, General Dynamics will start its flight-test program about three months ahead of Northrop, based on a timetable the contractors themselves proposed at the outset."

These latitudes meet with enthusiasm on the contractors' part. "We take our hats off to the Air Force. They said we are to design, develop, and flight-test substantially in accordance with the contractor's proposal. That's it, there are no other specs. We work with the Air Force on a completely open basis. The minute we know something, they do too. But we don't have hordes of people who ask for justification of everything we do or don't do. It has turned out to be a very rational approach, and we think that some of these techniques should be applied if there is a pro-

duction program," Mr. Josephs told AIR FORCE Magazine.

A key element of the flight-test program, according to Colonel Thurman, is "a completely integrated flight-test team, consisting of the contractors' personnel, the Flight Test Center, and the Tactical Air Command. This is the first time that such a total integration of all activities associated with flight test and evaluation has ever been attempted. In addition, the test program will also be more flexible than in the past. We don't want to bog down in minor details and will hold all aspects of bureaucracy to a minimum."

The flight testing will make allowance for differences in basic design philosophy of the two contractors. General Dynamics, he said, "over-designed" its airplane by twenty-five percent, making it possible to go up to 100 percent of design load in flight test, and to 110 percent in static test, Colonel Thurman said. Northrop decided not to overdesign, on the other hand, and, therefore, will initially hold its flight test to eighty percent of design load, although also reaching 110 percent in static test.

The results of the Lightweight Fighter Program to date, in Colonel Thurman's view, are highly encouraging. "In addition to having developed two very promising aircraft—and we hope that both will meet all the design goals completely—we have acquired a wealth of important design information for a fraction of the cost normally incurred. Also, we have learned or relearned some crucial lessons.

"First, competition is vital. There simply is no other contractual or management incentive that is as effective as competition. Secondly, this program has demonstrated the importance of visibility, the need to bring problems out into the open the minute they occur. Both sides, the Air Force and the contractors, have been scrupulously honest, in a fiscal as well as a technical sense. And third, it is vital that prototypes lead requirements. The results are cost savings and better products."

In this era of shrinking budgets and mounting requirements, the latter two characteristics would seem to be paramount. ■

FORTY-FIVE YEARS AGO THIS MONTH, TWO ARMY AIR CORPS DOUGLAS C-1 AIRCRAFT, CONVERTED INTO PRIMITIVE TANKERS, KEPT A FOKKER C-2, THE *QUESTION MARK*, AIRBORNE FOR MORE THAN SIX DAYS TO SET A WORLD ENDURANCE RECORD. FLYING NIGHT AND DAY AIR-TO-AIR REFUELING MISSIONS, SOME UNDER EXTREME WEATHER CONDITIONS AND WITHOUT INSTRUMENTS OR RADIO AIDS, THE "REFUELERS" PIONEERED A TECHNIQUE THAT HAS MADE THE USAF A GLOBAL DETERRENT FORCE. HERE, THE FULL STORY OF THIS REMARKABLE ACHIEVEMENT IS TOLD FOR THE FIRST TIME BY THE ONLY SURVIVING PILOT OF THE TANKERS IN . . .

REFLECTIONS OF AN EARLY REFUELER



Refueling Plane #1 at Rockwell Field. In the cockpit, an unidentified mechanic (left) and Pvt. Harold Rockenbaugh. The author stands on the wing, Lt. Odas Moon on the wheel. On ground, from left: Lts. Auby C. Strickland, Joseph G. Hopkins, Andrew F. Salter, and Irwin A. Woodring.

By Brig. Gen. Ross G. Hoyt, USAF (Ret.)

THE years 1923 and 1929 were marked by events that established a great milestone in the history of the United States Air Force: air-to-air refueling.

In 1923, a DH-4 airplane piloted by Lts. Lowell Smith and John Richter was kept aloft for more than thirty-seven hours, in the vicinity of Rockwell Field, Calif., by a second DH-4 refueling airplane crewed by Lts. Virgil Hine and Frank Seifert.

Six years later, two Douglas C-1s equipped as aerial refuelers kept a Fokker C-2 airplane airborne for 150 hours, forty minutes, and fifteen seconds over California—a world record. The record was of passing importance. Few could then foresee the lasting significance of the flight.

I was the pilot of one of the DC-1 refuelers. I am one of two survivors of that "Ancient Order of Refuelers." The other is Brig. Gen. Joseph

G. Hopkins, a member of the crew of the second DC-1. He is retired and living in California.

Plans and Preparations

Planning for the 1929 flight had begun the previous year. I was then on duty in the War Plans Section of the Office of the Chief of the Air Corps. Late in the year, I received orders from the Chief of the Air Corps to participate in an air-



RP #1, crewed by Hoyt, Strickland, and Woodring, refuels the Question Mark over Burbank, Calif.

to-air refueling endurance flight as pilot of a refueling airplane.

The Middletown Air Depot, Middletown, Pa., prepared two airplanes for the flight. A Fokker C-2 trimotor monoplane was fitted with additional fuel tanks and other special equipment as the airplane to be refueled. A Douglas C-1 was equipped with two 150-gallon fuel tanks, in addition to the standard tankage, and with a fifty-foot length of metal-lined hose with a lead weight attached to the lower end to be let down through a trap door in the bottom of the fuselage for refueling in flight.

The Douglas C-1 was a biplane of tubular construction, fabric covered, powered by a 400-hp Liberty engine, water-cooled, of World War I vintage. The C-1 had an unusually high angle of attack when taxiing, with the result that it was slow to gain flying speed on takeoff. However, it was considered an efficient "workhorse."

In early December 1928, the two airplanes were ready. I was flown to Middletown, together with a crew for the Fokker C-2, to take delivery of the airplanes.

The next few days were devoted to practice flights in the vicinity of Bolling Field, D. C., to test equipment, night and day, and demonstrate the feasibility of air-to-air refueling to Secretary of War Dwight F. Davis, Assistant Secretary of War for Aviation F. Trubee Davison, and Maj. Gen. James E. Fechet, Chief of the Air Corps. The project was approved, and both airplanes prepared to depart for Rockwell Field at San Diego. California had been decided on as the most favorable location for the endurance flight during the winter months.

The Fokker C-2, now christened *Question Mark*, and the Douglas C-1, designated Refueling Airplane No. 1 (RP #1), took off from Bolling Field, on December 18, for Rockwell Field via the southern route. Aboard the Fokker for the westward series of "hops" were Maj. Carl Spaatz, Commanding Officer of the project; Capt. Ira Eaker; SSgt. R. W. Hooe, mechanic; and Hans Adamson, Secretary Davison's secretary and public-relations representative for the endurance flight.

The crew of RP #1 consisted of myself as pilot; 2d Lt. Elwood "Pete" Quesada, copilot; and Pvt. Harold Rockenbaugh, mechanic. Lieutenants Quesada and Harry Halverson joined the crew of the *Question Mark* on arrival at Rockwell Field.

The flight was routine until we reached Shreveport, La., on December 20. There it was found that the field was too soft, due to the heavy rains, for the *Question Mark* to take off with a full load of fuel. Love Field, Dallas, Tex., also reported heavy rain, but was in better condition. It was decided that RP #1 would leave Shreveport for Dallas in advance to fill its tanks in preparation for refueling the *Question Mark* over Dallas en route to Midland, Tex.

At the appointed time, I taxied RP #1 to the southeast corner of Love Field, turned, and headed into a northwest wind. The engine was "revved up" for final test before takeoff. With full throttle, the C-1 just shuddered and sat there with its nose in the air. The wheels had settled slightly into the sod. Finally, with full power and Pete Quesada and Rockenbaugh pushing, we started rolling. Pete and Rockenbaugh scrambled aboard through the trap door in the bottom of the fuselage. Speed gradually increased, and about halfway down the field the tail came up. We lifted off, barely clearing the high-tension lines at the end of the field, climbed up, delivered 250 gallons of fuel,

and continued on to Midland. I remember commenting that "this crate will fly with a load it won't taxi with."

The remainder of the flight from Midland to Rockwell Field was completed without incident. We arrived after dark on December 22. The Fokker arrived the next day.

Communicating Without Radios

Beginning the day after Christmas and continuing until December 31, RP #1 made ten flights at Rockwell Field to test equipment, practice day and night refueling, and familiarize the pilot and crew of RP #2 with midair refueling.

During the preparatory period, 1st Lt. Auby C. Strickland and 2d Lt. Irwin A. Woodring, stationed at Rockwell Field, were assigned as my crew to handle the refueling hose and supply lines for delivering fuel, food, oil, batteries, mail, and other supplies necessary for life aboard the *Question Mark*.

RP #2, another Douglas C-1 airplane, was equipped the same as RP #1, at the Rockwell Air Depot. It was piloted by 1st Lt. Odas Moon, with Lts. Joseph G. Hopkins and Andrew F. Salter, also stationed at Rockwell Field, as his crew.

There was no electronic communication equipment in any of the airplanes. We had to improvise means of communication between airplanes, ground to air, air to ground, and between the pilot of the refueling airplane and his crew in the refueling compartment.

During daylight, communication between airplanes consisted of hand signals and messages written on a blackboard aboard the *Question Mark*. Flashlight signals and written messages, let down and pulled up on the end of the hose or supply line, were used at night.

Ground-to-air communication was accomplished by ground panels messages sent up via the refueling airplane, and messages written on the fuselage of an airplane, which would fly alongside the *Question Mark*.

Air-to-ground messages were

conveyed by Very pistol, messages dropped in Signal Corps message bags, and those brought back by the refueling airplane after contact.

The pilot and crew of the refueling airplane communicated by means of a small manila line fastened to the pilot's arm and running back to the refueling compartment. A code consisting of combinations of jerks on the line indicated the making and breaking of contact and desired variations in speed. It proved to be one of the most rapid means of communication used during the flight. Members of the refueling crew could come forward through a passageway between the refueling tanks to the pilot's cockpit for consultation, if necessary.

On December 31, 1928, all three airplanes and crews were ready. The *Question Mark* and RP #2 left Rockwell Field for Metropolitan Airport at Los Angeles for the start of the refueling endurance flight on New Year's Day, 1929. I remained at Rockwell Field with RP #1 for refueling and resupplying contacts at the southern end of the course laid out from Metropolitan Airport to Rockwell Field and return.

Going for a Record

The *Question Mark* lifted off from Metropolitan Airport with a light fuel load at 7:27 a.m., January 1, 1929. Five men were aboard: Maj. Carl Spaatz, Capt. Ira Eaker, Lts. Harry Halverson and Elwood Quesada, and SSgt. R. W. Hooe. The first refueling was performed at 8:15 a.m., by RP #2.

My crew and I were kept extremely busy with RP #1, making all of the next nine contacts of January 1 and 2 in the vicinity of Rockwell Field, including two night refuelings.

The next three contacts of January 3 were made by RP #2 near Metropolitan Airport, Los Angeles, the last at 9:00 a.m. Apparently RP #2 did not offload much fuel. Two hours later, the Fokker arrived over Rockwell Field, running very low on gasoline.

An entry in the log of the *Ques-*



Brig. Gen. Ross G. Hoyt, USAF (Ret.), was active in military aviation from 1918 until his retirement in the closing months of World War II. Much of his career was associated with the development of fighter aircraft and command of fighter units, culminating with his leadership of the 8th Fighter Command's Air Defense Wing in 1943. General Hoyt participated in or led many pioneering flights during the 1920s and '30s in addition to the refueling operation recounted in this article. He now lives in Washington, D. C.

tion Mark made by Major Spaatz on January 3 states: "Arrived Rockwell Field at 11:00 a.m. at 4,000 feet. Field covered with clouds. In urgent need of gas. Just a few gallons left. Went beneath the clouds. Crossed Rockwell Field at 300 feet altitude. Saw C-1 take off. Climbed back through clouds."

I took RP #1 up through the clouds and made two contacts. On the first contact we offloaded 150 gallons of fuel. On the second, we transferred a storage battery.

Major Spaatz also entered in the log: "Rockwell Field showed keen judgment in picking us up promptly and getting fuel to us just as we were about to use up our last few gallons."

Fortunately, RP #1 was fully serviced and its crew on alert so that we could take off immediately, climb up to the *Question Mark*, and replenish its rapidly dwindling fuel

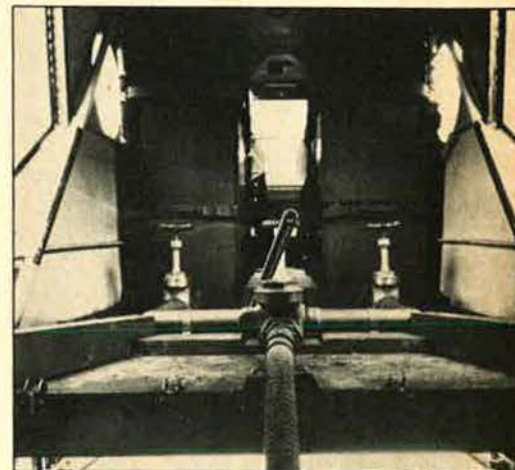
supply. The prompt action no doubt saved the midair refueling endurance flight from an untimely end before the world record had been broken.

Night refueling placed a heavy burden on the pilot and crew of the refueling airplane, both from a physical and piloting standpoint. There were frequent interruptions of rest during the night. We always took off with heavy loads and often had to fly and land in fog and dust during the hours of darkness, without instruments or blind-landing equipment. We shared an intense feeling of responsibility for the success of the undertaking.

All of these factors made the night operations especially fatiguing for the refueling crews. However, the greater number of refuelings provided by night contacts cut down on the Fokker's load. This, in turn, reduced the power needed to maintain altitude, thus prolonging the life of the plane's engines. After all, the object of the flight, in addition to confirming the practicality of midair refueling, was to keep the *Question Mark's* engines healthy as long as possible in order to break the air-to-air refueling record.

Zero-Zero Landing

On the other hand, it was easier both for the pilot of the refueler and



Interior of the author's Douglas C-1, RP #1, showing gasoline tanks, release valve, and refueling hose.



The auxiliary fuel tank and rudimentary refueling equipment of the *Question Mark*, a trimotor Fokker C-2.

the *Question Mark* to make and maintain refueling contact in the smoother night air. I found it easier to maintain constant airspeed when nosing down and throttling back to overcome the "ballooning" effect on RP #1, caused by its loss of weight during refueling and the settling of the Fokker as its load increased. That reduced the chance of prematurely breaking contact.

Our operations at Rockwell Field were not conducive to longevity! Once we had to take off in the dark into fog at the ocean end of the field, climb through the fog to the *Question Mark* cruising in the clear, deliver a load of fuel on course to Los Angeles, and return to find Rockwell Field completely obscured by a thick layer of fog. This posed a landing problem. (The Air Corps did not incorporate instrument flying and landing into its training program until long after 1929.)

Fortunately, the Douglas C-1 was a very stable airplane. With proper setting of control tabs on rudder, ailerons, and flippers; adjustment of the horizontal stabilizer and throttle for minimum speed in the landing glide; and the use of the lights of San Diego and the floodlights at Rockwell Field glowing dully up through the fog as reference points, it was possible to glide down into the soup, "hands off." After what seemed an interminable wait, the wheels touched. The control column was pulled slowly back, and we settled to an "eggshell" landing. The fog was so dense that a truck had to come out and lead us to the flight line. After that particular flight, my crew and I christened RP #1 *Asterisk!*

Great tribute must be paid to the

men back in the refueling compartment—Strickland and Woodring with me; Hopkins and Salter with Moon. They had to do a great deal of hard manual labor in letting down and pulling up the heavy, cumbersome hose.

On landing from refueling flights, Strickland and Woodring would be exhausted and drenched with perspiration. No doubt Hopkins and Salter had the same experience. In the cramped quarters of the refueling compartment, they had to remove their parachutes. This increased the hazards in case of collision or fire, which could have occurred during any one of the refueling contacts.

New Area, New Problems

On January 3, the weather was forecast to deteriorate still more along the coast. It was decided to move refueling operations eastward over the coastal mountain ranges to the Imperial Valley.

The *Question Mark* made the flight to Imperial Valley with a light fuel load because of doubt as to its ability to clear the mountains and in order to put minimum strain on its engines. The plan called for RP #1 to refuel the *Question Mark* on arrival over Imperial Valley.

As RP #1 proceeded to Imperial Valley, its engine already showed signs of fatigue. The flying time accumulated at Bolling Field prior to departure, the transcontinental flight, the test and familiarization flights at Rockwell, and the time accumulated since the start of the refueling endurance flight all had taken their toll.

I approached the mountains with doubt whether the heavily loaded RP #1 could make it over the mountains. However, as we drew nearer, the updraft caused by westerly winds striking the upslope provided enough boost to lift us over. After getting across the first ridge, we lost altitude with the downdraft on the eastern slope. The process was repeated at succeeding ridges until we were over the Imperial Valley, where refueling took place as planned.

Had the wind turned easterly, reversing the up and down drafts, or had the engine of RP #1 faltered, the endurance flight would probably have ended abruptly. It is doubtful, with no electronic communication equipment, that RP #2 at Los Angeles, nearly three hours away, could have been brought into the picture in time to save the situation. And there were only two refueling airplanes.

Ground and flying conditions in the Imperial Valley were highly unfavorable for our refueling operations. The airport was covered with a layer of fine dust that was blown about by RP #1 while taxiing, taking off, or landing. In the calm existing on the ground at night, the dust remained suspended over the landing area for a considerable time. This made landing conditions even more difficult than at Rockwell Field, since the lighting facilities in the valley were inadequate. I used the same tactics for night landings as those employed in the fog at Rockwell Field.

Although it was calm at night on the ground, the wind aloft was high and, due to the disturbing effect of the mountains, there were strong vertical currents. While refueling, the two airplanes would alternately lose and gain 500 to 1,500 feet.

All five contacts with the *Question Mark* over the Imperial Valley were made by RP #1—two during darkness and three in daylight. It was during the night of January 3-4 that the world record for mid-air refueling endurance was broken.

Victory and Near Tragedy

After the record had been broken, we continued refueling over the Imperial Valley. We landed after a refueling contact at 9:35 a.m., January 4, and filled all tanks before departure for Metropolitan Airport, Los Angeles, where operations were to continue until the end.

I took off from Imperial Valley at 11:00 a.m., January 4, and joined the *Question Mark* en route to Los Angeles, prepared to refuel if necessary. Upon arrival over Los Angeles at 2:35 p.m., we refueled

the *Question Mark* and continued to do so through eleven more contacts in the vicinity of Metropolitan Airport—six during hours of darkness and five in daylight.

During the midnight refueling of January 5–6, while based at Metropolitan Airport, we had a near brush with Gray Cliff mountain range. I took RP #1 up with a load of fuel and flew alongside the *Question Mark*. We made contact, and refueling started. I had a clear view from the cockpit of the C-1 throughout the forward 180 degrees. It became obvious to me that, if we maintained our course very long, collision with Gray Cliff was inevitable.

The close formation flying required for refueling demanded the complete attention of Captain Eaker, who piloted the Fokker during all refuelings. According to the *Report of the Flight of the Question Mark*, he kept his eyes glued on the refueling plane's landing gear above him during contact. Knowing this, but to avoid breaking contact prematurely, I maintained course awaiting the break signals: one when the main fuel valve was closed to prevent gasoline spewing over Major Spaatz, who handled the hose on the Fokker; another when the hose swung free.

Suddenly, the individual crags and boulders of Gray Cliff became faintly discernible in the dim, night light. No signals had been received from my crew! I made an abrupt, climbing turn away from the mountain as the only way of warning that we were proceeding into danger.

Needless to say, it was with a great sense of relief that, some time later, *Question Mark's* running lights were sighted.

Again I flew alongside for further refueling, but received a flashlight signal that no more fuel was required at that time.

During the last two days and nights of the operation, RP #1 developed engine trouble in the form of leaking water jackets and oil lines, which grew progressively worse. Upon landing from refueling flights, I would find my boots soaked with water and oil that had

come back through openings in the firewall. By filling the radiator and replenishing the oil before each flight, RP #1 continued refueling operations day and night until the last contact, risking forced landing, possibly at night, in order to avoid leaving the *Question Mark* with only one refueling airplane. The *Question Mark*, not informed of the situation, was also having worries with faltering engines.

The last refueling contact was made by RP #1 at 1:50 p.m., on January 7, 1929. Shortly thereafter, the *Question Mark* landed with the new world endurance record, made possible by midair refueling.

The two refueling airplanes had made a total of forty-three takeoffs and landings, night and day. My crew and I in RP #1 had made twenty-seven refueling and resupplying contacts, ten during the hours of darkness in the face of adverse weather conditions at Rockwell Field and in the Imperial Valley. RP #2 made sixteen contacts with the *Question Mark* in the vicinity of Metropolitan Airport, two during the hours of darkness.

Return to the Future

On January 20, 1929, after engine changes at Rockwell Field, the *Question Mark* and RP #1 began the return flight to Washington, where we landed at Bolling Field on January 26, 1929, to be greeted by the Secretary of War, Assistant Secretary of War for Aviation, and the Chief of the Air Corps.

The crew members of the *Question Mark* were awarded the Distinguished Flying Cross by the War Department. The pilots and crew of the refueling airplanes received letters of commendation from the Chief of the Air Corps.

When considering the early refueling flights, where the success of the operation was so dependent on the refuelers who delivered the requisites for keeping the refueled airplane in flight, the refueled and the refueler should be treated as a unit.

Those pioneering flights of both airplanes—refueled and refueler—

hold a special and secure position in the advancement of the capabilities of the United States Air Force. They are special with respect to both place and time. They are not only historical; their value to national security lives today and will continue to live.

Thirty-five years after the event, I received the following letter from the Air Force Chief of Staff, Gen. Curtis E. LeMay:

Dear General Hoyt:

On the 35th Anniversary of the flight of the *Question Mark*, I send best wishes both personally and on behalf of the United States Air Force.

Although few recognized the long-range impact in 1929, it was certainly the first glimmer of light leading to the development of the KC-135 and today's sophisticated refueling techniques.

You have left to the Air Force a heritage of which you may well be proud.

Sincerely,

CURTIS E. LEMAY
Chief of Staff

It was not until after World War II, which included the first large-scale air war in history, that in-flight refueling came into its own. The reason for the delay is not of importance.

However, it is important that through the development of the KC-135 tanker and the advent of propellerless jet aircraft which made aerial refueling easier, especially for fighter aircraft, midair refueling over the vast landmasses and ocean areas of the world has made the Air Force a truly global deterrent force.

We knew in 1929 that we had established the great potential of air-to-air refueling for increased capabilities of the Air Force. We could not foresee that the seeds planted in 1923 and 1929 would grow like the mustard seed of the Gospel parable: “. . . the smallest of seeds, which a man took and cast into his own garden; and it grew and became a large tree and the birds of the air dwelt in its branches.” ■

AFA ADVISERS AND

AFA Committee members, Advisers in specialized areas of interest, and special Advisory Councils exemplify the tradition of volunteer service so essential to a membership association. Last month, we presented the members of AFA's several committees. This month, we introduce the Special Advisers and members of the Advisory Councils who have agreed to serve AFA during the coming year, to be followed next month by AFA's Junior Officer Advisory Council Executive Committee and Airmen Council.

AIR FORCE JUNIOR ROTC ADVISER

Recommends to AFA's President policies and procedures in support of the Junior AFROTC program in the nation's high schools. Col. Thomas E. Lamb, USAF (Ret.), Irmo, S. C.



Lamb

AIR FORCE SENIOR ROTC ADVISER



Morley

Recommends to the AFA President policies and procedures in support of the Senior AFROTC program at colleges and universities. Lt. Col. William G. Morley, USAF (Ret.), Springfield, Va.

CIVIL AIR PATROL ADVISER

Recommends to the Association President policies and procedures in support of all elements of the Civil Air Patrol, especially the CAP Cadet Program. Kenneth A. Rowe, Richmond, Va.



Rowe

RETIREE ADVISER



Mazer

Advises the President of AFA on such retiree matters as recomputation, dual compensation, job opportunities, survivors' benefits, and other matters of particular interest to this important segment of the AFA membership. Col. Nathan H. Mazer, USAF (Ret.), Ogden, Utah.

MEDICAL ADVISER

Advises the AFA President in areas of interest to Air Force Medical Personnel, both active and Reserve, as well as military medical programs benefiting all Air Force people. David Waxman, M.D., Kansas City, Mo.



Waxman

ORGANIZATIONAL ADVISORY COUNCIL

The Council considers matters pertaining to State and Chapter programming, membership solicitation, reporting procedures for field units, and so on. Members are Jack C. Price, Chairman, Clearfield, Utah; B. L. Cockrell, San Antonio, Tex.; Floy F. Damman, Whittier, Calif.; Alexander E. Harris, Little Rock, Ark.; and Edward T. Nedder Hyde Park, Mass.



Price



Cockrell



Damman



Harris



Nedder

ADVISORY COUNCILS FOR THE COMING YEAR

AIR RESERVE COUNCIL

Recommends to the AFA President policies in support of the Air Force Reserve. One of AFA's oldest Advisory Groups, it is concerned with programs and legislation affecting both Reserve units and individual Reservists. Members are Maj. Gen. Clarence

Davies, Jr., Chairman, New York, N. Y.; Capt. Joan C. Collins, McGuire AFB, N. J.; Lt. Col. George P. S. Forschler, Burley, Idaho; Col. James D. Isaacks, Jr., San Antonio, Tex.; and Brig. Gen. Alfred Verhulst, Robins AFB, Ga.



Davies



Collins



Forschler



Isaacks



Verhulst

AIR NATIONAL GUARD COUNCIL

Recommends to the AFA President methods by which the Association can most effectively support the Air National Guard. Members include Brig. Gen. Richard Posey, Chairman, Harrisburg, Pa.; Col. James R. Ash-

ford, Hickam AFB, Hawaii; Lt. Col. James C. Hall, Denver, Colo.; Col. Stanley F. H. Newman, Oklahoma City, Okla.; and 2d Lt. Diane L. Tucker, Arlington, Va.



Posey



Ashford



Hall



Newman



Tucker

CIVILIAN PERSONNEL COUNCIL

Advises the President on AFA matters concerning Civil Service employees of the Air Force and seeks to promote greater understanding between civilian employees and uniformed members of the Air Force. Members include John A. Lang, Jr.,

Chairman, Greenville, N. C.; Ray W. Kelso, Washington, D. C.; Robert W. Watson, Wright-Patterson AFB, Ohio; John A. Watts, Mathews, Va.; John E. Zipp, Denver, Colo.; and Thomas W. Nelson, Adviser, Washington, D. C.



Lang



Kelso



Watson



Watts



Zipp



Nelson

The Air Force Institute of Technology (AFIT) directs all advanced specialized education—both technical and nontechnical—needed by the Air Force to supplement military education and training provided by the Air Training Command and Air University. Educational opportunities that are available to Air Force people through AFIT are described here, in . . .

What AFIT Has for You

By Capt. Don Carson, USAF

CONTRIBUTING EDITOR, AIR FORCE MAGAZINE

THE number of senior Air Force officers with advanced degrees has been growing steadily during the past two decades. There is every indication that this trend will continue. In our technically oriented Air Force, which uses sophisticated management techniques and has worldwide responsibilities, advanced education is fast reaching the status of a necessity, rather than a luxury, for Air Force leaders. If you want to be better qualified to compete for positions of great responsibility, the Air Force Institute of Technology (AFIT) has something for you.

The continuously expanding demands placed on Air Force leaders have been a governing factor in the growth of AFIT. From its original seven students in 1919, AFIT has mushroomed to more than 17,000 continuation and degree students, a faculty and staff of some 500, and programs involving 250 civilian institutions throughout the country.

AFIT, a major element of the Air University, is headquartered at Wright-Patterson AFB, Ohio. It is responsible for all advanced education programs not conducted by the Air University's professional military colleges and schools in the

Maxwell-Gunter AFB complex at Montgomery, Ala. In addition to AFIT's residence schools at Wright-Patterson, the Institute is the home of AFIT's Civilian Institutions and Admissions Directorates. The current Commandant is Maj. Gen. Frank Simokaitis.

Residence Schools

AFIT has three residence schools: The School of Systems and

Logistics, the School of Engineering, and the School of Civil Engineering.

• **The School of Systems and Logistics** offers several programs, and its students come from all DoD elements and several allied nations. This school, which emphasizes methods of scientific management, is fully accredited and has a high academic rating. The Graduate Logistics Management Program is a twelve-month course granting master's degrees to 150 students each year.

The school also conducts a broad continuing education program, offering thirty-five different courses, varying from one to seven weeks in length and designed to keep military managers abreast of the latest developments in such specialty areas as maintenance, supply, procurement and production. It also conducts seminars at various bases as a follow-on to this program. AFIT believes the seminars will improve the long-term effectiveness of USAF systems and logistics programs by keeping managers current in the latest developments in these fields.

To meet their thesis requirement Systems and Logistics graduate students spend the last quarter of their academic year working on actual



In the view of AFIT Commandant Maj. Gen. Frank Simokaitis: "AFIT programs offer an officer the chance to directly influence career progression and assignments."

USAF logistical problems submitted by the major commands. This program involves students in solving such problems while preparing themselves for future assignments in their career field.

• **The School of Engineering** is the other degree-granting AFIT residence school. It differs from civilian engineering schools by tailoring its curricula to meet the specific needs of the USAF in scientific and technological areas. The school grants degrees through the doctoral level, but most students are enrolled in one of eleven master's programs.

Many of the aerospace scientists working at the USAF laboratories at Wright-Patterson AFB also serve as instructors and lecturers in the School of Engineering. This affords AFIT students the opportunity to learn from direct association with some of the nation's leading scientists.

Toward the end of their twelve- to eighteen-month programs, many students are assigned full time to a USAF laboratory for specialized training. The opportunity to become directly involved in the labs' programs is not available at any civilian institution. This is one reason why the AFIT School of Engineering is so highly regarded in the aerospace and academic communities.

• **The School of Civil Engineering** is the third AFIT residence school. It emphasizes short courses, designed to keep USAF civil engineers current on the latest developments in their profession. Courses are offered in the many civil engineering specialties required by the USAF, including corrosion control, pavement engineering, and environmental protection. These courses are unique to the Air Force and are not available elsewhere. The School of Civil Engineering does not have a graduate degree-granting program at this time.

Unique Programs

General Simokaitis stressed the uniqueness of the residence programs during an interview with AIR FORCE Magazine at his head-

quarters. "Our resident schools offer many advantages not found elsewhere," he explained. "The proximity to the Air Force Laboratories and our excellent student/faculty relationship are two definite advantages of our residence programs. The maturity and motivation of our students is another unique advantage we have over civilian schools. Our students realize that this is an important step in their careers, and they are very competitive. We seldom have a motivation or attitude problem. Many of our students have not attended school for several years and need to be reacquainted with an academic environment. We prep these students before getting into their programs in order to bring them up to speed."

The General continued, "Our biggest responsibility is to see that the Air Force gets the type of graduate it needs to meet today's requirements. We think we are doing this. More than ninety-six percent of our entering graduate students will graduate. This is not because AFIT is an easy school—it is a very good school—but because we have a stringent selection process. We do not select an officer for AFIT training unless we feel certain he can make the grade."

Civilian Institutions

AFIT residence schools are oriented toward courses not found in civilian universities. However, AFIT does rely on civilian schools whenever possible, since it is often more practical to send students to civilian colleges and universities than to duplicate courses offered elsewhere. The Civilian Institutions Directorate sends approximately 5,000 officers and 1,000 airmen to many of the nation's leading universities each year. AFIT monitors each of these programs to ensure that they are closely related to specific USAF needs.

Students in civilian institutions may enter one of six general academic areas of study: they may pursue regular, special, or medical degrees; enroll in continuing education courses; train in the Education With Industry programs; or study under the Airman Education and Commissioning Program (AECP).

More than 100 programs in the humanities, biology, physical sciences, engineering, and medicine are offered at civilian institutions. Among them are graduate programs in a wide range of disciplines for Air Force people who have been selected to teach at the Air Force Academy, in Air University schools and colleges, or in the Air Training Command. The two fastest growing programs, however, are the medical and Airman Education and Commissioning programs.

The author, Capt. Donald D. Carson, is assigned to AIR FORCE Magazine for a year's training under the Education With Industry (EWI) program. He is a fighter pilot with 131 SEA missions to his credit. His pilot report on the F-106 appeared in the October issue of AIR FORCE.

Health Professional Scholarships associated with the medical education program administered by AFIT are designed to alleviate the present shortage of Air Force medical personnel. When fully implemented, this program will train 1,500 doctors and medical specialists annually. Medical scholarships provide full tuition and \$400 per month while students attend school in USAF Reserve status. Upon graduation, students will enter active duty and repay the Air Force with one year of active duty for each year of school they attended under scholarship. There is also a comparable AFIT program for active-duty personnel who want to attend medical schools.

The Airman Education and Commissioning Program, combining the Bootstrap and Airman Education



H. E. Lillie, AFIT Director of Admissions, stresses the importance of applying for a records review, even if your academic record is weak.

Programs into one, was recently introduced. Each year, it will enable 1,000 airmen to earn a college degree at USAF expense and to continue active duty as officers.

The Civilian Institutions Directorate also monitors the Minuteman Education Program, Educational Delay Program, and training for foreign officers enrolled in US civilian institutions.

The Minuteman Education Program enables officers to complete a master's program while assigned to SAC missile launch-control duty. This is a SAC-funded program, but is under AFIT management.

Education With Industry (EWI) places 150 officers each year in some fifty civilian corporations and organizations. Students receive on-the-job educational experiences not available through formal schooling. During this year-long program, EWI students are involved in top-level corporate management and decision-making. They return to the USAF with fresh experience in management and corporate operations.

The Educational Delay Program allows AFROTC graduates to postpone their active duty until they have obtained a graduate degree at their own expense. AFIT also sends 1,500 officers each year to one of thirty-five different continuing education short courses. These programs are all geared to meeting specific Air Force needs and are reviewed frequently to ensure they are, in fact, doing so.

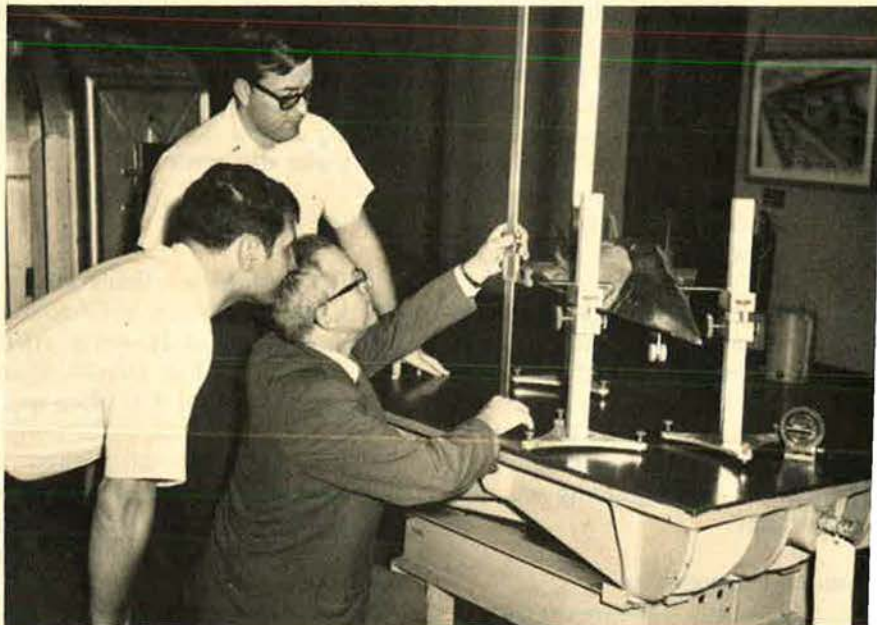
Selection for AFIT

There are two methods of selection for AFIT programs: direct application, and central selection through records screening. Mr. H. E. Lillie, AFIT Director of Admissions, works hand in hand with the Military Personnel Center (MPC) at Randolph AFB, Tex., to find officers who are qualified academically and militarily. Mr. Lillie explained: "We need a man who is promotable. If we send someone to a graduate program who is not senior-officer material, we have not effectively used our funds to better the Air Force. This is why we have a central selection in addition to

direct application. For unknown reasons, many qualified officers do not get around to applying to AFIT. We screen the records of all officers, and when we find someone who looks good, but has not applied, we may offer him a program in which we need additional officers.

"Today, our engineering programs are being filled by a number of officers from central screening. We no longer take lieutenants right out of college, so we are filling their slots with officers we select. There is no pressure put on an officer who turns down a program when it is offered. He can, in fact, apply at a later date for the very program he turned down. We want what is best for the officers involved and for the USAF."

Mr. Lillie's enthusiasm and sincere interest in AFIT was obvious as he continued, "If I could give officers one bit of advice, it would be this: If you have any intention of ever getting a graduate degree, take the Graduate Record Examination (GRE) now. Many officers



Professor Harold Larson, of the AFIT Aerospace Design Center, and engineering students check out a model of the XB-24 reentry vehicle. The three are engaged in a series of wind-tunnel tests to determine the experimental craft's lift, drag, and stability characteristics.

have been selected for schools and could not attend because they could not complete the GRE prior to the start of the school."

Mr. Lillie's admissions staff provides evaluations for officers interested in attending AFIT. "If you did not have good grades in college, you may still apply," he said. "We will review your records and tell you where you are deficient. In many cases, only one or two courses taken at a night school would qualify an officer for the program he wants."

Many officers have expressed concern about promotions while assigned to AFIT. General Simokaitis emphasized that "AFIT students have done considerably better in promotions over the past few years. This was not always true, but now there is increased interest in properly training military managers to do their jobs. Today, an AFIT student or graduate is doing better on promotions than the Air Force average. This is due in part to our selective screening process. We take

only the best qualified officers in the Air Force, and it is natural that they are getting promoted.

"Applying for AFIT is one place an officer can directly influence his career. If he is accepted, he gets an advanced degree, enters the field of his choice, and improves his chances for promotion. There is no single action that can do more to influence an officer's career."

Future of AFIT

Recent congressional cuts in the DoD budget have affected AFIT. Nevertheless, General Simokaitis is confident that the programs will continue and not be drastically cut in the future. He explained, "We are constantly changing our programs to meet current Air Force needs. All AFIT programs are established in response to Air Force requirements; we do not select them at our convenience. These are valid needs and are clearly justifiable to Congress. The total size of the Air

Force is shrinking, and there is a need for people to do more things better. To do this, they need better training.

"In the future, we may see a greater percentage of the total AFIT program directed toward our resident engineering and management schools with a corresponding decrease in our civilian institutions program. This would address the current need of engineers and scientists by putting the emphasis in that area. There would, of course, be some cutbacks in less technical areas, but I do not expect a cutback in our overall program level."

AFIT offers a great opportunity for airmen and officers to receive invaluable education under USAF sponsorship. AFIT's programs have greatly enriched the Air Force and many thousands of Air Force people who have taken advantage of them. If you are not one of these people, you can be with a little effort. The rewards are great—for you and for the Air Force. ■

THE ULTIMATE PROMOTION

In 1954, I had the good fortune to serve as Catholic chaplain of the 7330th Flying Training Wing (MDAP) at Furstenfeldbruck Air Base, Germany. In those days, we were training jet pilots from the NATO nations. At the time, I held the rank of captain.

One fine day, I was sitting in my office in the chapel and little Terry Dumontier, seven years old and the daughter of a lieutenant colonel with the wing, came into the office. I knew her and her family very well, and we had a nice chat. Soon she came to the reason for her visit. "Father," she said, "today is my mother's birthday. Can I get some flowers for her from the garden around the chapel?" I said, "Why, Terry, that's a wonderful idea; of course you can." She then left to pick the flowers, and I thought that was the end of it.

I heard the rest of the story not too long afterwards and so did the rest of the base. She took the flowers home to her mother, presented them to her with a happy birthday wish, and Mrs. Dumontier said, "Why, thank you, dear, for the lovely flowers, but where did you get them?" Terry innocently said, "I got them from the chapel, Mother."

Mrs. Dumontier was a little taken aback by this. "Oh, Terry," she said, "you shouldn't have taken them from the chapel without permission." "That's all right," the little girl replied. "I got permission to take them for you. I went into the chapel and asked God for permission, and he said it was all right."

"You asked God for permission?" said Mrs. Dumontier, even more taken aback. "Who was he? What did he look like?"

"Oh, Mother," Terry answered, "don't worry. I went into the office, and God was sitting behind the desk. Do you know, Mother, that God is big, that God wears glasses, and, Mother, do you know that God is only a captain?"

To this day, the men of the 7330th still call me Captain God.

—Contributed by Chaplain (Col.) William L. Travers, USAF (Ret.)

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

Airman's Bookshelf

The Lesson of the Luftwaffe

The Rise of the Luftwaffe: Forging the Secret German Air Weapon 1918-1940, by Herbert Molloy Mason, Jr. Dial Press, New York, N. Y., 1973. 341 pages. \$10.00.

When World War I ended, the Allies, through the sweeping provisions of Part V of the Versailles Treaty, stripped Germany of all airplanes and dirigibles, leaving nothing flyable or permitted to fly except hot-air balloons. British Prime Minister David Lloyd George remarked, "Well, we shall have to do the same thing all over again in twenty-five years, and at three times the cost."

The German Air Force, the Luftwaffe, did come back, and Lloyd George's prophecy became fact when Adolf Hitler ordered his Wehrmacht into Poland in September 1939. It was a new fighting force, based not upon the traditional arms and weapons of 1914-18, but upon rapid mobility and the control of the skies over the battlefield. The Luftwaffe airmen who exploited those skies were battle-tested in the just-completed Spanish Civil War. The aerial weapon that so demoralized Poland's legions and crushed the defenders of Scandinavia, the Low Countries, and France had been carefully, and secretly, forged during Germany's dark days following her defeat in World War I and the Allied occupation.

The story of the resurrection and growth of what, for at least a while, became the world's greatest air force is the subject of Mason's very readable book. He has consulted extensive archival materials, including the excellent, but seldom used, USAF Historical Studies in the Air Force Historical Archives at the Air University. These plus original documents detail a fantastic story of duplicity that allowed Germany to rebuild her armed forces under the incredibly naïve noses of the Allied Control Commission.

Faced with defeat, riots, mutiny, and attempted Communist takeover, a proud German high com-

mand reorganized itself. Under the stern guidance of Gen. Hans von Seeckt, every means available was used to evade the harsh terms of Versailles and to rebuild Germany's air arm. Training schools were established in Russia for German student pilots in civilian clothes. Glider clubs taught the rudiments of flying under the guise of recreation. Transport aircraft were built, not for passenger comfort but to be converted to bombers. Lufthansa, the German civil airline, became the training ground for bomber pilots.

Aircraft were designed and built by Fokker, Junkers, Messerschmitt, and Heinkel in small, carefully dispersed factories that suddenly became bicycle or tractor plants when Allied Commission inspection teams arrived. The complete success of such deceit, known but unproven by the Allies (and often in collusion with Commission member Japan), becomes a pitiful story of Allied war-weariness and frustration versus the single-minded determination of von Seeckt and his General Staff.

A second, and equally interesting story, is that of the Luftwaffe's ultimate failure. For all the awesomeness of the Ju-87 Stuka dive bomber and its "trumpets of Jericho" whistles, there were no long-range bombers. Without them, the Luftwaffe could not mount the kind of strategic air war that contributed so significantly to German defeat. A lack of cargo-carrying aircraft cost Germany its famed Sixth Army that was surrounded at Stalingrad and cut off from other means of resupply. The late arrival, and misuse, of the world's first operational jet—a weapon calculated to sweep the skies of American and British aircraft—was a colossal blunder caused by Hitler's meddling. Hermann Goering's incompetence and bureaucratic ignorance gave pitiful leadership to an otherwise brilliant and capable fighting force. Competition and bitterness between aircraft manufacturers played their part in restricting the capabilities and types of Luftwaffe aircraft. The lack of sound air doctrine that would have permitted aerial action beyond the immediate support of

battlefield operations led to catastrophic choices of aircraft types, limited pilot training, and prevented development of a well-rounded aerial force.

With all its capability in the air, Germany went on to lose the Battle of Britain, a conflict not dealt with by Mason, and the war. Through the bungling and incompetence of Goering and other leaders, the German Luftwaffe lost the supremacy of the skies as rapidly as it had been gained.

Mason leaves his readers well aware of what can be expected when technical and tactical genius is thwarted by the nonsensical interference of leaders who know too little and have too much power.

—Reviewed by Lt. Col. John H. Scrivner, Jr., Professor of Aerospace Studies, Kent State University.

Supersonic Pioneers

Supersonic Flight: Breaking the Sound Barrier and Beyond, by Richard P. Hallion. Macmillan, New York, N. Y., 1972. 248 pages with appendices and index. \$8.95.

Here is the detailed, documented account of the Bell X-1, which broke the sound barrier in 1947, and of the Douglas D-558-1 and -2—the latter of which in 1953 first touched twice the speed of sound. If author Hallion's account—truly a prodigious effort—occasionally is exhausting as well as exhaustive, there in no way detracts from the position of respect it deserves on the bookshelves of anyone who is even mildly interested in the sweep of aeronautical history.

That NASA, as part of its continuing support of aviation and aerospace historical writing, and the Smithsonian Institution, by its undergirding of the book's publication, should have given such strong encouragement to Hallion's project is commendable; his product does them credit! Evident also is cooperation, provided by the Air Force and Navy, to good purpose.

Over the many months, Hallion interviewed or had correspondents

with more than thirty of those who contributed in fundamental ways to the successful prosecution of the high-speed, research airplane program. Actually, this reviewer (who himself was rather intimately associated with the program, first at Bell Aircraft and then at NACA) is hard put to think of ones still alive whom he has missed.

These men contributed living bone and sinew to a history that otherwise would have been dependent upon not always revealing official records. If the contributors sometimes recall what was thought and happened, beginning some thirty years ago, in the context of today when supersonic flight has become commonplace, well, the careful reader can sprinkle his own grains of salt!

—Reviewed by Walter T. Bonney, former Director of Information, NASA.

Churchill and World War II

Churchill as Warlord, by Ronald Lewin. Stein & Day, New York, N. Y., 1973. 271 pages with bibliography. \$10.00.

At the beginning of chapter seven of this book, Mr. Lewin writes:

The popular conception of a War Lord [sic] is of a man who is master of events: a Napoleon. But no War Lord in history has been able to dominate events in an absolute sense.

This book follows Mr. Lewin's studies of Montgomery and Rommel as military commanders, but the present title is less happy. There is a Far Eastern ring about it—barbaric, parochial, and feudal. This, to a degree, reflected in Churchill's energy: a whimsical dynamo throwing off solutions and suggestions in every direction; present while the bombs fall on London or under snipers' fire on the bank of the Rhine; prevented only with great difficulty in being active at the Normandy landings; traveling to conferences, a bulldog with wings, in the eyes of the *Punch* cartoonist. In this sense, he is a warlord at the beginning of the war, when the policies and personalities are being sorted out. But warlords do not have allies, and there are ranges as America's resources are brought to bear.

The scheme of the book is to see the war from Churchill's angle, through his own published recollec-

tions, and through the commentaries or memoirs of his war cabinet, his Chief of Staff, his Commanders in Chief, and his private staff and advisers. The material is compiled mostly from secondary sources, although the author has culled some interesting snippets from still-extant survivors. The more important parts are well footnoted. It is well researched and presented; mainly chronological, not by any means comprehensive, but certainly well documented and with many quotations. It would be an excellent basis for a TV documentary in, say, ten episodes.

For the air-minded, there is, strangely, little about the Battle of Britain, which will always be associated with Churchill's name. There is a chapter on the strategic bombing offensive, which makes some good points in depth about the targeting controversy (Cherwell gets short shrift) and which exonerates Churchill from selecting Dresden in particular, although he directed general attacks to hamper evacuation and troop movements. There is little material that is new, but the synthesis is often exciting.

Is it still too early to expect answers to the big questions? Was it the right policy to continue the war on Nazi Germany; is it still too soon to examine the consequences if Churchill had not been called to power? Was he so much the obvious choice? After all, even Lloyd George was still alive and active. What were his relations with Parliament? We are told of his devoted attention, his meticulous explanations, and of his anxiety over his control of it, but was Parliament Churchill's poodle?

What was the nature of Churchill's crisis with Parliament in the summer of 1942? How was it re-



solved? It does not figure significantly in the book. Do we not have to account for the election which deprived him of office; was he really a warmonger, as was the cry in 1945, rather than a warlord?

Perhaps it is too early; but when it is time, these questions will be settled in a book very like Mr. Lewin's. In the meantime, we have an important addition to Churchilliana.

—Reviewed by Squadron Leader D. H. Stables, RAF, Department of History, USAF Academy.

Books in Brief

The Student Pilot's Flight Manual, by William K. Kershner. A compilation of material used in preflight and postflight briefings and in-flight instruction. The maneuvers appear in the probable order of introduction to the student. This new fourth edition also contains a chapter on night flying, sixty questions and multiple-choice answers designed to test student comprehension of the material covered in the manual, and more than 260 up-to-date illustrations. It is intended both for students who are working for the private certificate "on their own" and for those who are part of ROTC flight programs. Iowa State University Press, Ames, Iowa, 1973. 232 pages with appendix, bibliography, and index. \$6.95.

System 37 Viggen: Arms, Technology and the Domestication of Glory, by Ingemar Dörfer. A study of the development of a weapons system, the SAAB 37 Viggen military aircraft, to illustrate the performance of a peaceful, scientific state, Sweden. It asks questions about who runs a scientific state and deals with current government-business relations, civilian-military relations, and foreign relations. Scandinavian University Books, Oslo, Norway, 1973. 258 pages with appendices, bibliography, notes, and index of names. \$18.00.

Those Fabulous Amphibians: A Pictorial History of American Amphibian Aircraft, by Don C. Wigton. A pictorial encyclopedia of every known type of American amphibious aircraft. Included is information about each amphibian, the year of manufacture, horsepower, range, size, and what it was designed or used for. Harlo Press, Detroit, Mich., 1973. 191 pages. \$9.95.

—By Catherine Bratz

The Bulletin Board

By Capt. Don Carson, USAF

CONTRIBUTING EDITOR, AIR FORCE MAGAZINE

On the Hill

Congress has directed the Secretary of Defense to carry out a comprehensive study and investigation to determine the desirability and feasibility of merging the Air Force Reserve and the Air National Guard. The study will investigate the costs, effects, and other advantages or disadvantages of such a merger. Alternatives under consideration are (1) to merge the ANG into the Reserve, (2) to merge the Reserve into the ANG, and (3) to keep them as separate components.

The study will also consider modernization of the ANG and Reserve Forces and their needs in recruiting and training qualified personnel. The Secretary of Defense will submit a report of this study to the President and to Congress by January 31, 1975. The report will include the findings of this study and suggested legislation to implement the study recommendations.

The study will be directed by Secretary of Defense James R. Schlesinger and will attack many major issues that have been skirted in the past. The Joint Chiefs of Staff and the military services are providing top people to the study group, to be chaired by Eckhard Bennewitz, a key DoD civilian official with extensive experience in finance and management.

Congress also has established a Defense Manpower Commission made up of seven members—two from the House, two from the Senate, and three to be appointed by the President. The commission will study the overall manpower requirements of the DoD on both a short- and long-term basis. The commission is directed to give special emphasis to the areas of pay, grade distribution, cost-effectiveness, retirement, and recruiting. It will also look closely at the effectiveness with which civilian and active-duty personnel are utilized,

particularly in headquarters staffing and in the number of support forces in relation to combat forces. Some DoD officials believe that the Proposed New Military Nondisability Retirement System (see AIR FORCE, December '72 and August '73) will come under close scrutiny by the commission.

Survivor Benefit Plan

On November 16, 1973, President Nixon signed the FY '74 Military Authorization Bill into law. An amendment to that bill reopens the opportunity for most retired military people to enroll in the Survivor Benefit Plan. The original enrollment period expired on September 20, 1973. Under the new law, any military person who retired before September 21, 1972, and who did not enroll in SBP prior to the September 20, 1973, cutoff may now do so before midnight March 20, 1974. Those who may now wish to enroll are urged to not wait until the last minute to do so.

Military people who have retired since September 21, 1972, are not affected by the extension, since they were counseled individually before their retirement.

The extension of the SBP enrollment period does not affect or change any other provision of the Survivor Benefit Plan. It does not allow those who have previously elected to participate either to withdraw from the plan or to increase or decrease the base amount that they chose as the basis for their survivor's annuity.

SEA Assignments

Effective November 1, 1973, was a change in policy to unfreeze SEA critical skills and involuntary second SEA tours for enlisted men, and a new SEA officer-selection plan. Freeze and controlled officer-selection policies have been used by the USAF to ensure all similarly qualified persons are equally ex-

posed to the risks of a combat theater. Air Force policy has been not to return personnel to SEA for a second tour until everyone else in the same grade and specialty had served a SEA tour. The exception to this was a volunteer for a second tour.

This new action opens many assignment opportunities to USAF members. It removes the distinction between SEA assignments (Thailand) and other overseas short-tour areas. Starting in November, all short tours, including Thailand, were to be filled on an equal basis. An individual's number of previous tours and short-tour return date (STRD) is the basis of selection. This action does not affect assignment selections made prior to November 1.

Short-Tour Volunteers

Officers may now volunteer for an overseas short tour and be guaranteed attendance at Squadron Officer School. The officer may elect attendance en route to or from the assignment, as long as his record merits selection for the school.

Recruiting Recruiters

The Air Force is looking for officers through the rank of lieutenant colonel for special duty with the Recruiting Service. Positions are available in command, operations, advertising, support, and nursing duties. Officers selected for recruiting duty attend a three-week management course at Lackland AFB, Tex. Tours of duty are for three years, except for nurses who serve two years. If you are interested, contact your CBPO or call AT Assignments Division (AUTOVO 487-3372).

Military Construction

The original House version of the Military Construction Bill co-

ained a provision which would have required that military bachelor housing (E-4 and below) be occupied by a minimum of four persons. This would have placed a burden on the USAF, which has long attempted to limit occupancy to two per room. This limitation was later eliminated by Senate and House conferees. AFA actively supported

dropping the limitation on room occupancy, leaving that decision up to the Department of Defense.

AFA President Joe Shosid, in a telegram to the congressional conferees, asked that "favorable consideration be given to the Senate version of Section 606 of the bill [which placed no limit on the number of enlisted personnel per room],

in belief that any change from the present policy would have a negative impact on the already difficult task of recruitment and retention."

CHAMPUS Claims

DoD has placed a time limitation on filing claims by beneficiaries of CHAMPUS. Beginning January 1,

Ed Gates . . . Speaking of People

Judge Advocate General Retention Goes Critical

Air Force's success in recruiting and retaining people in the no-draft year of 1973—it's the best record among the military services—hasn't spilled over to the various professional corps. Such as the JAGs.

All services, in fact, are singing the blues about their judge-advocate manpower problems.

It is an old story, but the dilemma is getting more acute. Air Force recently told Congress that a decade ago it was short only fourteen field-grade JAGs, but, each year since, the deficit has increased.

USAF's 1,200-member JAG force (it includes three women lawyers) at a recent date had a shortage of 328 field-grade officers—and a corresponding overage of young, inexperienced new officers. It figures out to a forty-three percent deficit of the experienced career types vital to assuring that the service and its members receive the best legal support possible.

And what of the future? This experience deficit will continue to worsen "until measures are taken to make careers as military attorneys more attractive and more competitive in the job market." USAF authorities told a House Appropriations subcommittee recently.

Convincing young JAGs to serve extra time is the big problem. Most of USAF's new lawyers enter service via the AFROTC educational delay program, but only about eight percent extend their commitment.

In the Army, it's a mere five percent. Stated another way, only twelve Army lawyers per year remain on active duty beyond their required service. The Navy and Marine Corps also are suffering from a severe lack of JAG experience; the Marines, in fact, with only 300 JAGs on board, are short 143 field graders!

The services, meanwhile, have not been indifferent to their JAG manning woes. Air Force has accelerated its JAG recruiting efforts. It has improved legal officer career patterns and provided wider personal preference in assignments. It has even tried to bolster retention by such things as authorizing a distinctive JAG insignia.

But all with little success. By and large, young lawyers today apparently can command considerably larger salaries in civilian life than in uniform. And other unique features of a military career—playing a role in national security, travel, fringe benefits, and a liberal retirement program—don't compensate.

As Hq. USAF officials explained to lawmakers on Capitol Hill recently, "Clearly, the pay differential between military and civilian attorneys continues to be the largest obstacle to significantly improving our competitive position in the job market."

Attempts to improve that position by providing military lawyers more money have failed.

The House of Representatives twice in recent years has voted substantial extra compensation for legal officers, but the Senate Armed Services Committee refused to go along. The legislation died. The fact that the Defense Department did not actively support the measures undoubtedly contributed to their demise.

But would enactment of a JAG pay bill actually improve retention and procurement? There's no sure way of knowing, though some quarters doubt it. They liken the situation to the special pays and quickie promotions medical officers enjoy, pointing out that their preferential treatment has not reversed the alarming departure rate of members of that group.

Critics of special rewards for preferred officers also cite the unfavorable impact on the overall officer corps.

Be that as it may, the services are not throwing in the towel on the JAG pay issue. And the Defense Department now supports the efforts. When the Pentagon sent its multi-bonus proposal to the Administration's budget office for clearance, before submitting it to Congress, the measure contained both extra monthly pay and an annual lump-sum bonus for legal officers.

The budget office cut out the pay feature, however, but the bill still contains the bonus authority. It permits payment of up to \$4,000 a year for officers the services designate as "short-skill" people. If approved, Hq. USAF plans to use it to the hilt for JAGs.

That approval, though, may be long in surfacing, because Congress is ignoring the multi-bonus package. It is possible, of course, with the JAG experience level sinking still further and with Defense now standing four-square behind monetary relief, that a separate JAG pay-bonus measure might get through Congress in the near future.

The government did take a step forward to improve JAG manning last month when Congress, in the annual military procurement bill, gave each service authority to send twenty-five career line officers to law school each year, at government expense. And they would retain their pay and allowances.

Actual funds for this project appear in the FY '74 military appropriations bill, which was nearing final approval at press time. This training authority was eliminated eighteen years ago, and the services have been pressing for its reinstatement.

Providing funding is approved, Air Force plans to enroll its first twenty-five selectees in law schools next fall. Once in full operation, officials feel the program will add experience, maturity, and stability to the troubled legal corps.

But will it prove sufficient? ■

The Bulletin Board

1974, all claims must be filed within one year of the date CHAMPUS services were received. Claims for services prior to January 1 will be processed under current directives.

Reserves

The Cincinnati Air Reserve Information Flight has been selected as the outstanding flight in the Air Reserve Information Program. Maj. Gen. Robert N. Ginsburgh, Air Force Director of Information, presented a plaque to Lt. Col. Bob Erman in recognition of the Cincinnati flight's outstanding support of Air Force, Reserve, and civic programs in Ohio.

Palace Fly

Airmen in the ranks of sergeant through technical sergeant may apply for flying duty as B-52 Defensive Fire Control Operators or KC-135 boom operators. The program, called Palace Fly, is one of the few opportunities for airmen with nonflying AFSCs to become aircrew members. Airmen serving in the US may apply at any time. Those serving overseas must apply between the eighth and twelfth month before their return date. Positions are available at six State-side SAC bases. Full details of the

Palace Fly program are available at local CBPOs.

Interest-Free Loans

The Air Force Aid Society has interest-free loans available for dependents of active-duty and retired Air Force personnel. Qualified applicants will receive a maximum of \$1,500 each year for vocational and college education. The loans will not have to be repaid until the student leaves full-time attendance at a school. Information and application forms are available at base Air Force Aid Society offices. Palace Flicks film No. 83, available at local CBPOs, also explains the program.

New Commissioner

J. Raymond Bell, of New York City, was confirmed by the Senate as Commissioner of the Foreign Claims Settlement Commission. The commission determines claims of American nationals against foreign governments in compensation for losses and injuries. Mr. Bell is active in veteran affairs and in 1972 was named "Man of the Year" by the Air Force Association. He has also been awarded the US Air Force Exceptional Service Award.

Palace Flicks

Palace Flicks film No. 98 covers the navigator career field and what navigators can expect in the way of assignments. The film explains the navigator assignment process, job specialties, and command requirements for career planning.

Palace Flicks No. 3 has emerged

as the most popular subject in the series of personnel films. Report No. 3 presents a detailed explanation of the Career Objective Statement (Form 90) and how it is used in assignment selection.

Airmen wishing to trade their assignment for one at a new base can get the facts from Palace Flicks report No. 96. This film covers eligibility criteria and application procedures for a base swap under this program. Also explained are facts about moving expenses, finding a trading partner, and other details to assist anyone interested in swapping bases. Palace Flicks films are available at local CBPOs and cover a wide range of subjects to assist Air Force personnel. Contact your CBPO Customer Service for details on where to view these informative films.

Senior Staff Changes

M/G Royal N. Baker, from Asst V/C, to V/C, Hq. ADC, Ent AFB Colo., and promoted to L/G, replacing retiring L/G Thomas K. McGehee . . .

M/G Frederick C. Blesse, from DCS/Ops, Hq. PACAF, Hickam AFB, Hawaii, to Senior AF Member, Weapons System Evaluation Group, ODDR&E, Arlington, Va. . . **M/G James D. Hughes**, from Dep. Cmdr. 7th AF, and C/S, USSAG, Nakhon Phanom RTAB, Thailand, to Cmdr. 9th AF, TAC, Shaw AFB, S. C., replacing retiring M/G Levi R. Chase

PROMOTION: To Lieutenant General: Royal N. Baker.

RETIREMENTS: M/G Levi R. Chase; L/G Thomas K. McGehee

—Compiled by Catherine L. Brat

KEEPING HIS SPIRITS UP

Word quickly spread around our fighter squadron at Itazuke Air Base, Japan, in 1948 that one of our most popular P-51 pilots, a first lieutenant and West Point graduate, inbound from Tokyo, was circling overhead with a slight problem: He couldn't get his landing gear down!

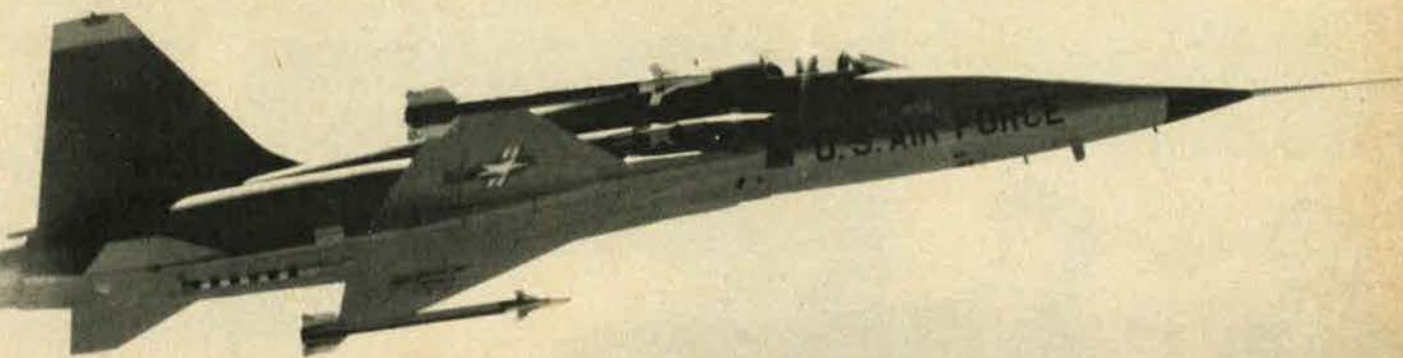
After the "top brass" had given him instructions to solve his embarrassing dilemma, all to no avail, he was told to drop his two wing tanks and land, wheels up. As we watched his final approach, the tanks were still on! Down, down, down he came. Then he flared out and made a perfect belly landing on the grass beside the runway.

We got to the plane after he had climbed out of the cockpit and was explaining to the furious group commander: "But, sir, I just couldn't drop my tanks. They're not fuel tanks—they're cargo tanks. I've got the whiskey for tomorrow night's party in them!"

(P.S.—Only two bottles were broken, and we had a MARVELOUS party!)

—Contributed by Lt. Col. Bert McDowell, Jr., USAF (Ret.)

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



Tiger.

It lives in another kind of jungle. Cold. Bright. Blue. It lies in the trees. Just above. Or way above.

Our new F-5E Tiger II was bred for it. The arena where most air combat happens. In the speed range between

Mach 0.4 and 1.4 victory is to the agile. To the relentless. To the tigers.

Combine this air-to-air superiority with a significant boost in ground attack capability. Cap with top speed of Mach 1.6. All together, Tiger II makes a lot of dollar sense.

Chosen after competition as the International Fighter, it is recognized as the most realistic answer to the self-defense needs of many nations: peace through security.

Northrop already has orders for over 500. They're now being built. At promised cost. Ahead of schedule. In what has been termed the most completely automated and efficient production operation in the industry.



We expect great things from this tiger. Well, we should. It's a part of the creative technology that spawned the F-5. The T-38. The Cobra P-530. The USAF YF-17.

The toughest family of light fighters in the entire world.

NORTHROP

AFA News

By Don Steele
AFA AFFAIRS EDITOR



AFA National Director Arthur C. Storz, Sr., left, congratulates SSgt. Robert E. Davidson, II, a Hq. SAC intelligence NCO, recipient of the Ak-Sar-Bon Chapter's Arthur C. Storz, Sr., Award as Offutt AFB's outstanding airman. The awards, presented annually to the outstanding junior officer and NCO, consist of a plaque, a holiday weekend, and a US Savings Bond. Chapter President Paul W. Gaillard made the presentations during a dinner at the Offutt AFB NCO Club.



During the Louisiana AFA's recent convention, Lt. Gen. James M. Keck, left, Commander of the Second Air Force at Barksdale AFB, explains some of the features of the B-1 strategic bomber to Barksdale AFB's Sgt. Storm Hensley, Miss Louisiana 1973 in the Miss Universe Contest; Louisiana AFA President Lou Kaposta; and Lt. Gen. David Wade, USAF (Ret.), President of AFA's Ark-La-Tex Chapter. Maj. Gen. Charles F. Minter, Sr., Deputy Chief of Staff for Maintenance, Hq. Air Force Logistics Command, was the guest speaker at the convention banquet. General Keck is now SAC's Vice Commander.



During a reception hosted by AFA's Atlantic City, N. J., Chapter in honor of the Air Force's Thunderbirds, Chapter President Harry Johnson, left, accepts an autographed photo from the group's leader, Lt. Col. Roger Parrish. The Thunderbirds performed their maneuvers over the Atlantic City Boardwalk before a crowd of more than 250,000.



During the Huron Chapter's Charter Night Dinner at Wurtsmith AFB, Mich., Bernard D. Osborne, Vice President for AFA's Great Lakes Region, presented an AFA Chapter charter to the new Chapter's President, L. A. Thompson. Admiring the Charter are, from left, Mr. Osborne; Sigvard C. Swanberg, Chapter Secretary; Mr. Thompson; Col. (Brig. Gen. selectee) Donald M. Davis, 40th Air Div. Commander; and Brig. Gen. Joseph A. Kryszakowski, from Hq. Strategic Air Command, the guest speaker.

During a visit to Whiteman AFB, where he was guest speaker at a meeting of AFA's Central Missouri Chapter, AFA President Joe L. Shosid, seated, then AFA's Board Chairman, and Earl D. Clark, Jr., Vice President for AFA's Midwest Region, receive a briefing from Col. Charles W. Parker, 351st Strategic Missile Wing Commander, on Minuteman missile operations.



CHAPTER AND STATE PHOTO GALLERY



Noel Bullock, center, Director of Aerospace Education for the Colorado AFA, presents AFA Executive Director James H. Straubel, right, a check covering dues for fifty-three new AFA members obtained from participants in the Front Range Chapter's National Aerospace Education Workshop. The presentation was made during a reception honoring Mr. Straubel, one of the principal speakers at the three-week Workshop. AFA National Director George M. Douglas looks on.



Utah Governor Calvin L. Rampton and Maj. Gen. Bryce Poe, II, Ogden Air Materiel Area Commander, place the first Utah AFA "U.A.T.A.F." bumper sticker on the Governor's car. The initials stand for "Utah Appreciates The Air Force." Earlier, the Governor signed a proclamation designating November 7 as "Air Force Appreciation Day" in Utah.



Following his installation as President of the Olmsted, Pa., Chapter, H. M. Eaton, right, is congratulated by immediate past President Gerald S. Leib, left. Looking on are: Pennsylvania AFA President Frank E. Nowicki, left center, and Harold Wells, Deputy Adjutant General for Veterans Affairs, Commonwealth of Pennsylvania, and guest speaker at the installation banquet.



Stanley N. Marker, right, President of AFA's London Chapter, England, presents a check to Col. LaVerne H. Griffin, Commander, 10th Tactical Reconnaissance Wing, RAF Alconbury, England, as the Chapter's donation to the Base Welfare Fund.



John F. Loosbrock, second from right, AFA's Deputy Executive Director and Editor of AIR FORCE Magazine, was the guest speaker at a recent meeting of AFA's Jerry Waterman Chapter, Fla. Shown with Mr. Loosbrock are, from left, Col. Sidney Davis, Commander, 1st Tactical Fighter Wing, MacDIII AFB; Gen. Timothy F. O'Keefe, former Deputy Commander in Chief, US Readiness Command, now Commander, Seventh Air Force and US Special Activities Group, Nakhon Phanom Royal Thai AB, Thailand; and Acting Chapter President Col. John G. Rose, USAF (Ret.).

AFA News



With the gasoline shortage becoming more acute, bicycles are becoming an important mode of transportation on many Air Force bases. Recognizing this, AFA's Merced County Chapter recently donated bicycle racks to Castle AFB, Calif. Participating in the presentation ceremonies were, from left, Ted Brodalski, Harold Johnson, and Edith Dingler, Chapter President, Vice President, and Secretary, respectively; and SMSgt. James Gaviglia, 93d Bombardment Wing Sergeant Major.



TV Safety Sheriff Joe Higgins, left center, an AFA National Director and AFA's "Man of the Year" for 1973, visits with Maj. Gen. Jessup D. Lowe, Commander, Space and Missile Test Center, Vandenberg AFB, Calif., and Joe Sesto, a member of the Robert H. Goddard Chapter council, during a USAF Thunderbirds' demonstration. The Chapter sponsored a barbeque for the Thunderbirds and Chapter members after the demonstration.



Donald Kuhn, second from right, newly elected President of AFA's Greater St. Louis, Mo. Chapter, is congratulated by Col. Walter J. Chappas, USAF, Director of the Defense Mapping Agency Aerospace Center. The Chapter held its election of officers at the Center prior to touring the facilities. Also shown are, from left, Stuart Popp and John Mollenkot, Chapter Secretary and Treasurer, respectively; and, at far right, Chapter Vice President Wallace Brauker.



The Tidewater Chapter, Va., recently presented the Armed Forces Staff College a permanent Senior Tennis Champion trophy named in honor of Maj. Gen. James Kirkendall, USAF, Commandant of the College. Participants in the program included, from left, Congressman G. William Whitehurst (R-Va.), the guest speaker; General Kirkendall; Chapter President Robert H. Edwards, Jr.; and A. A. West, Vice President for AFA's Central East Region.



High Desert, Calif., Chapter President Howard Tanner, left, presents Victorville, Calif., Mayor David A. Brownell a membership in AFA. Mayor Brownell was the guest speaker at a recent Chapter meeting.

CHAPTER AND STATE PHOTO GALLERY



Air Force Officer Trainee Larry W. Butler, left, presents a memento of Class 74-05 to Texas AFA President Stanley Campbell, the guest speaker at the graduation dining-out of the class at the School of Military Science, Lackland AFB, Tex.



Rudy Fitchenberg, left, one of six small-plane owners who made it possible for eighty-four Spokane, Wash., AFJROTC cadets to experience an orientation ride, explains an oil-leak inspection routine to three of the cadets. The arrangements were made by AFA's Spokane Chapter.



San Diego Chapter President William Parker, left, and La Jolla, Calif., Mayor Jim Snapp, a former AFA National Director, inspect new equipment donated by the Chapter to the new Burn Center recently opened at the University Hospital in San Diego.



Principals in the Harry S. Truman Chapter's First Annual Awards Banquet honoring the outstanding junior officer, senior NCO, NCO, and airman at Richards-Gebaur AFB, Mo., included, from left, Brig. Gen. Donald L. Werbeck, Commander, Air Force Communications Service; Lt. Wayne L. Holloway; MSgt. James A. Hunter; Chapter President Charles H. Church, Jr.; SSgt. William A. Thomas; A1C Donald W. Hamm; and Missouri AFA President Robert E. Combs.



Edward L. McFarland, left, Vice President for AFA's Southwest Region, presents an AFA Membership Achievement Plaque to Enid, Okla., Chapter President Ken Martin as Lt. Gen. William V. McBride, Commander, Air Training Command, looks on. The presentation was made during the Chapter's annual dinner, at which General McBride was the guest speaker.



Maj. Gen. Kenneth R. Chapman, left, Commander, Air Force Eastern Test Range, Patrick AFB, Fla., performs the traditional cake-cutting ceremony at the Cape Canaveral Chapter's observance of the Air Force's twenty-sixth anniversary. Chapter President Brig. Gen. Felix Vidal, USAF (Ret.), stands by to assist if necessary.

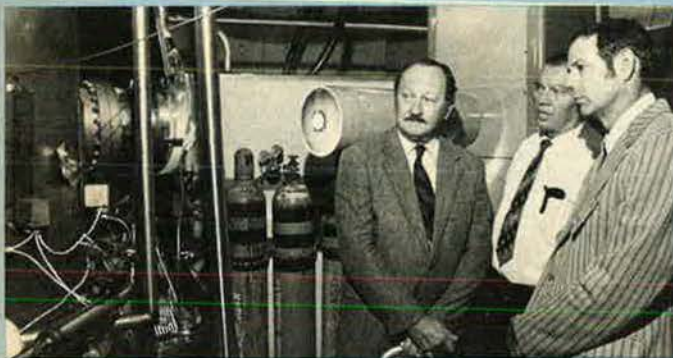
AFA News



During a recent Georgia AFA Executive Committee meeting, State AFA President Don Devlin, right, presented CAP Cadet Lt. Col. John Berry an AFA Citation as the Georgia AFA's "CAP Man of the Year."



Leo Jordan, left, Vice President of AFA's Tucson Chapter, Ariz., presents a Chapter Citation to Col. Donald S. White, center, Commander, 100th Strategic Reconnaissance Wing, Davis-Monthan AFB. The award recognized the Wing's "outstanding contribution to national security through vital worldwide reconnaissance operations." Looking on is Brig. Gen. James S. Murphy, Commander, 12th Air Division.



Following his address at a recent dinner meeting of AFA's H. H. Arnold Memorial Chapter at the Arnold Engineering Development Center, Tenn., Bill Mayes, right, of NASA's Skylab Project Office at Marshall Space Flight Center, Huntsville, Ala., toured the facilities of the Center accompanied by Chapter President Leonard T. Glaser, left, Bill Kirby, center, a project engineer at the Center, is giving the briefing.



During the Wright Memorial Chapter's annual dinner dance at Wright-Patterson AFB, Ohio, Chapter President Edward Nett, right, presented the Chapter's Aerospace Power Award to Maj. Gen. Benjamin Bellis, F-15 program manager at the Aeronautical Systems Division (AFSC), Wright-Patterson AFB. General Bellis was cited for his leadership in the F-15 development program, which has resulted in the aircraft's becoming the nation's latest fighter.



AFA's Fort Worth, Tex., Chapter and Airpower Council joined funds and forces recently in a project to completely carpet the lobby of the Carswell AFB hospital and the waiting room of the outpatient clinic, provide furnishings for the hospital's sun deck, and provide concrete picnic tables and benches on the hospital grounds. Inspecting the picnic tables are, from left, Chapter President Herman F. Stute, Jr.; Council Chairman Joe L. Shosid, who also serves as AFA's National President; and Col. Stanley Rhodes, the hospital administrator.

This Is AFA

The Air Force Association is an independent, nonprofit, airpower organization with no personal, political, or commercial axes to grind; established January 26, 1946; incorporated February 4, 1946.

OBJECTIVES

The Association provides an organization through which free men may unite to fulfill the responsibilities imposed by the impact of aerospace technology on modern society; to support

armed strength adequate to maintain the security and peace of the United States and the free world; to educate themselves and the public at large in the development of adequate aerospace

power for the betterment of all mankind; and to help develop friendly relations among free nations, based on respect for the principle of freedom and equal rights to all mankind.



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Fort Worth, Tex.



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Arthur F. Kelly
Los Angeles, Calif.
George C. Kenney
Bay Harbor Island, Fla.
Thomas G. Lanphier, Jr.
La Jolla, Calif.
Jess Larson
Washington, D. C.
Curtis E. LeMay
Newport Beach, Calif.
Carl J. Long
Pittsburgh, Pa.
Howard T. Markey
Washington, D. C.
Nathan H. Mazer
Ogden, Utah
J. P. McConnell
Washington, D. C.
J. B. Montgomery
Beverly Hills, Calif.
Edward T. Nedder
Hyde Park, Mass.

J. Gilbert Nettleton, Jr.
New York, N. Y.
Jack C. Price
Clearfield, Utah
Julian B. Rosenthal
Decatur, Ga.
John D. Ryan
San Antonio, Tex.
Peter J. Schenk
McLean, Va.
C. R. Smith
Washington, D. C.
Carl A. Spaatz
Chevy Chase, Md.
William W. Spruance
Wilmington, Del.
Thos. F. Stack
San Mateo, Calif.
Arthur C. Storz
Omaha, Neb.
Harold C. Stuart
Tulsa, Okla.

James M. Trail
Boise, Idaho
Nathan F. Twining
Hilton Head Island, S. C.
Winston P. Wilson
Arlington, Va.
Jack Withers
Dayton, Ohio
Rev. Msgr. Rosario L. U.
Montcalm
(ex-officio)
National Chaplain, AFA
Holyoke, Mass.
Henry A. Huggins, III
(ex-officio)
National Commander,
Arnold Air Society
Univ. of Kentucky
Lexington, Ky. 40506

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District of Columbia,
Virginia, West Virginia,
Kentucky



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Tallahassee, Fla. 32303
(904) 488-1374
Southeast Region
North Carolina,
South Carolina,
Georgia, Florida,
Puerto Rico



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 Standard Plan (\$66,000 Maximum)



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
20-24	\$ 66,000	\$12,500	\$10.00	\$6,000	\$2,000	\$22.00
25-29	60,000	12,500	10.00	6,000	2,000	22.00
30-34	50,000	12,500	10.00	6,000	2,000	22.00
35-39	40,000	12,500	10.00	6,000	2,000	22.00
40-44	25,000	12,500	10.00	5,250	2,000	22.00
45-49	15,000	12,500	10.00	4,050	2,000	22.00
50-59	10,000	12,500	10.00	3,000	2,000	22.00
60-64	7,500	12,500	10.00	2,250	2,000	22.00
65-69	4,000	12,500	10.00	1,200	2,000	22.00
70-75	2,500	12,500	10.00	750	2,000	22.00

Insured's Age	Coverage	Extra Accidental Death Benefit*	Monthly Cost	Optional Family Coverage Spouse	Each Child**	Monthly Cost
20-24	\$100,000	\$12,500	15.00	\$6,000	\$2,000	\$27.00
25-29	90,000	12,500	15.00	6,000	2,000	27.00
30-34	75,000	12,500	15.00	6,000	2,000	27.00
35-39	60,000	12,500	15.00	6,000	2,000	27.00
40-44	37,500	12,500	15.00	5,250	2,000	27.00
45-49	22,500	12,500	15.00	4,050	2,000	27.00
50-59	15,000	12,500	15.00	3,000	2,000	27.00
60-64	11,250	12,500	15.00	2,250	2,000	27.00
65-69	6,000	12,500	15.00	1,200	2,000	27.00
70-75	3,750	12,500	15.00	750	2,000	27.00

* 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 injury 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 carbonyl monoxide, or [4] During any period a member's coverage being continued under the waiver of premium provision, or 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 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 beneficiary 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!

REAKS THE BENEFIT BARRIER!



APPLICATION FOR AFA MILITARY GROUP LIFE INSURANCE



Group Policy GLG-2625
United Benefit Life Insurance Company
Home Office: Omaha, Nebraska

Name of member _____
Rank _____ Last _____ First _____ Middle _____

Address _____
Number and Street _____ City _____ State _____ ZIP Code _____

Date of birth _____
Day _____ Yr. _____
Height _____ Weight _____
Social Security Number _____

Name and relationship of primary beneficiary _____

Name and relationship of contingent beneficiary _____

Please indicate category of eligibility and branch of service.

Extended Active Duty Air Force
Ready Reserve or Other _____
National Guard (Branch of service)
Air Force Academy _____ Academy
ROTC Cadet _____
Name of college or university _____

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

STANDARD PLAN

Members Only	Members and Dependents	Mode of Payment	Members Only	Members and Dependents
<input type="checkbox"/> \$ 15.00	<input type="checkbox"/> \$ 17.50	Monthly government allotment. I enclose 2 months' premium to cover the period necessary for my allotment to be established.	<input type="checkbox"/> \$ 10.00	<input type="checkbox"/> \$ 12.50
<input type="checkbox"/> \$ 45.00	<input type="checkbox"/> \$ 52.50	Quarterly. I enclose amount checked.	<input type="checkbox"/> \$ 30.00	<input type="checkbox"/> \$ 37.50
<input type="checkbox"/> \$ 90.00	<input type="checkbox"/> \$105.00	Semiannually. I enclose amount checked.	<input type="checkbox"/> \$ 60.00	<input type="checkbox"/> \$ 75.00
<input type="checkbox"/> \$180.00	<input type="checkbox"/> \$210.00	Annually. I enclose amount checked.	<input type="checkbox"/> \$120.00	<input type="checkbox"/> \$150.00

Names of Dependents To Be Insured	Relationship to Member	Dates of Birth			Height	Weight
		Mo.	Day	Yr.		

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, date of recovery and name and address of doctor. (Use additional sheet of paper if necessary.)

I hereby 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.

_____, 19____

Member's Signature

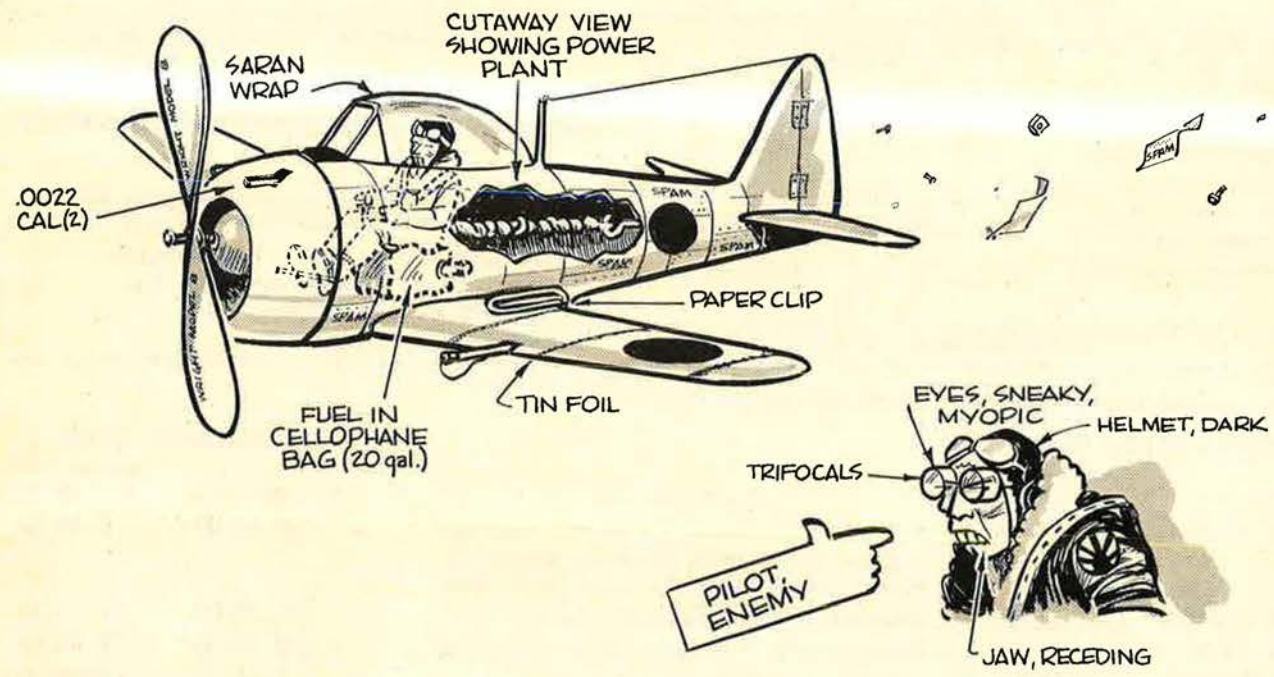
Application must be accompanied by check or money order. Send remittance to: Insurance Division, AFA, 1750 Pennsylvania Avenue, NW, Washington, D.C. 20006

Bob Stevens'

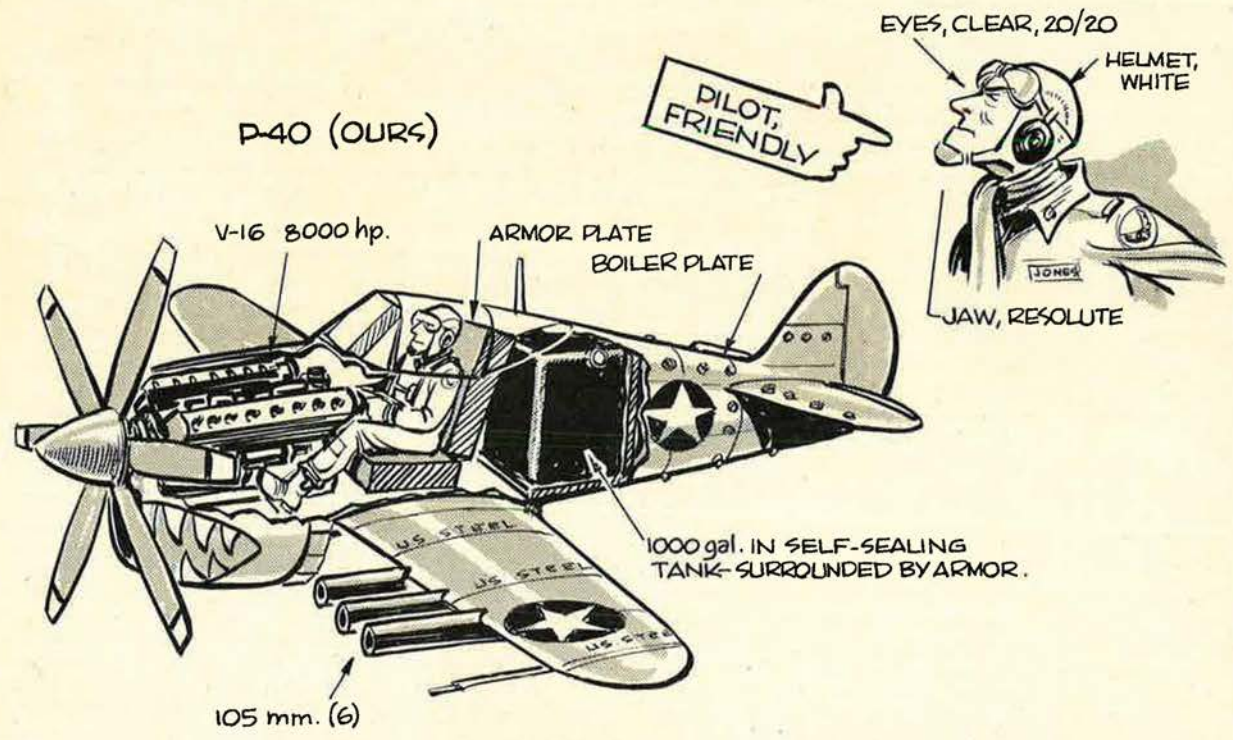
"There I Was..."

EARLY IN WWII THERE WAS A LOT OF HYSTERIA and MISINFORMATION ABOUT JAPANESE AIRCRAFT and PILOTS. SINCE THE RATHER FRAGILE ZERO COULD OUTCLIMB THE P-40 and JAPANESE PILOTS RARELY ATTACKED UNLESS THE ADVANTAGE WAS CLEARLY THEIRS (NOT A BAD IDEA), PR TYPES PAINTED THE FOLLOWING:

ZERO (THEIRS)



P-40 (OURS)



Bob Stevens



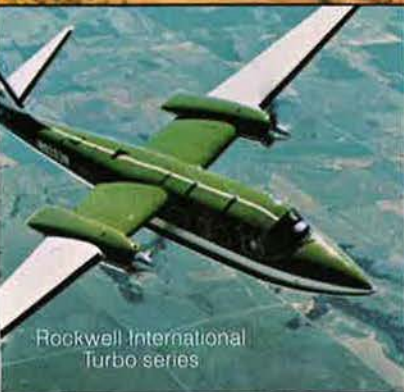
Mitsubishi MU-2 series



CASA Model 212



Fairchild-Swearingen
Merlin and Metro series



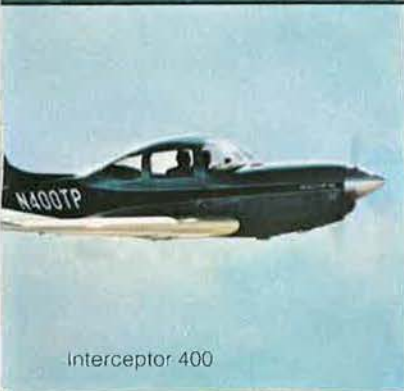
Rockwell International
Turbo series



Fairchild Pilatus Porter



Volpar Turboliner



Interceptor 400



Jetliner Dove conversion



Grumman Goose conversion



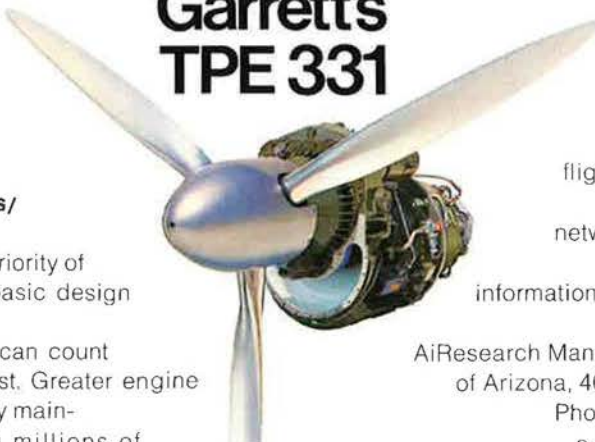
OV-10 Bronco

**Most popular
engine for fast,
high-flying, and
quiet turboprops**



Short's Skyvan

Garrett's TPE 331



Garrett's TPE 331 sets the pace; it powers two out of three new business/commuter turboprops sold today.

There are two main reasons for the superiority of Garrett's TPE 331 turboprop engines; basic design and high rated installed performance. □ The reliability of TPE 331-powered turboprops can count on operating efficiency and low cost. Greater engine life, low fuel consumption and easy maintainability have been proved during millions of

flight hours. The TPE 331 is backed by a worldwide product support network and carries the best turboprop warranty in the industry. □ For full information call your local Garrett sales office.

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AiResearch Manufacturing Company
of Arizona, 402 South 36th Street,
Phoenix, Arizona 85034.

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When the Air Force wanted an air superiority fighter, it chose a company with a superior record.

Products built by McDonnell Douglas work. They do the job for which they are intended. Their costs are carefully controlled.

Although these may seem like values you expect to receive, they are product virtues that distinguish McDonnell Douglas among high-technology companies.

Our F-15 Air Superiority Fighter for the USAF, now being flight tested, is on price and on schedule. It is proving to be the most advanced

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The F-15 is an example of how we apply technology to meet the defense needs of our nation and its allies. But the wise application of what we learn from today's research and development is

also at the core of other programs in our future, whether it's building cleaner and quieter DC jetliners for airlines, creating space stations for NASA, or a project as far removed from aerospace as operating communication and information systems for hospitals.

To learn more about how we put superiority into our products and services, write Box 14526, St. Louis, Mo. 63178. We'll send our Annual Report.



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