

JUNE 1984/\$1

AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE

WHERE TAC AIR IS HEADING



**TACTICAL PRIORITIES
THE FIGHTER ROAD MAP
USAF IN SPACE
SOVIET MILITARY POWER 1984**

It can fly anywhere in the flight envelope with no throttle restrictions whatever

In its flight-test program, the General Dynamics F-16XL has proved that flawless operability and the highest standards of durability can go hand-in-hand.

The General Electric F110 engine makes all the difference.

The engine a fighter pilot would have designed himself

Everything about the F110 says "exceptionally operable."

Just like in its F-16 and F-14 flight-test programs, the F110 (formerly F101 DFE) had no

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Record-breaking 5,000-IAC-cycle AMT testing confirms it. The F110 is one tough engine.

Demonstrated hot section life is equivalent to 2,500 flight hours. That's more than twice the life of current fighter engines in the same class. And because of

this rugged durability testing, the F110 promises to enter U.S. Air



In flight testing, the F101 DFE (now designated F110) has demonstrated equally impressive operability, durability and reliability results powering the Navy's F-14 Super Tomcat.

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Engines that set new standards

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For more general aviation



GENERAL  ELECTRIC

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When the Air Force selected Garrett's F109 to power the new Fairchild T-46 trainer, they got more than just another advanced technology engine.

They got the new standard in engine durability, safety, and efficiency. An engine that is rolling on schedule toward an early 1985 takeoff.

As the first engine developed under the strict criteria of ENSIP (Engine Structural Integrity Program), the F109 is designed for the 18,000-hour life of the airframe.

Moreover, its advanced core technology, full-authority digital electronic fuel control, and 5:1 bypass ratio all contribute to SFC's that are miles ahead of any other engine in its class.

And that's just the beginning.

The first F109 exceeded its 1,300 lb. thrust requirement on its initial run

Dec. 4, 1983, 4 weeks ahead of schedule. With its capability for growth and configuration flexibility, the F109 is also the

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Garrett's F109. On test, on cost, on schedule for delivery in 1984. An engine that's on target for the times.

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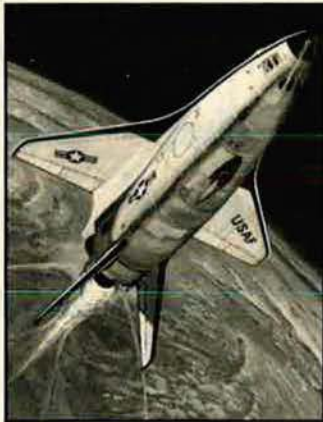
GARRETT



The Garrett Corporation
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About the cover: An F-15 Eagle from Langley AFB, Va., takes off from Nellis AFB, Nev., on a Red Flag sortie. A special section on "Tactical Airpower" begins on p. 50. (Cover photo by Art Director William A. Ford)

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HOW TO GET 300 WITHOUT BUILDING

Handwritten text in a dense, repeating pattern of a stylized, cursive script, likely a form of shorthand or a specific dialect. The text is arranged in approximately 15 horizontal lines, filling the majority of the page below the title. The characters are highly stylized and difficult to decipher as individual words.

MORE TANKERS A SINGLE AIRPLANE.



With retrofitted fuel-efficient engines, two Boeing KC-135s can now do the work of three.

That means our present force of 600 tankers can handle the job of 900.

It's the most cost-effective means available to help solve our country's refueling shortfall.

In addition to significant energy savings, a retrofit will decrease atmospheric pollution, reduce noise, improve lift capacity, and substantially lower maintenance and operational costs.

Production of the KC-135R is already underway. It's right on schedule and well within budget.

At Boeing, we believe that's exactly the kind of cost savings this country needs.

BOEING

Converting ARC-186 to SINCGARS is little more than putting on a good front.

Collins AN/ARC-186 (V) is ready for Airborne SINCGARS V.

Contrary to what you might think, SINCGARS-compatible airborne VHF comm is not years away. It's here now. In the form of a modified Collins ARC-186.

We've already completed all of the necessary internal modifications. And all that remains is the addition of an ECCM front panel control module.

Better yet, to keep logistics and support costs low, we've made sure those internal modifications are backward compatible with older ARC-186's. So the 12,000 units already in service can be converted to work with new generation ECCM systems.

By using a modified ARC-186 for SINCGARS, you'll realize significant savings on

retrofit, installation and support costs. And you won't have to sacrifice the superior performance characteristics you bought ARC-186 for in the first place—including an Air Force test verifying MTBF of more than 9,000 hours.

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Standard panel-mount control allows direct cockpit retrofit of older radios.

New ECCM front-panel module converts AN/ARC-186 radios to SINCGARS.

AN/ARC-186 uses common support equipment and has more than doubled original projected life-cycle cost-savings over other models.



MIL-STD-1553 front-panel module allows direct interface with aircraft digital bus systems.



Standard serial receiver module for replacing older-generation remote radios.

AN EDITORIAL

Capability × Will = Deterrence

By Russell E. Dougherty, EDITOR IN CHIEF AND PUBLISHER

WHETHER in mathematics, law, or analyzing the great issues of our time, it is important to get the basic proposition set down properly. Otherwise, one is unlikely to arrive at a useful solution. Thus it is unfortunate that so many Americans persist in portraying the gravest matters affecting our nation's security as issues of "war and peace."

When the National Conference of Catholic Bishops established its Committee on War and Peace, for example, it formulated not only a name for the study commission but also a conceptual framework within which the issues were to be studied. This was of more than semantic importance. In casting the central problem as one of war and peace, the Bishops made it difficult for Americans to carry on a realistic and helpful discussion about circumstances that deeply concern all of us.

"War and peace" is an erroneous proposition—a nonissue. All rational people desire peace; I know none in favor of war. Debate of non-issues leads nowhere. In this case, it also obscures vital principles that our nation has held dear for two centuries and positions us to forfeit what may be our best opportunity for peace.

The political creed of the United States is to preserve basic individual freedoms—not to seek peace at the price of those freedoms. Our fundamental national values are at variance with those of the Soviet Union, where individual liberties are seen as a *threat* to the political system instead of its central objective. Over the years, some nations have secured—or sought to se-

cure—peace by the expedient of surrendering their freedoms, but our legacy rejects that solution. Unless we are ready to concede freedom in order to achieve peace, we must state the issue more broadly and less simplistically than "war and peace."

The real issue is how best to go about keeping our people both alive and free. And the right solution—possibly the only solution—is a strategy of deterrence. While deterrence requires armed preparedness, it is not a strategy that a warlike nation would adopt. It optimizes the capabilities to forestall aggression and to reduce the probability of conflict at any level.

The United States emerged from World War II as the strongest nation in the world. Although mobilized, equipped, and intact, it did not use its power to build an empire, as many dominant nations throughout history had done. Rather, the post-war United States pursued a course aimed only at containing the export of Communist control and at deterring military aggression against the freedoms of the Western democracies.

So, in the aftermath of Korea, the United States addressed seriously the two essentials of a successful strategy of deterrence. This involved not only the acquisition of adequate military *capability* but also the development of a national consensus of *will* that the capability would be used, if need be, to preserve our freedoms. We recognized that reliable deterrence is achieved only when potential adversaries perceive the multiplying effect of our capability and our will. As Col. "Abe" Lincoln of West Point used to

put it, capability *times* will equals deterrence. He emphasized that this is a proposition in multiplication, not in addition, for if either of the essential factors is zero, then the product—deterrence—is also zero.

It has become clear that the Soviet Union will feel totally secure and satisfied only when the entire world is, like its own populace, subjugated under Soviet control. It has also become clear that the Soviets have built a military force that is awesome in its potential to coerce and intimidate—as well as to wage actual war against—those who have neglected their defenses.

The exercise of that capability by the Soviet Union, either for war or intimidation, must be deterred. If we and our allies would keep our freedom, we must also keep a credible deterrent, incorporating both capability and will. We must have improved conventional forces, because we need to decrease our reliance on nuclear responses to non-nuclear attacks—as some say, to raise our nuclear threshold. But conventional forces, no matter how strong or how much improved, will not be enough. Faced with a nuclear-equipped and determined adversary, there is no "conventional" option. We cannot avoid the necessity for both nuclear and conventional forces of a quality and quantity relevant to the threats we face.

Of course, there is a risk to ourselves as well in a strategy of deterrence, because implicit in it is the assumption that freedom is worth fighting for and that we have the guts to fight for it. Since the risk has a nuclear dimension, it has generated understandable fear about the

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AN EDITORIAL

escalating horror that could ensue if deterrence should ever fail. This leads to erosion of the "will" factor in the equation for deterrence. And, unlike a problem in addition, a consequential reduction in the *will* factor has a devastating effect in decreasing the product: *deterrence*. Erosion of will also decreases the determination of the nation to prepare itself in a timely, adequate manner, resulting in further erosion of the "capability" factor as well. The synergistic effect is to weaken the product of the factors—deterrence—to a most dangerous degree.

It is perversely ironic that the circumstances under which the continued success of deterrence is *least* likely are exactly those minimalist solutions advocated by many would-be peacemakers. Never was an acronym more apt than MAD, which describes a unilateral strategy, supported by a grossly inefficient deterrent force, capable only of a *Minimum* level of Assured Destruction of enemy populations and urban areas. Pursuit of a MAD strategy would provide us with minimal strategic forces, armed with minimally capable weapons, posing a minimal threat to opposing military forces. It would leave us with cheap, inefficient weapons that might be useful for blowing up cities and killing people by the millions, but—contrary to much of the claptrap written for dissertations or the op-ed pages—neither the policy of the United States nor its treaty obligations has ever sanctioned the wholesale targeting of concentrations of civilian noncombatants.

What is true, unfortunately, is that misguided minimalists have been successful, all too often, in blocking development of the systems required to maintain an adequate deterrent posture. They have derailed progress toward advanced and accurate weapons that are efficient enough, and in sufficient

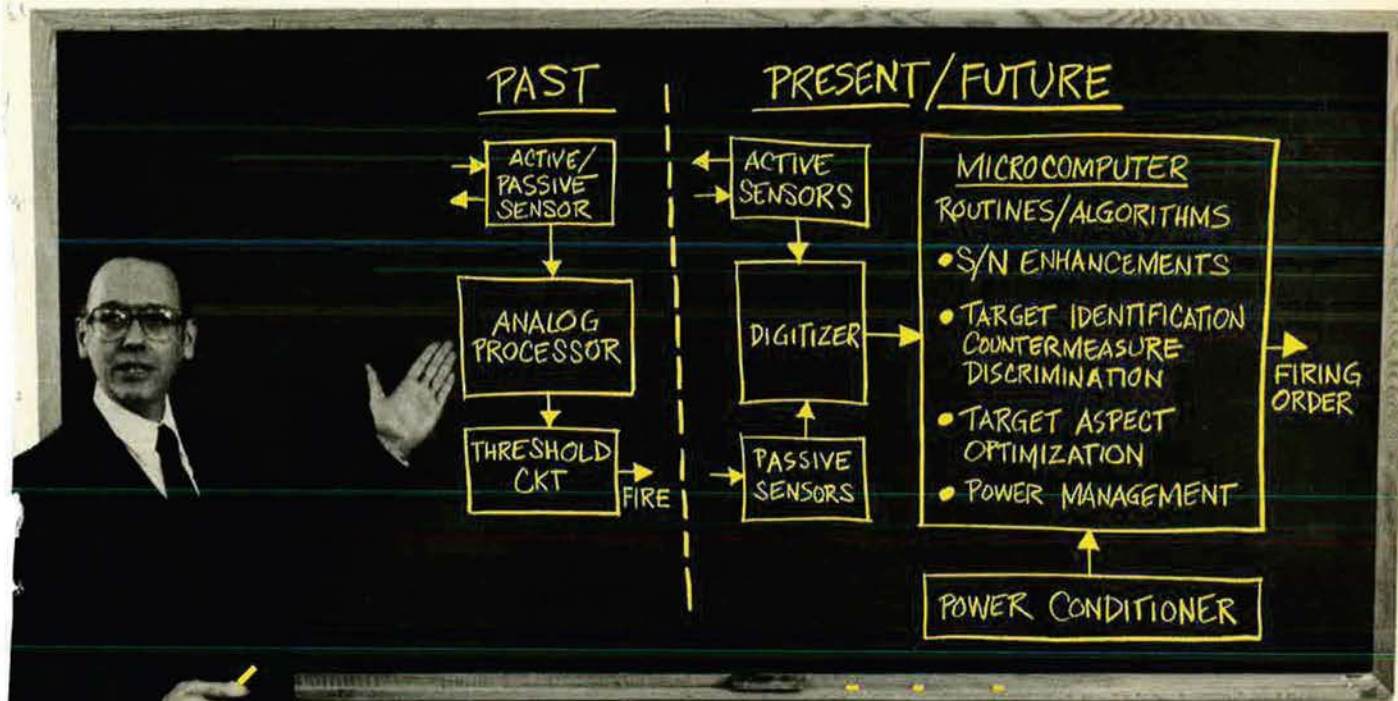
quantity, to put an adversary's military might and his command and control system *at risk*. To the extent that the Soviet Union perceives that it might be able to wage war without significant losses of the political and military assets it values most highly, the chances that our deterrent strategy will succeed are decreased. The probability of peace is diminished, too.

Our national policies, our treaty law, common sense, morality, and military logic all converge in the requirement for a credible deterrent posture. We must couple the will of our nation to deter conflict with the capability of our armed forces to deny an aggressor the benefits—or even the perceived benefits—of aggression. He must be denied any possible calculation of success through military aggression. This is not, as some would have us believe, preparation for Doomsday. On the contrary, it is the most sensible approach to keeping our world at peace without compromise of our freedoms. Let us not be misled by those who pose the great issue of our times simply as one of "war and peace." As Secretary of Defense Caspar Weinberger said in the Oxford Union debate earlier this year, the real issue is *freedom*—or lack of it.

I have just reread the Declaration of Independence. It does not speak of war and peace. It defines rights of people and governments and declares denial of those rights unacceptable. That is a declaration to which our American political ancestors pledged their lives, their fortunes, and their sacred honor. The current generation of Americans should do no less.

As Americans, let's make sure we have our basic propositions right before we proceed. The issue is not merely one of war and peace, but rather how to preserve our freedoms with the least risk of war. So far, the best answer for us has been the possession of the capability and the will for a credible deterrent. For the future, our best bet is to make sure that both our capability and our will are adequate for the job. ■

Bob Gruber on smart munitions.



“Unlike large advanced weapon systems with relatively ample space for detection and processing capabilities, munitions that are produced in high volume—artillery and mortar projectiles and mines—have been unsophisticated and incapable of making tactical decisions after launch. They have suffered from technology limitations and cost constraints.

“That is changing rapidly,” states Bob Gruber, Director of Engineering and Operations at Lockheed Electronics’ Denville Division.

“Modern, smart munitions now are a vital threat defeat mechanism in the integrated battlefield weapon concept of the future.

“The new munitions capitalize on advances in microminiaturization that

enable us to perform signal processing in restricted space—for use in target identification, IFF, electronic counter countermeasures, and command control.

“At LEC, we are developing and adapting advanced detection and digital signal processing techniques in our ordnance R&D programs. We are advancing the state of the art by using high density logic and microcomputer technology that is compatible with severe munition launch environment and highly restrictive packaging envelopes.

“Through use of unique target signature recognition algorithms and a minimum number of discrete hardware components, LEC is developing cost-effective approaches to sensor design for a variety of ordnance products.”



Sperry's QF-100 does ev

Henry ...



Anything but shoot back.

Only the *real thing*, a supersonic, afterburning, fully maneuverable unmanned aircraft with radar and IR signatures like a real-life threat, offers totally effective weapon system evaluation and air crew training. Sperry is well into delivering the first 100 USAF QF-100 drone conversions after mod-

ifying over 200 PQM-102s. Sperry's full-scale target design, modification and operation experience is unequalled, from the QB-17 through the QF-80, QT-33, QF-86, QB-47, QF-104 and QT-38. To get on target, contact Sperry, P.O. Box 9200, Albuquerque, NM 87119. Phone (505) 822-5031.



AIRMAIL

The Academy at Thirty

Congratulations to Lt. Col. Bill Wallich on his truly outstanding article on the Air Force Academy in your April 1984 issue ("Four Pillars of Excellence," p. 94). His article aptly summarizes how in only thirty years the Academy has grown to become one of the leading educational institutions in our nation. His sidebar on p. 97 of that issue truly captures the unique "spirit of the Academy."

I had the privilege of observing the Academy in action during the four years that my stepson, 2d Lt. Scott Eshleman, spent at the Academy. (He's now an instructor pilot at Williams AFB, Ariz., teaching undergraduate pilots how to drive T-38s.) Even in the unlikely event that Scott doesn't someday become Chief of Staff of the Air Force, I am convinced that the solid education he received at the Air Force Academy will stand him in good stead in whatever career he chooses to pursue.

George F. Romano
Springfield, Va.

Your article "Four Pillars of Excellence" in the April '84 issue of AIR FORCE Magazine is absolutely super and a magnificent tribute to the Academy's program.

I have had the good fortune of visiting the Air Force Academy, the most recent visit being with our P-40 Warhawk Pilots Association when we held our reunion in Colorado Springs two years ago. Although this was my second tour of the Academy, additional insights were gained and the tremendous outreach of the Academy's academic program was most vividly portrayed.

Having been an instructor at several universities and colleges, I am fully aware of the difficulty encountered in motivating students toward excellence in academic pursuits. The Academy staff has succeeded in doing so beyond description when compared to other institutions of higher learning. I agree wholeheartedly with your statement, "I think that our program at the Academy is an admirable example for the entire Ameri-

can educational community. In only thirty years we've chalked up a record worth looking at." It is for this reason that the inscription on the statue—"Man's flight through life is sustained by the power of his knowledge"—becomes true for Academy graduates.

Speaking for all of the officers and men of the P-40 Warhawk Pilots Association, congratulations on a terrific contribution to our knowledge of the Academy. I would hope that this article would receive publication in sources available to the general public.

Dr. A. P. Tadajewski
Louisville, Ky.

Superchip Static

Your April 1984 issue contained the article "Here Come the Superchips" by James W. Canan. As good as it was, it failed to address a significant problem.

Microcircuit devices with miniaturization at that level are extremely

sensitive to common static electricity. Devices with the geometries cited experience degraded performance in the five- to thirty-applied-volt range and complete failure in the 100- to 500-volt range.

This problem is made worse by a lack of knowledge on the part of major contractors as well as military field users. This lack of knowledge impacts spares requirements and reliability and availability rates.

Because of this, the introduction of Very-High-Speed Integrated Circuits (VHSIC) into large-scale use is destined to cause unnecessary problems and expense.

W. P. R. Anderson
St. Charles, Mo.

● *VHSIC program officials claim that such problems as that cited by Mr. Anderson are taken into consideration, and obviated, in the design of the VHSIC chips and in the way that they are inserted into systems. The chips are not used in isolation, the officials point out; rather, they are part of systems that are properly grounded and built to cope with power fluctuations and power surges. VHSIC chips will rarely be subjected to electrical charges of more than five volts anyway, as nearly all function at a level of just three to five volts. At any rate, some have already been tested successfully at 2,000 volts. Moreover, all must meet tough Transistor-Transistor-Logic (T²L) milstandard electrostatic discharge requirements.—*
THE EDITORS

Space Junk

I have just finished reading the April 1984 issue and really enjoyed Bob Stevens's "There I Was . . ." cartoon on the NORAD Cheyenne Mountain Complex (NCMC). I'm an old "mountain man" myself, and his cartoon brought back some fond memories of the unique NCMC facility.

I did, however, detect a fairly big error in the caption over the lower, right-hand panel. The caption states, "In the Missile Warning Center an accurate tab is kept on all the space junk in orbit."

AFA Is MOVING!

The Air Force Association's national headquarters is moving next month to new offices in the AFA National Headquarters Building now under construction in Arlington, Va. AIR FORCE Magazine will also relocate from the present AFA address in Washington, D. C., to the National Headquarters Building.

Submissions to "Airmail" and all other correspondence can be posted to 1750 Pennsylvania Ave., N. W., Suite 400, Washington, D. C. 20006, until July 17. After that date, please direct all mail to:

Air Force Association
1501 Lee Highway
Arlington, Va. 22209-1198

Correspondence mailed to the Washington, D. C., address after July 17 will be forwarded to the new AFA offices but may be significantly delayed. (Submissions to "Airmail" should be marked to the attention of the "Airmail" editor.)

The Missile Warning Center detects and, of course, keeps track of ballistic missiles (ICBMs, SLBMs, etc.), but it does *not* keep track ("an accurate tab") of any "space junk," or any other classification of space objects, in orbit. That task would be accomplished primarily by the NORAD Space Surveillance Center, a separate operational center within the NCMC.

Thanks again for the fine magazine you publish each month. I thoroughly enjoy reading every article and consider it the best of all military-related publications.

SMSGt. Charles J. Sallinger,
USAF
Nellis AFB, Nev.

● *NORAD's Space Surveillance Center at the Cheyenne Mountain Complex is responsible for cataloging and tracking man-made objects in space. Bob Stevens—and we—apologize for the error.*—THE EDITORS

Inspiring Snuffy

"Snuffy" Smith—a Hollywood press agent couldn't have chosen a name better suited to capture the fancy of the American public (see "Valor," April '84 issue, p. 120).

Oh, how well I remember him! That name conjured up from the past brings back the memory of how proud we were of his gallant deed and how even prouder we were to wear the same enlisted combat gunner's wings as Maynard "Snuffy" Smith.

He was an inspiration to us all, and he certainly boosted the *esprit de corps* of fighting men in every theater of war.

Harold O. Christensen
San Francisco, Calif.

Hands-Only Flying

Upon returning from Vietnam in 1969 with a spinal-cord injury, my primary concern was "when do I return to the cockpit?" To my dismay, it was not to be! Now an Air Force Academy senior engineering class is given credit for developing a device that allows hands-only flying (see "Aerospace World," April '84 issue, p. 37).

As much as I love the Air Force, I must cry "Foul!" Even though I've been paralyzed from the chest down since my injury, I've been able to enjoy flying Cessna or Piper aircraft, thanks to Union Aviation of Sturgis, Ky.

Their hand controls have been FAA-certified for almost ten years, are transferable from plane to plane, are inexpensive, can be quickly installed, and could be adapted to sailplanes.

The two most unfortunate circumstances are that it took me five years to discover the technology and that

it's taken the Air Force fifteen years or more to begin thinking about technology in a field that should be exclusively theirs.

Tom Deniston
Washington, D. C.

The Space Threat

Your March 1984 issue was both informative and pleasurable to read. I enjoyed and fully agreed with the article "Indivisible Airpower" by Gen. Bennie L. Davis. Long-range airpower, as embodied in such aircraft as the B-1 and B-52, is the most impressive reminder to the free world of our ability to defend our interests with speed, power, and accuracy.

Edgar Ulsamer's article, "The Threat in Space," was rather thought-provoking. I question the strategic value and utility of getting embroiled in yet another facet of arms escalation with the Soviets, especially when it involves systems that are the most critical "confidence-builders" preventing accidental nuclear conflict. Perhaps we need to make all satellites in geosynchronous orbit sacrosanct from any form of interference. This is a logical continuation of trends that began with President Eisenhower's ill-fated "Open Skies" plan.

I suggest that the US should publicly inform the Soviets, preferably at a UN Security Council meeting, that any damage to US high-altitude satellites caused by laser, particle-beam, or ballistic weapons will cause immediate assumption by the US that the Soviets are seeking to hide preparations for a preemptive strike. Let them consider what such a belief on our part might mean to their survival and to that of the world.

To forestall accidental damage from being confused with intentional attack, we will encourage Soviet use of the "Hot Line" to inform us of any "space objects" that could threaten our satellites. Failure to provide either prior or immediate notification will cause us to go to heightened alert. More than one satellite being damaged or blinded would cause us to assume Soviet hostile activity.

These reconnaissance and early warning satellites stand between the US and the USSR. Without both sides having a secure ability to predict and understand the major actions of the other, the world would be an even more dangerous place than it is now. We must ensure that these "eyes in the skies" remain above consideration as easy targets, whether the Soviets agree or not.

Capt. Steven E. Daskal,
USAFR
Annandale, Va.

Top Ten

Your editorial in the March '84 issue, "The Responsibility To Be Responsible," must be ranked among the ten most important editorials of the last decade. It ought to be republished in every responsible magazine and newspaper in the country.

Speaking as a veteran of World War II and Korea, I am vastly distressed by the irresponsibility of the media. . . . Possibly, if the media begins to be responsible and if, as you have suggested, the Defense Department, in turn, works more closely with the media, something useful may be accomplished.

Let us hope the days of ambush interviews and slanted, distorted reporting will soon be behind us.

Volney F. Morin
Los Angeles, Calif.

Rejoinder from Janeway

I deeply appreciate the thoughtful and perceptive review your Senior Editor, James W. Canan, wrote of my book *Prescriptions for Prosperity*. (See "Airman's Bookshelf," March '84 issue, p. 143.) With due respect to the judiciousness of his critique, may I respond to his suggestion that the sense of urgency I expressed may have been premature and aborted by the vigor of the recovery?

The recovery was already in full swing when I sent my book off to press last spring. In fact, that was precisely when the stock market was making its highs and interest rates their lows and when euphoria over a happy landing for our banking crisis had its climax.

This spring, interest rates are spiraling back into admittedly dangerous territory, the stock market has stumbled and is vulnerable to being tumbled by the next notch-up in interest rates, and the banking crisis is being aggravated by defaults in the Third World (not just by Soviet satellites) and by foreclosures in the US farm belt.

The evidence piling up suggests that Mr. Canan's misgivings are misplaced. He is indeed realistic in warning that authors offering timely prescriptions are prone to being ambushed by events. Events, however, far from waiting to "vindicate Janeway and reinforce his premises"—as I am grateful to note Mr. Canan was broad-minded enough to suggest at the time he wrote his review—are doing so right now.

Eliot Janeway
New York, N. Y.

Pinning Down Tyuratam

Re: The article "The Tyuratam Enig-

ma" that appeared in the March '84 issue of AIR FORCE Magazine:

Author Dino Brugioni states that the "launch complex was located in the Bet Pak Dala Desert, south of the Aral Sea." Further, he writes that "Tyuratam is fifty-seven miles south of the town of Novokazalinsk and forty-two miles north of Dzhusaly" and, finally, that "Baykonur . . . is 200 miles northeast of Tyuratam."

While reading this interesting article, I got out a copy of Hammond's 1982 edition of the *Standard World Atlas* to put these places in better perspective. Indeed, Baykonur is shown about 200 miles northeast of a town called Leninsk, which I assume may be a new Soviet name for what we call Tyuratam. In addition, Leninsk does lie about halfway between Novokazalinsk and Dzhusaly, but from there on there is a disconnect.

The Bet Pak Dala Desert is shown east of the Aral Sea. Furthermore, Novokazalinsk and Dzhusaly lie on an east-west line, making it impossible for Tyuratam to be south and north of these towns, respectively.

Who's correct, Mr. Brugioni or the *World Atlas*?

Lt. Col. Henry R. Kramer,
USAF
St. Petersburg, Fla.

The article "The Tyuratam Enigma" in the March 1984 issue of AIR FORCE Magazine is more enigmatic than might appear to the casual reader. I took the trouble to look up the location of the subject in an atlas and discovered the following:

- The Soviet missile test site and the Bet Pak Dala Desert are east, not south, of the Aral Sea.
- The Syr Dar'ya River flows west, not north, to the Aral Sea.
- Tyuratam is fifty-seven miles east, not south, of the town of Novokazalinsk and forty-two miles west, not north, of Dzhusaly.

Apparently there is something about this site that induces confusion within the CIA as well as within the Soviet government.

Lt. Col. Herbert W. Young,
USAFR (Ret.)
Seattle, Wash.

• *Tyuratam—which has been called Leninsk by the Soviets—is indeed fifty-seven miles east of Novokazalinsk and forty-two miles west of Dzhusaly. Both Tyuratam and the Bet Pak Dala Desert are east of the Aral Sea. Baykonur is roughly 200 miles northeast of Tyuratam. Rivers in the Soviet Union are usually characterized as north-flowing or south-flowing. The Syr Dar'ya River flows*

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north from its source and then curves westward to empty into the Aral Sea—thus, it is a "north-flowing" river.

Winston Churchill once said that "Russia is a riddle wrapped in a mystery inside an enigma." We hope that the foregoing finally resolves—correctly, this time—the riddle of our own "Tyuratam enigma." We apologize for the errors and appreciate the many letters from readers pointing out the mistakes.—THE EDITORS

The Forgotten Front

The article "The Forgotten Front" by John L. Frisbee in the February 1984 issue was of great interest to me. All too often in the history written regarding World War II there is little or no mention of the Alaska and Aleutian Islands action.

For all of us who served and flew out along the "Chain," as it is called, this excellent article brought back memories. My favorite phrase to refer to this string of volcanic rocks has always been "a string of pearls laid out in a semicircle arc" pointed toward Asia.

Flying the Aleutian Islands routes, as with others near the top of the world, has always presented special problems due to the extreme weather. At the points in the North Pacific where the warm air masses meet the cold air coming in over the Bering Sea, the weather is the worst. Rapid and drastic change is the normal situation.

In order to improve the safety of flight in this forgotten and lonely place, and to extend the times and frequency of our bombing attacks on the Japanese-held Kuriles, it was determined that radar control might be the answer. Ground control approach radar team number six, made up of seventeen men with a Gilfillan AN/MPN-1 set, was assembled and sent to Shemya Island located near Attu and Agattu, out near the end of the Chain. For each of us on the team, it was a radical change from the radar training at Boca Raton, Fla., or operations conducted in secret at Fort Dix, N. J.

Flight operations at Shemya and the air traffic control had to be for real all the time, testing both men and equipment. I felt then, and have throughout the intervening years, that this experience in such an environ-

ment was the true proving ground for radar as a tool to assist the pilot and controller in solving air traffic control problems.

To assist in the preparation of an article on the start of radar control, and to arrange a forty-year reunion, I would appreciate hearing from former radar team members and Eleventh Air Force friends or others concerned. You can write me at the address below.

Jack E. Reed
1616 Sienna Lane N.
Columbus, Ohio 43229

Salving the Salts

It was charitable of you to publish "The Annapolis Connection" by Maj. Gen. Robert A. Rosenberg in your February 1984 edition. Naval Academy graduates' egos have needed salving to these many years.

However—please—once is enough!
LeRoy V. Greene, Jr.
Redlands, Calif.

Deterring the Soviets

Recent articles and letters in AIR FORCE Magazine prompt me to both comment and question.

It seems strange to me, as an ex-SAC pilot and professional radar engineer, that much discussion seems to dwell on what kind of bomber, ALCM, or ICBM is most suitable for US defense.

I cannot but ask why so little attention is paid to the extreme vulnerability of these systems to a Soviet first strike—vulnerability that can but increase over the coming years?

Consider, if you will, the results of a Soviet strike that employs sub-launched ballistic missiles to hit airfields and missile silos within perhaps five to ten minutes from breaking the sea surface. Agreed, hardened silos aren't in great danger, but it's quite likely that the only surviving bombers and ALCM carriers will be those on airborne alert, and their prospects of making a successful attack from that point aren't very bright, especially against an alert and prepared Soviet air defense.

And as the accuracy of Soviet warheads increases (and we are still selling them electronics, ball bearings, gyros, etc., aren't we?), the time obviously approaches when no degree of silo hardening can be expected to survive an attack. After all, what's in the fireball has to be in deep trouble.

And if your ground-based ICBMs are in such danger, then an explicit policy of launch-on-warning becomes a very handy path—if not absolutely necessary. Now we're talking about walking a very fine line, since a

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systems engineering for strategic communications programs, and computer program design agent for the U.S. Coast Guard's Command, Control and Display (COMDAC) system.

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When it Comes to International Training the Air Forces Come to Link

The U.S. Air Force long has depended upon Link Flight Simulation Division for advanced training systems. T-37's, T-38's, T-39's, F-4's, F-5E's, F-111's, C-130's, B-52's—all have been simulated by Link.

The Air Force also selected Link for the multi-national F-16 program—one of the most extensive undertakings in simulation history.

Link is producing F-16 simulators for installation not only in the United States but also in Belgium, Denmark, the Netherlands and Norway—the countries which are jointly producing the single-engine light-

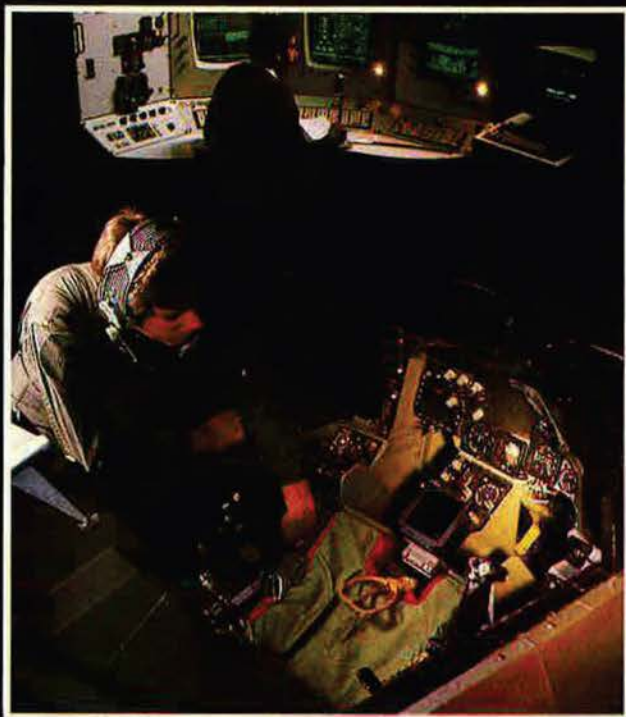
weight advanced technology fighter. At least 18 simulators are being provided, including some for other countries planning to acquire the versatile aircraft.



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Each of these tactical flight training systems will simulate the performance and flight environment of the General Dynamics F-16A aircraft, including the highly complex on-board avionics. Like all other simulators Link has built for the Air Force, the F-16's will substantially reduce training costs while upgrading pilot proficiency. They will make a significant contribution to the security of the United States and its allies.

When it comes to simulation, nations come to Link! Binghamton, N.Y. 13902



false alarm holds the charming alternative of instant disarmament or commencement of the next world war!

By the way, even mobile ballistic missiles don't get you out of hot water, what with the advent of maneuverable warheads with terminal guidance combined with good satellite observation and ground intelligence. Besides, it's easy to see problems hardening such vehicles, and won't the eco-freaks have fun with day-to-day sabotage!

Why not admit we have a problem in the event of a *real* Soviet attack and try to solve that problem? It seems apparent that a crash missile-defense program could yield point defenses and atmospheric defenses in short order with existing technology, with the promise of midcourse and boost-phase defenses available in just a few years from satellite carriers of missiles (or just pellets, or even directed-energy weapons). Combine that with a *real* civil defense program (how about a \$5,000 tax credit for personal civil defense preparations? It seemed worthwhile for saving energy, how about lives?), and we might soon have a much more optimistic outlook on Soviet nuclear blackmail.

And since some kind of retaliatory forces would seem in order, how about big flocks of intercontinental ground-launched cruise missiles? Launch 'em in waves on early warning, then recall and refuel them in the event of a false alarm. No need for fancy silos or to wait for crews from the BX. Hard (impossible, in tens of thousands) to stop, highly accurate, cheap (comparatively), no lives risked, and *no* first-strike threat to any other nation!

Agreed, a simple-minded view, but shouldn't we step back and take a look at our basic problems and their cures at least once in a while?

Lannon F. Stafford
Phoenix, Ariz.

Hill AFB Alumni

The Alumni Committee of the Hill AFB, Utah, Heritage Program is compiling a list of all former base employees, military and civilian. To help preserve the history of Hill's significant contributions to national defense since the beginning of World War II, all former employees are asked to contact us so that we can include them in the Heritage Program.

Under the program, a permanent museum and aerospace park has been approved for construction on a thirty-six-acre site near the Roy gate. Fourteen aircraft have already been received and are being restored, an outdoor missile plaza has been

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planned to display the ICBMs and smaller missiles associated with the base, and many other activities are under way.

The Alumni Association is being formed with the realization that there are thousands of men and women across the country whose efforts at Hill AFB should be recognized as the force that created its heritage. Membership will automatically enroll you in the Air Force Heritage Foundation of Utah, Inc., and the Hill AFB Historical Society, and will place you on our newsletter mailing list.

We know that there are many former members of the Hill family who would like to find out what their old friends are up to now. Others have historical information, artifacts, and memorabilia they may want to make a permanent part of the museum here.

If you were once assigned to Hill AFB, Utah, contact me at the address below so that we can keep you informed of our progress and plans.

Lt. Col. Richard F. Quimby,
USAF (Ret.)
Hill AFB Alumni Committee
OO-ALC/CE-2
Hill AFB, Utah 84056

Phone: (801) 777-6818

2d ACCS

We, the members of the 2d Airborne Command and Control Squadron (2d ACCS), are immensely proud of our record of more than 200,000 accident-free flying hours. This record has been neatly documented on computer chips, but the human side of this record—the side we can be most proud of—has gone largely undocumented.

In hopes of remedying this situation, we are preparing a history of the 2d ACCS and the "Looking Glass" mission. We plan to include not only statistics but also people-oriented articles and photographs in this history.

To aid us in our history project, we are asking for contributions of photographs, magazine articles, newspaper clippings, personal memories, and anecdotes. Any bit of information will be greatly appreciated and, upon request, will be carefully copied and returned.

Please contact the address below.
1st Lt. Mark A. Carter, USAF
2d ACCS/DOF
Offutt AFB, Neb. 68113

AFROTC Det. 005

Air Force ROTC Detachment 005 of Auburn University is compiling a file of its former detachment staff and alumni. The file will contain a card on each alumnus and staff member. The file will serve the following functions:

- To update the addresses and ranks of alumni and staff.

- To build a list of Auburn War Eagles who are stationed at the same base.

- To help graduating seniors establish contact with Auburn graduates stationed at their first assignment.

- To compile a list of locations of graduating class members that can be sent out on request.

Each year, Detachment 005 sends out an alumni newsletter, but we lack many current mailing addresses. If you have moved recently or have not been receiving the newsletter, please notify Detachment 005 by letter or postcard so that we can update you in our alumni file.

The alumni staff is also establishing a pledge program for interested alumni and graduating seniors. The funds are now being used in purchasing equipment and supplies for our new building on campus. The funds are also to be used for the increased circulation of the newsletter, distribution of requested address lists to alumni, the homecoming alumni barbecue, other alumni functions, and to improve the operations of the cadet corps.

Please contact the address below for more information.

Alumni Affairs
AFROTC Det. 005
Auburn University
Auburn, Ala. 36849

619th Tactical Control Flight

The 619th Tactical Control Flight is seeking information concerning its intriguing history for our unit's scrapbook and trophy case. Specifically, we need photographs, lists of achievements, memorabilia, names of personnel assigned, and interesting stories from our brief past.

If you were a member of the 619th Tactical Control Flight, or know of any members, please contact us at the address below. (We are tentatively planning a ten-year reunion at Loccum in the Federal Republic of Germany.)

1st Lt. Richard A. Caldwell,
USAF
619th Tactical Control Flight
APO New York 09669

95th Fighter Squadron

The 95th Fighter Interceptor Training Squadron is dedicating a room in our squadron building for the pur-

pose of displaying some of our history.

We are looking for photographs, especially from the World War II period, and other memorabilia that could be copied or loaned. Also, we are interested in personal accounts and war stories concerning the 95th that veterans may have to offer.

During World War I, the 95th was called the 95th Aero Squadron (1st Pursuit Group). In WW II, the squadron was designated the 95th Fighter Interceptor Squadron (82d Fighter Group). In 1974 the squadron was redesignated the 95th Fighter Interceptor Training Squadron and holds that title today.

Please contact the address below with any information on this unit.

1st Lt. Scott L. Swanson, USAF
95th FITS
Tyndall AFB, Fla. 32403
Phone: (904) 283-3113

Horse Cavalry

Did an ancestor or relative follow the cavalry guidon in the winning of the West? Did your grandfather ride with Jeb Stuart or with one of Sheridan's vaunted regiments in the War Between the States? Or did an uncle serve with Pershing's troopers on the Mexican border? Do you have a family connection with a cavalryman—regular, militia, or volunteer—who served between 1776 and 1945, either in peace or wartime?

The US Horse Cavalry Association will record this service and a brief biography in its permanent archives, the only central reference source for information on the history and traditions of the horse cavalry.

USHCA is a nonprofit organization of former troopers and supporters of the cavalry's contribution to the history of our country. There is no charge for the registration of former cavalrymen, nor is the listing limited to relatives of members.

To obtain a registration form or more information on membership, please write to the address below.

US Horse Cavalry Ass'n
Box 6253
Fort Bliss, Tex. 79906

Prairie Aviation Museum

Attention, all of you C-47/DC-3 admirers: This organization is for you!

The Prairie Aviation Museum is a nonprofit organization devoted to preserving our aviation heritage. Our current project is a 1942 DC-3, tail number N763A, that became a C-53 when it came off the Douglas assembly line. This aircraft has an impressive military and civilian airline history.

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We are seeking additional members for our organization (there is a \$30 annual membership fee) and aviation memorabilia. Please contact us at the address below.

Prairie Aviation Museum
P. O. Box 666
Bloomington, Ill. 61702

6916th ESS

We are seeking photographs, patches, and any other information relating to the history of the 6916th Electronic Security Squadron for inclusion in a unit scrapbook. Any material sent will be copied and returned if requested.

Please contact the address below.

TSgt. James R. Pitney, USAF
6916th ESS, Box 2153
APO New York 09223

868th Bomb Squadron

I am writing a history of Lt. Edward B. Mills, Jr., who was a pilot of a B-24 in the Thirteenth Air Force's 868th Bomb Squadron (H) in the Pacific theater during World War II.

Lieutenant Mills and his crew were, to the best of my knowledge, the only Americans killed in action in Korea in that war.

According to the mission report for August 6-7, 1945, two aircraft were on an armed shipping search off the south coast of Korea. One of the planes was piloted by Lieutenant Mills, the other by a Lieutenant Ellington. They had taken off from Yontan and proceeded to Hwa-Do, then they were to fly to Fusan and back to their base. Lieutenant Mills's plane was later confirmed shot down and crashed on Namhae Do.

I would like to hear from airmen who were with the 868th, men who may have known Ed Mills, and, hopefully, even from Lieutenant Ellington and his crew.

I have found very little written about the Snoopers of the 868th. Almost no pictures seem to be available. Other airmen were aware of the Snoopers by name; but, in general, they seem to be a mystery group. They spent most of the war flying from Morotai and were stationed on Okinawa only during the last few weeks of the war.

I would appreciate hearing from anyone who might be able to add to my information about the history of this group and who could share anec-

dotes and, perhaps, copies of photos. Please contact me at the address below.

William E. Allen
4883 Delevan Dr.
Lyndhurst, Ohio 44124

32d Tactical Fighter Sqdn.

In November of this year, the 32d Tactical Fighter Squadron at Soesterberg in Holland will celebrate its thirtieth anniversary. *Reconnaissance* magazine and the 32d Friendship Alliance are planning to make a book about this fine unit.

We need a lot of information concerning the history of the 32d. Are there any former 32d Squadron members among readers who are willing to contribute material to this book? We need information concerning World War II history as well as photos of 32d Squadron aircraft. We also would like to find out why the unit flew the YP-37 and to find out about any other aircraft flown.

The book will be printed in Dutch and will feature photos. For more information or contributions, please contact the address below. (All material will be properly handled and returned after use.)

G. H. J. Scharringa
Reconnaissance Magazine
P. O. Box 146, 3730 AE
De Bilt, the Netherlands

Crash Near Tokyo

I am looking for information regarding the crash of a C-54 near Tokyo on May 29, 1947. The plane was flying into Tokyo from Korea with forty passengers aboard, among whom was my brother, Col. Theodore B. Anderson. All perished when the aircraft flew into a mountainside.

No explanation of the cause of the accident was ever given, although several inquiries have been made over the past thirty-five years.

Anyone having any information regarding this crash is asked to write to me at the address below.

H. Kenneth Anderson
5236 S. E. 32d Ave.
Portland, Ore. 97202

Phone: (503) 774-6990

North Witham

We, a small group of World War II aviation enthusiasts, seek the help of readers most urgently.

We live in the East Midlands/East Anglia area of England, an area littered with disused American airfields. A large majority of these fields have received the attention of Eighth Air Force associations, societies, and memorial trusts, but one such airfield, North Witham, has received no

AIRMAIL

such attention, as far as we can tell from our research and investigation.

We have made several contacts in England, but have received no detailed information. We would like to contact any American personnel who may have been stationed at North Witham or who flew from this field. Some units connected with North Witham include the 9th Air Service Command, 1st Tactical Air Depot, 9th Troop Carrier Command, 9th Troop Carrier Service Wing, 33d and 85th Air Depot Groups, 29th Air Depot Group, Parachute Pathfinder School, 1st Independent Polish Airborne Brigade, and units that flew out of the field for the D-Day invasion of France.

Anyone having any information on North Witham during World War II is asked to contact us at the address below.

Trevor John Sharpe
15, Eastfields Crescent
Nassington
Peterborough, Cambridgeshire
England

6570th Air Base Group

I would like to hear from anyone who served in any unit in San Antonio, Tex., from 1962 to 1966, especially with Hq. Aerospace Medical Division, 6570th Air Base Group, Brooks AFB.

Please contact the address below.

Robert E. Lee Duncan III
1311 Shun Pike, RFD #4
Nicholasville, Ky. 40356

Phone: (606) 885-9995

VNAF F-5Es

I am seeking information on a number of Northrop F-5Es that were sold to South Vietnam toward the end of the Vietnam War. I have been unable to locate any photographs of these aircraft and need to know if there were any special markings or camouflage on them. I am also interested in the type of mission these aircraft flew over Vietnam and what types of armament they used.

If anyone can help me, it would be greatly appreciated.

Jim Ivey
5305 Hames Trace #27
Louisville, Ky. 40291

Air War Over Denmark

I am trying to put together the history of the air war over Denmark during World War II. I would like to get in

AIR FORCE Magazine / June 1984

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touch with anyone who knows anything about operations over Denmark by the 20th Fighter Group and the 303d Bomb Group on August 27, 1944.

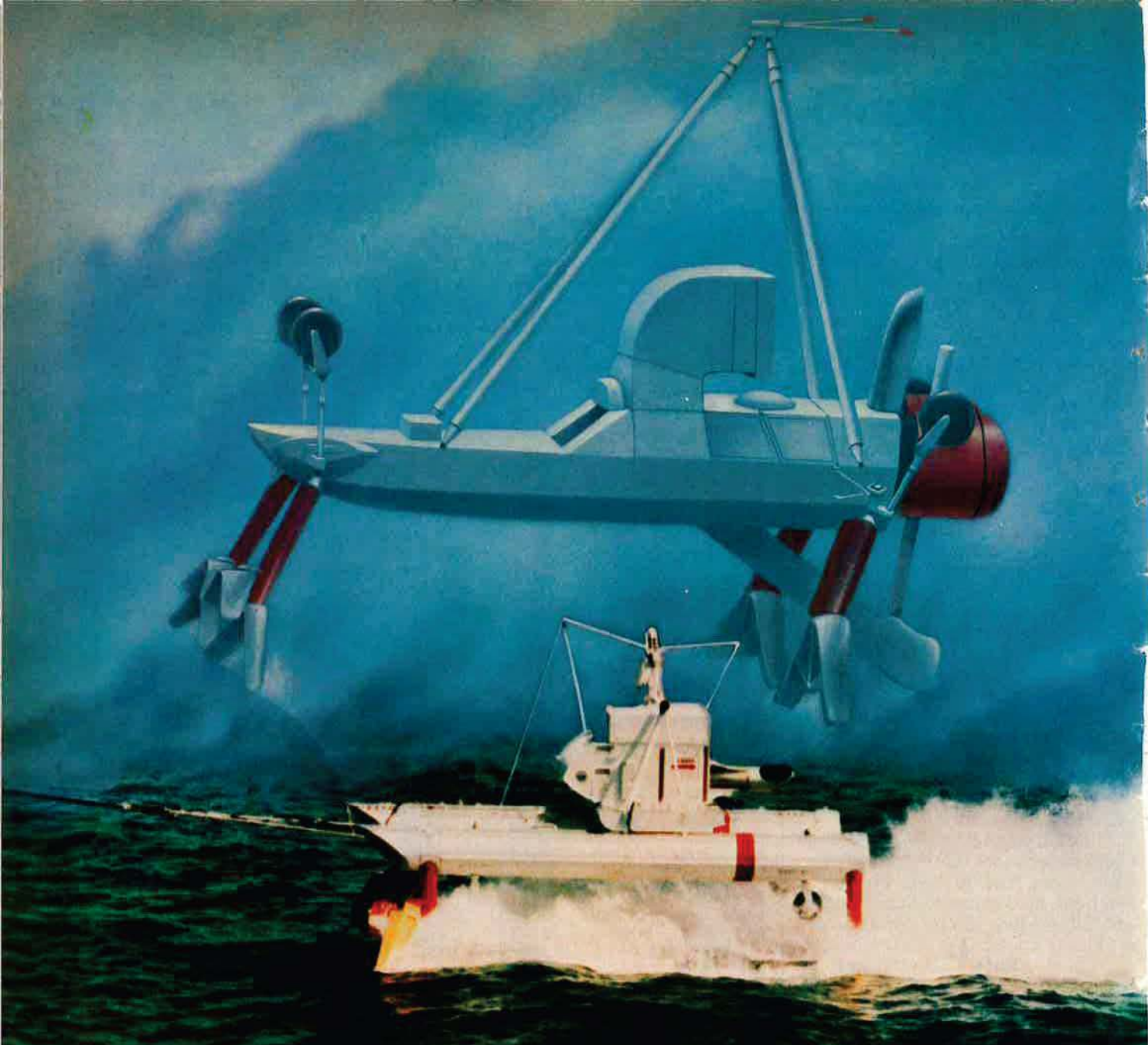
Please contact me with any information concerning these units at the address below.

C. Petersen
Nørre Alle 88 st th
8000 Aarhus C
Denmark

57th Bomb Wing Ass'n

The 57th Bomb Wing Association is searching for air and ground crew personnel, regardless of rank or grade, who served in any capacity in the 310th, 319th, 321st, and 340th Bomb Groups, or who served with Group and Wing Headquarters or with the attached 308th Signal Corps.

The Association publishes a quarterly newspaper and holds national reunions. The fifteenth annual meet-



A View of Things to Come...the AN/ALQ-166!

The next generation of airborne magnetic minesweeping is in the final stages of development. Hydrodynamic, electronic, power, deployment and handling tests have been successfully accomplished. During next year, full scale systems tests will be conducted. This new, high-performance airborne magnetic minesweeping system will provide a significant increase in performance over its EDO built predecessor, the MK 105, that was so successfully used in Halphong Harbor and the Suez Canal.

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EDO Corporation, Government Systems Division
College Point, NY 11356, U.S.A.
Phone: 212 445-6000 Telex: 127431

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ing will be this September in South Bend, Ind.

Anyone desiring more information about our Association should contact the address below.

57th Bomb Wing Ass'n
11720 Whisper Bow Dr.
San Antonio, Tex. 78230

Crash in Munich

I would appreciate hearing from anyone who has information concerning an air crash in Munich in 1960, during which the pilot, copilot, crew members, and students from the University of Maryland were killed. The plane was a Convair flying out of London under the command of General Moore.

Please contact me at the address below.

Lt. Col. Charles T. Bush,
USAF (Ret.)
190 SW 84th Lane
Ocala, Fla. 32674

Where Are You?

I am looking for information about my late father's stint in the Army Air Forces during World War II. My father, Charles Edwin Kindinger, served with the 314th Headquarters and Base Service Squadron and 466th Air Service Group overseas in England and France. While in France, I know that my father painted an oil portrait of his commanding officer, who had the painting insured and shipped back to the States.

I would like to contact my father's commanding officer or anyone else who knew him during his military service.

Danja K. Schaefer
2491 Bryonaire Dr.
Mansfield, Ohio 44903

I'm trying to locate a Charles A. Jones, who, in 1942-43, served as a lieutenant colonel on the staff of General Ira C. Eaker, Commander of Eighth Air Force in England. Colonel Jones was also a member of General Eaker's private mess in Kingston in the southern part of London, known as "Castle Coombe."

I am trying to find Colonel Jones to see if he still has his cup that was part of the punch set used in General Eaker's mess during the war. The bowl and four of the other cups are now on display at Eighth Air Force headquarters at Barksdale AFB, La., and General Eaker and I have hopes that we may eventually be able to locate all of the cups to complete the display.

Brig. Gen. C. P. Lessig,
USAF (Ret.)
1700 Dakar Rd. E.
Fort Worth, Tex. 76116

AIRMAIL

Our family is seeking information concerning Lt. John B. Willcoxon, who was with the 90th Bomb Group serving as group operations officer at the time of his death on July 20, 1943. His last flight was a recce flight to Madang in New Guinea. There was one survivor of that flight, the nose gunner, M. D. Turrentine.

Personal recollections and factual accounts relating to John from the time his group was formed in 1942 at Iron Range in Australia to the time of his death in New Guinea would be appreciated.

Kathy Willcoxon
10 Aberdeen Dr.
Mendham, N. J. 07945

We are trying to locate Norman D. Smith, who was the only survivor of a B-24 that was shot down near Lae in New Guinea on January 9, 1943. The plane was flying out of Iron Range in Australia and was jumped by six to eight Zekes.

Please contact the address below.
MSGt. Edward T. Keyworth, Jr.,
USAF (Ret.)
38 Crestlyn Dr., East
York, Pa. 17402

We are looking for former members of the 12th Fighter Squadron who served on Christmas Island or Guadalcanal in 1942-43.

Anyone who served with this unit is asked to contact the address below.

Paul S. Bechtel
155 Carrigan Blvd.
Merritt Island, Fla. 32952

I am trying to locate pilots from World War II Class 42-A who served at the following training fields: Thunderbird, Taft, and Stockton, Calif.

Any pilots from that class are asked to contact the address below.

Col. Charles C. Kimball,
USAF (Ret.)
1515 South 2100 East
Salt Lake City, Utah 84108

I am seeking anyone who met Lt. Col. Norman Baessell, Maj. Glenn Miller, or Flight Officer Pee Wee Morgan in Bordeaux, France, during World War II.

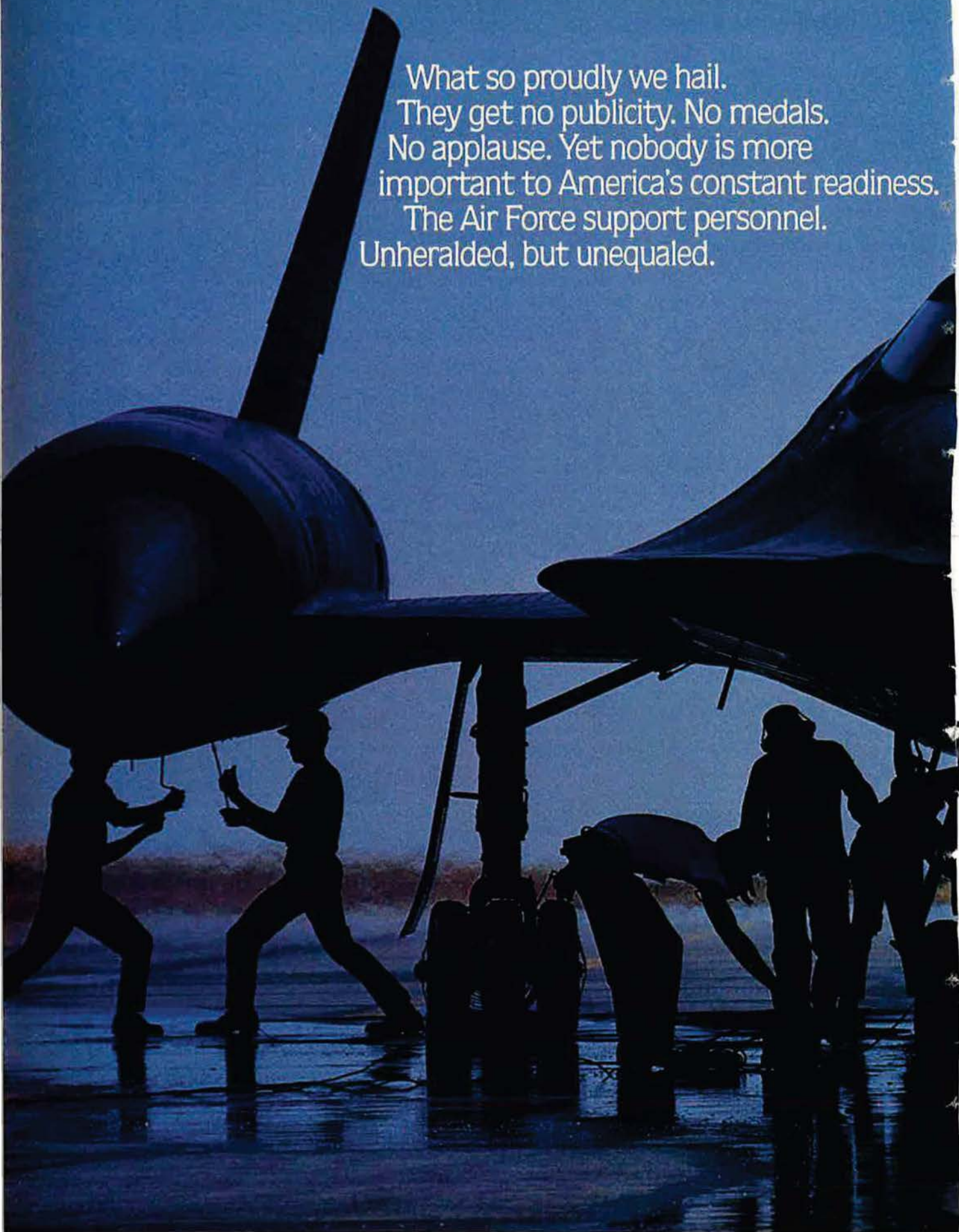
Lt. Col. Thomas F. Corrigan,
USAF (Ret.)
3815 Somerset Dr.
Colorado Springs, Colo. 80907

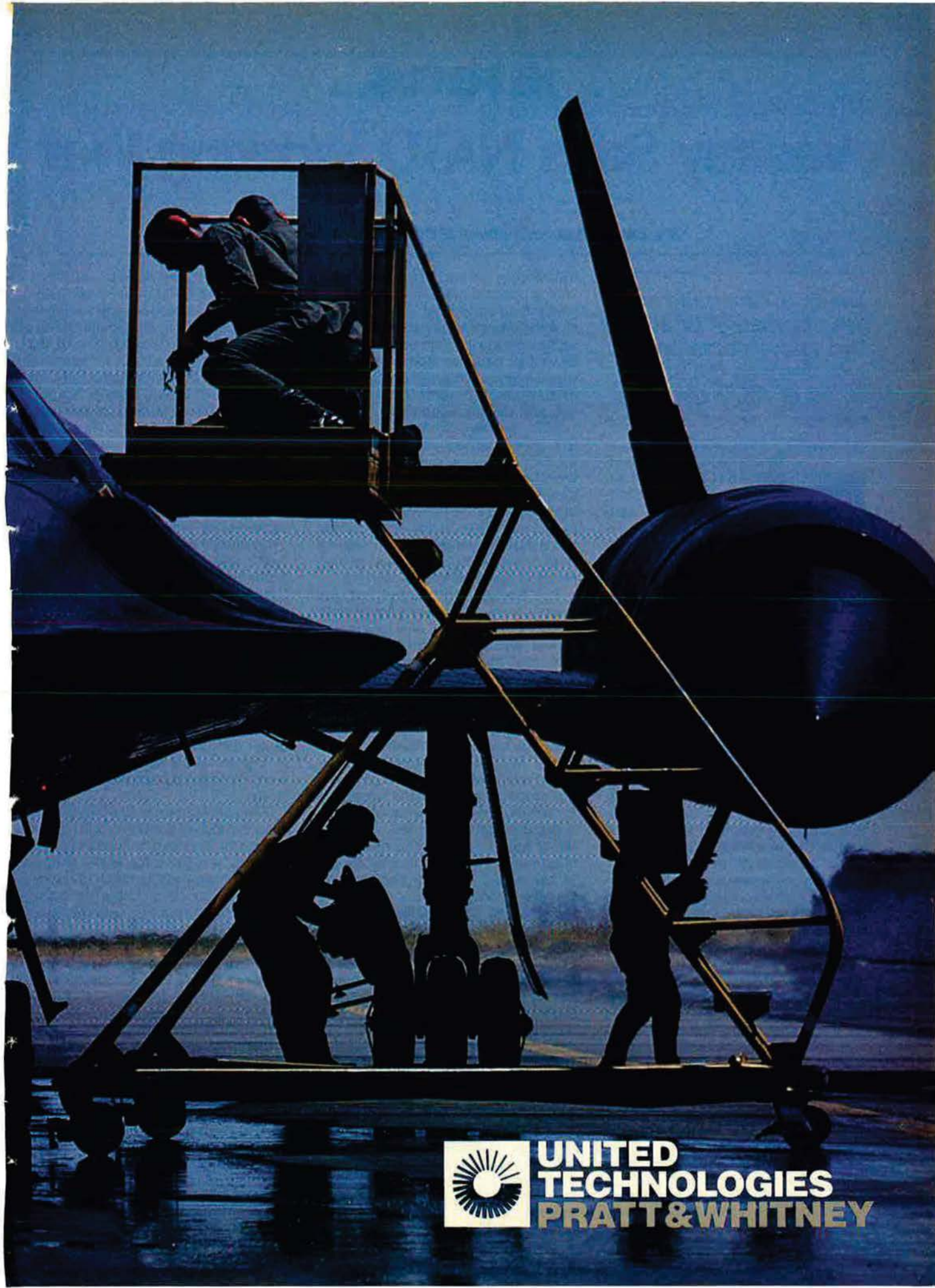
FREE

For a free color print of the SR-71 Blackbird as it appears on the following pages, simply write to Pratt & Whitney, Communications M.S. 103-01, 400 Main Street, East Hartford, CT 06108.



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Vessey Says NATO Working Well

By Edgar Ulsamer, SENIOR EDITOR (POLICY & TECHNOLOGY)

The JCS Chairman also sees formation of unified space command and stresses the importance of ASAT development.

Washington, D. C., May 5



The Chairman of the Joint Chiefs of Staff, Gen. John W. Vessey, Jr., USA, in a recent interview with this writer, termed NATO "one of the greatest successes of the Western world," rejected the claim by some Cassandras that the alliance was tottering on the brink of dissolution, expressed confidence that a unified space command would be formed eventually, and stressed "significant improvements" in the cooperation among the services, especially at the operational level.

General Vessey, a veteran of forty-five years of military service who has just been appointed to another two-year term as Chairman, feels "proud to wear the uniform at this stage of the game" because of the recent "rather dramatic" improvements in the quality of the people serving in the armed forces at all echelons of the four services. He put special stress on the importance of the service chiefs, whom he described as "hard-working guys who pay attention to both of their jobs." This involves building, training, recruiting, and supporting the forces for the unified and specified commands, and their responsibility as JCS members in formulating national defense strategy and advising the President and the Secretary of Defense.

In assessing the military balance between the US and the USSR and the trends associated with that balance, General Vessey pointed with concern at the fact that the Soviets keep increasing the size of their forces while

the US does not and, at the same time, "are producing military equipment at a rate three times ours." Other factors shaping the balance between the superpowers are a mixed bag of positive as well as negative elements. On the US side, good progress is being made in equipment modernization, training, and backup support.

With the new *Trident* SSBNs and the air-launched cruise missiles (ALCM) coming into the inventory of the strategic forces, "significant capabilities" are being added. On the other hand, the Soviets have just completed one major phase in their ICBM force modernization and are moving to the next while "we are just getting started," General Vessey warned.

The Soviets, he pointed out, are coupling the modernization of their ICBM forces with the development of a new strategic bomber of the B-1 type and the deployment of cruise missiles on their attack submarines. Over the long term, the key question associated with the strategic nuclear balance is whether or not the US will continue its modernization program in the face of mounting public apprehension over the effects of strategic modernization on the prospects for peace. These concerns are understandable but ill-founded: "We certainly want to reduce the risk of nuclear war, but failing to modernize our forces would increase that risk," in General Vessey's view.

He counts the US allies as a clear plus because of the nature and vitality of NATO as opposed to the Warsaw Pact's questionable allegiance to Moscow. The Soviet Union, General Vessey suggests, "is the only nation in the world surrounded by hostile Communist neighbors." NATO, which just celebrated its thirty-fifth birthday, General Vessey said, has succeeded in maintaining a long, stable peace in an area of the world that in the past was marked by frequent wars and was the catalyst for two world wars, barely twenty years apart, prior to the formation of NATO. Moreover, NATO has spawned an unprecedented economic and political cooperation among its members.

As a result, the alliance, at times, has become a victim of its own successes and a favorite target for Soviet political agitation. The Soviet Union's primary political objective over the past few years has been the political dissolution of NATO, especially the separation of the US from its European allies. The Chairman of the Joint Chiefs of Staff pointed out that "the last two years of nuclear-weapons negotiations [with the Soviets] weren't negotiations—they were attempts at separating us from our allies."

In this context, the Soviets have proved to be "masters at double talk." They fielded about 370 modern, highly effective SS-20 intermediate-range ballistic missiles (IRBMs) and then walked out of the negotiations, charging that it was the US, not the USSR, that had upset the balance by deploying a handful of Pershing IIs and ground-launched cruise missiles. To provide this stratagem with further political leverage in the public eye on both sides of the Atlantic, the Soviets announced that the removal of this small number of US theater missiles in Europe was a categorical precondition for the resumption of negotiations.

The Joint Chiefs of Staff repeatedly have expressed concern about potential gaps between the goals of US strategy and the force levels and capabilities required to match that strategy. This concern, although somewhat ameliorated by modernization, is still valid.

At the core of the concern is the fact that the Soviet forces outnumber those of the US by a substantial margin, according to General Vessey. There is good reason to believe that the current force levels are roughly consonant with what the American people are willing to support over the long haul. A solution other than a massive force increase is needed, therefore, to prevent a mismatch between strategy and capability: "We look for ways to multiply that force by modernizing its equipment and by paying a lot of attention to the quality and training of the people in that force." The quest for force multipliers

is concentrated in three key areas.

One of these, he explained, is "good intelligence, so that we know more about the enemy than he does about us." Equally important is superior mobility of the combat and support forces. This trait is the essence of maneuver in warfare at the strategic and tactical levels. In this context, good progress is being made to improve sealift and airlift, according to the Chairman of the Joint Chiefs of Staff. The maritime Ready Reserve Force is expanding, the purchase of KC-10As is funded, C-5A improvements are under way, and KC-135 re-engining and conversion of fast sealift SL-7 ships are well along and need to be kept going. Hand in glove with both good intelligence and mobility go good command control and communications. These systems, General Vessey pointed out, are being modernized for increased survivability as well as redundancy and improved interoperability of key command facilities.

These three traits—coupled with modern, well-equipped, and well-trained forces that can operate flexibly and cope with unforeseen contingencies—can provide the kind of synergism needed to compensate for the numerical superiority of the Soviet forces, General Vessey suggested.

Associated with this military strategy is the need for forward-deployed forces. Many areas of vital interest to this country are far away from US territory yet close to the threats to those interests. Forward-deployed land, naval, and air forces, therefore, are imperative from a military as well as a political perspective. They undergird this nation's alliance strategy. Such forces provide a clear demonstration of the firmness of the US commitment and put potential aggressors on notice that an attack will be met by rapid, resolute allied opposition—including US opposition.

Basic to this posture of force multiplication, mobility, and superior C³I (command control communications and intelligence) is general technological superiority, or at least an appreciable lead in key areas of technology. But keeping US technology at a level sufficient to offset the Soviet numerical lead becomes "harder as they get better" technologically by pirating US technology as well as by working hard on expanding their own technology base. General Vessey acknowledged that the Soviet military R&D budget is large and growing and expressed concern that the number of scientists and engineers graduating each year in the Soviet Union is several times greater than the number

of US graduates. He took comfort, on the other hand, in the higher productivity intrinsic in the US free-enterprise approach as compared to the inhibiting qualities of Soviet totalitarianism.

The Strategic Defense Initiative (SDI), the Administration's comprehensive plan for examining the viability of a defense-oriented nuclear strategy, is not yet ready for implementation, according to General Vessey. There are many questions about

The CINCs now have a direct role in the development of operational concepts and in shaping the defense budget by personally presenting their warfighting and operational needs.

the feasibility of this umbrella program—and the maturity of the technologies associated with it—that can't be answered without further research. Whether or not SDI can support a shift away from a deterrent posture based on offensive capabilities toward a defensive strategy is not yet clear, but "we do know what the questions are that we will need answers to [before such a decision can be made], and that's what the Administration is trying to do," General Vessey said. The present status of the SDI program, therefore, does not justify any curtailment or slowdown of the strategic force-modernization program centered on the recommendations of the Scowcroft Commission, he asserted.

One of the most significant improvements in recent years in the nation's defense planning, the Chairman of the Joint Chiefs pointed out with obvious pride, brought the commanders (the CINCs) of the unified and specified commands more directly into the formulation of what kind of forces and capabilities the country needs. This involves not just determining force size but total capabilities and "looking toward the future in terms of what the services can and should build into those forces and [to tailor them] so that they can support the CINCs and carry out the nation's strategy," General Vessey explained.

Since it is the CINCs who ultimately must fight "the nation's battles," they

are now being given the opportunity to help grade the scorecard of the services and the forces they built. Specifically, the CINCs now have a direct role in the development of operational concepts and in shaping the defense budget by personally presenting their warfighting and operational needs. The central factor is the determination of "how the services work together. That's an area that the CINCs didn't work on in the past. We sort of superimposed doctrine on the CINCs, and if they didn't like it, they changed it for their unique theater needs."

Maintaining a uniform doctrine under these circumstances obviously became difficult. Under a new pilot program, the CINCs have been given the lead responsibility for developing joint doctrine.

This joint approach to warfighting is also of special importance to the Airland Battle concept developed by the Army and Air Force. The Chiefs of the two services, General Vessey said, are in the midst of detailed examinations of this concept to improve interservice combat cooperation and coordination further and "to make sure that the taxpayer gets a fair shake for his money spent on defense." In a similar fashion, the heads of the Air Force and the Navy are reviewing and refining their arrangements for mutual support with an eye "on making our forces more effective."

In line with the emphasis on joint operations, the Joint Chiefs of Staff set up a new structure earlier this year, the Joint Special Operations Agency (JSOA), to improve management and increase the responsiveness of the Special Operations Forces of the individual services. The new agency provides a mechanism to improve pertinent interservice R&D, joint training and doctrine, and strategic planning. JSOA, General Vessey explained, works directly for the Joint Chiefs and has been given the mandate to make sure that "the services are trained and ready to fight together and to give the CINCs what they need in the special operations area." Terming special forces operations the "lower end of the spectrum of warfare," he pointed out that such operations also constitute the most likely form of warfare.

In addition, special forces operations, if not executed well, could open the door to escalation, possibly even all the way up to strategic nuclear conflict. Thus, they deserve greater attention than they received in the past. While investments in strategic nuclear capabilities involve many billions of dollars, just a few thousand dollars could make all the difference

between effective and ineffective special forces operations. JSOA is to provide a central focus on the organization, training, and equipment of these forces on behalf of the Joint Chiefs. The overriding objective is to make sure that the requirements of these units don't get shortchanged. JSOA does not mean that "we are building a new warfighting outfit," he stressed.

The need to operate jointly, in the view of General Vessey, extends to space. This medium is being used for warning and C³I by all the services and supports operations all the way from special forces to the strategic nuclear regime. While the Air Force and the Navy recently set up their own space commands, "we will have a unified space command—I don't think there can be any question about that," the Chairman of the Joint Chiefs emphasized.

In the interim, the Joint Chiefs set up a special agency within the Joint Staff to ensure adequate coordination of all military space functions. It is imperative that "we take a complete national look at the use of space." The formation of the new JCS agency does not mean that the US is spoiling "to fight war in space," he explained. What it does mean is that the US will continue to use space for military operations and to take the steps necessary to provide for the protection of its space assets.

A key factor in this context is the development and test of the Air Force's ASAT antisatellite weapon, General Vessey stressed. Its principal function is to enforce this country's unrestricted use of space for civilian as well as national security purposes. ASAT is needed—in concert with other measures—specifically to deter the Soviets from shooting down US satellites, he pointed out.

General Vessey expressed cautious optimism about the prospects of raising the nuclear threshold in theater warfare by boosting the lethality of unmanned standoff weapons. But technology, he warned, can't replace completely the human factor on the battlefield. "Murphy's law," for one, will see to it that things "designed by fallible human beings and operated by other fallible human beings" at one time or another won't work properly. Consequently, the ability to overcome glitches could prove decisive.

Also, "sooner or later, on every battlefield you need some riflemen fighting for a piece of terrain or for access to a building. That aspect of warfare will always be with us. You can build a great space operations center and sit around in it playing the universe like an organ, but if somebody gets inside

IN FOCUS...

that building and points a .45 at your head, you got a big problem," General Vessey pointed out graphically.

Stressing the importance of using technology as broadly and extensively as possible to make the battle easier and simpler for the foot soldier on the ground, General Vessey said that he and Air Force Chief of Staff Gen. Charles A. Gabriel keep looking for ways "to feed the enemy to the infantry in digestible doses." That is one of the key reasons for air interdiction and such automated standoff concepts as "Assault Breaker," he pointed out.

Washington Observations

★ The Commanders of the Air Force Systems Command and Space Command recently signed a Memorandum of Agreement (MOA) that recognizes the maturing of space to operational status and, accordingly, plans for the transfer of certain assets from AFSC to Space Command. Satellites, for instance, will be handed over to the operating command (Space Command) when it is mutually agreed that the spacecraft are operational, meaning certified as functioning properly at the specified orbit. Responsibility for Shuttle operations will be shared by the two commands, but generally AFSC will have lead responsibility.

★ On May 3, Secretary of Defense Caspar Weinberger announced reductions in the FY '85 Defense budget of an additional \$13.9 billion, or a total cut of \$30.5 billion from the original budget draft. This revision, which reduced the Air Force budget by \$5.4 billion in budget authority, was submitted by the Administration on the condition that the other two components of the President's deficit-reduction package—cuts in nondefense spending and increases in federal revenues—be approved by Congress.

Secretary Weinberger and Air Force spokesmen made no bones about the debilitating effects of these latest cuts that extend from program cancellations and delays in reaching readiness goals to reduced force expansion rates, reduced flying hours, and sustained backlogs in maintenance and repair. Attainment of the long-sought Air Force goal of a forty-wing tactical fighter force slips under the revised budget from 1989 to 1990

through cuts in the acquisition rates of both F-15 and F-16 aircraft.

Even this schedule is probably academic because the House Armed Services Committee has made even deeper cuts aimed at holding the tactical fighter force to thirty-eight rather than forty wings over the next five years. As the committee's report states: "Air Force plans to expand from thirty-six to forty tactical fighter wings over the next five-year period are unrealistic. . . . Air Force planning should be scaled down to a more realistic goal of thirty-eight wings."

The committee also cut the funding of the Advanced Technology, or "Stealth," Bomber program by \$350 million. The Administration's revised FY '85 budget retains full funding for "Stealth," ASAT, and the Advanced Cruise Missile, but cuts such programs as C-17 R&D, C-5B, AMRAAM (but provides for the acquisition of an additional 600 AIM-7s), the Advanced Air-to-Surface missile, the OTH-B radar, the DEW Line Upgrade, Maverick, the KC-135 reengining, and MaRV, the Maneuvering Reentry Vehicle whose IOC was delayed until 1997. Canceled outright was acquisition of three C-19s (Boeing 747s) for the Air National Guard.

★ The respected nonpartisan "Committee on the Present Danger" recently commissioned two comprehensive national polls on national security matters that strongly refuted media allegations about the American public turning soft on defense. The nationwide scientific opinion sample showed strong opposition to a unilateral nuclear freeze and firm support for continuing defense spending at current or higher levels, even though the respondents overestimated actual spending levels by a wide margin.

Seventy percent of respondents oppose a mutual freeze if Soviet compliance can't be verified, while fifty-seven percent think that America's military position compared to the Soviet Union has not improved or has gotten worse in the past five years. Two out of three oppose telling the Soviets "that we will not respond with nuclear weapons if they attack our allies," and sixty-three percent favor American retaliation in the event of a Soviet attack on the United States, "even though it may result in the total destruction of both countries."

The polling organization conducting the opinion sample includes such antidefense stalwarts among its clients as the Senators from Massachusetts, Edward M. Kennedy and Paul E. Tsongas. ■

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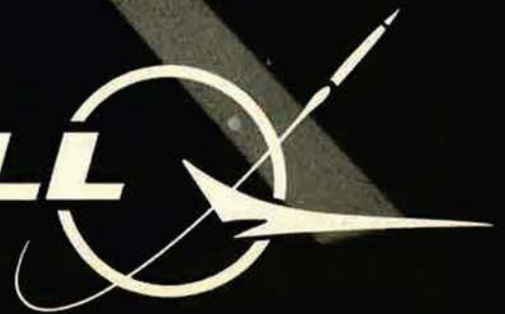
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MCDONNELL DOUGLAS



CAPITOL HILL

By Kathleen G. McAuliffe, AFA DIRECTOR OF LEGISLATIVE RESEARCH

Washington, D. C., Apr. 30 Defense Authorization

The House Armed Services Committee cut the President's FY '85 defense request by \$19.7 billion, the largest reduction ever made by the generally prodefense panel. Major changes were made in procurement and R&D, the areas with the largest growth in the defense budget.

The \$208.1 billion authorization measure reflects a real growth rate of about six percent despite a House-passed budget resolution allotting 3.5 percent for defense. The Committee expected the Senate to approve seven or eight percent growth for defense and the final budget resolution to provide a five or six percent after-inflation increase. A cut of \$28 billion would be required to conform to a 3.5 percent growth.

Despite a large procurement cut of \$8.7 billion, no major Air Force programs were canceled. The number of MX missiles was cut from forty to thirty, but the requested thirty-four B-1Bs were authorized. A request for forty-eight F-15s was reduced to forty; seventy-five Advanced Medium-Range Air-to-Air Missiles were authorized instead of 174; two C-5Bs were slipped two years; and the Air Force's night/precision-attack program, LANTIRN, barely survived with \$5 million.

R&D was cut eleven percent, or about \$4 billion. The President's Strategic Defense Initiative (SDI) request of \$1.7 billion was reduced \$407 million. The C-17 airlifter was funded at \$127 million to begin full-scale development, but \$2 million was diverted from the request to complete test and evaluation of C-5 capability under short and austere airfield conditions. The Committee also cut by more than half the only new program start for the Air Force—the Advanced Air-to-Surface Missile, a follow-on to the Short-Range Attack Missile. Funds were dropped for the Air Force Joint Surveillance Target and Attack Radar System (Joint STARS) and deep underground ICBM basing.

More Arms-Control Violations

The Administration's report to Con-

gress of nine different violations by the Soviets of various arms-control agreements is just the tip of the iceberg. Assistant Defense Secretary Richard Perle said those violations were merely "illustrative," and twenty to twenty-five additional violations by the Soviets will be reported to Congress in the near future. Secretary Perle urged Congress to fund in full the President's strategic modernization request as an essential first response to Soviet actions.

He also informed Congress that the Soviets have increased by seventy-five percent the number of ballistic missile warheads targeted on the US since the SALT II treaty was signed in 1979. That equals at least 3,500 additional warheads. The number could be even larger since many of the launchers have a reload capability.

Strategic Defense and Arms Control

Administration officials told a Senate panel that the US should not entangle itself in treaties on space-based weapons until more is known about the development of emerging technologies for possible future strategic defense capabilities. Dr. George Keyworth, science advisor to the President, told the Senate Foreign Relations Committee that "patchwork" treaty provisions adopted independently from one another could foreclose certain R&D options for SDI. The Committee, hostile to SDI plans, previously unanimously approved legislation calling for a mutual moratorium on antisatellite system (ASAT) testing and renewed negotiations with the Soviets to ban space-directed or space-based weapons.

The Administration reported to Congress that difficulty in verifying any ASAT agreement militates against entering into a treaty at this time. The Soviets, who have an operationally capable ASAT system while the US does not, propose an ASAT treaty that does not provide for on-site inspection.

SDI, which is budgeted at \$25 billion over the next five years, is not a new program but rather a grouping of

numerous research efforts in being into one area focused on defense against all ballistic missiles, including tactical and theater systems.

A new study by the scientific arm of Congress, the Office of Technology Assessment, alleges that development of a perfect or near-perfect strategic defense system is remote. Congress is questioning the wisdom of pursuing technologies that, if deployed, would not be 100 percent effective. Lt. Gen. James Abrahamson, newly appointed SDI director, said that even if each layer of a five-layered defense system were just eighty-five percent effective, only .01 percent of Soviet ballistic missiles could get through.

Antijam Voice Need

Failure by Congress to fund a high antijam voice communication system for the Air Force is tantamount to cutting tactical force structure by two-thirds, according to TAC Commander Gen. W. L. Creech. The Air Force wants the Enhanced JTIDS System (EJS) to fill its voice communication requirement, but Congress is concerned about an \$8 billion to \$10 billion total program cost. Congress also wants interoperability and greater interservice commonality.

The TAC Commander told a House panel that the Joint Tactical Information Distribution System (JTIDS) does not meet USAF requirements for high antijam voice communication near the forward edge of the battle area. Recent Green Flag exercises "turned on all the jammers," and the results show current voice capability in a jamming environment to be disastrous.

According to General Creech, sixty-seven percent of the sorties were not effective in antijam communication and eighty-six percent of the sorties were rendered ineffective in command and control.

JTIDS provides medium antijam capability adequate for Navy needs and some USAF operations in the rear area of battle. EJS, to be made interoperable with Navy systems, is eight times more jam-resistant. ■

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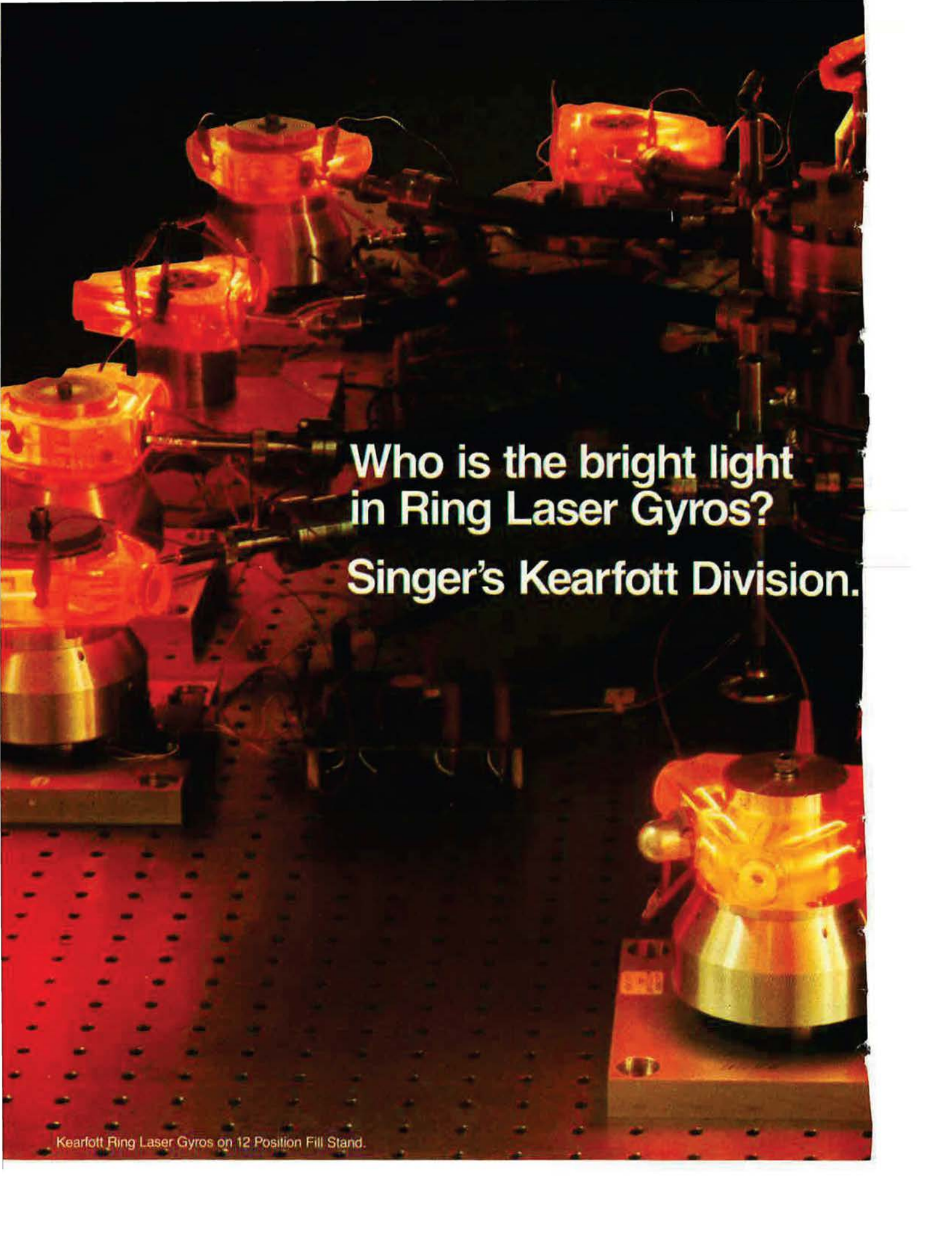
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AEROSPACE WORLD

News, Views & Comments

By William P. Schlitz, SENIOR EDITOR

Washington, D. C., May 4
★ Air Force Systems Command's Aeronautical Systems Division awarded McDonnell Douglas Corp. a \$359.4 million fixed-price incentive contract for full-scale development of the F-15E as USAF's Dual-Role Fighter (DRF).

The contract, awarded May 1, obligates \$15.1 million in the current fiscal year (FY '84). It covers engineering, flight-testing, and systems integration as well as unique manufacturing production tooling.

The first F-15E is scheduled for delivery to USAF for testing in December 1986. Eight of the aircraft will be produced in FY '86, forty-eight in FY '87, and sixty each in subsequent years through FY '93 until 392 have been built.

The contract also calls for McDonnell Douglas to integrate LANTIRN (Low-Altitude Navigation and Targeting Infrared for Night) pods, fail-safe flight controls, and a radar altimeter into "missionized cockpits" to give the aircraft a terrain-avoidance capability.

The F-15E will also have conformal fuel tanks for greater range as well as provision for weapons carriage of



A US Marine Corps AV-8 Harrier fighter from the amphibious assault ship USS Inchon intercepts a Soviet Bear-D reconnaissance aircraft during recent Supreme Allied Commander Atlantic exercise Teamwork '84, the first such interception of a Bear by a Harrier. The appearance of Soviet aircraft in the vicinity of NATO seaborne exercises is a frequent occurrence. (Official SACLANT photo)

electro-optically and laser-guided bombs, Maverick missiles, and other air-to-ground armaments.

The Air Force chose the F-15E last January as its DRF to fill air-to-surface

interdiction missions while retaining the aircraft's air-superiority capability. The F-15E is slated to replace the aging F-4 in the air-to-ground role and will also augment the already heavily committed F-111 force in the interdiction mission.

★ The 455th Flying Training Squadron at Mather AFB, Calif., is testing the feasibility of flying tactical navigation missions at 500-foot altitudes. That's half the current restriction of 1,000 feet.

The Tactical Navigation Program is open to graduate navigators assigned to such tactical aircraft as the F-111, F-4, RF-4, and fighters flown by the Navy and several allied nations.

Needless to say, such low-altitude flying is a challenge and is designed to enable students to better relate map contours to actual terrain features.

"Low-level contour flying is a must in evading enemy detection, and this program will better prepare" TAC's fledgling weapon system operators, according to Capt. Peter Deibig, 455th FTS instructor.



Sporting the markings of the 325th Tactical Training Wing, an F-15 Eagle hugs the Florida coast near Tyndall AFB. The Wing is transitioning from F-106s to F-15s and is scheduled to train maintenance personnel as well as pilots in operation of the air-superiority fighter.

While initial tests of the low-level flying took place using the T-45 navigator training flying simulator, the squadron is now conducting 500-foot AGL (above ground level) missions and route-planning and evaluation phases are being completed.

"The next step is to run a test program using tac nav trainees in response and control groups," noted Captain Deibig. "If everything goes smoothly, the 500-foot levels are to become a permanent part of the tac nav outline," he added.

★ Once again demonstrating that humanitarian endeavors need not be tinged by international political tensions, an Air Force rescue helicopter in April plucked from the deck of a trawler a Russian seaman stricken



A two-thirds-scale production prototype of the P-51D Mustang on its recent maiden flight. Venture Aviation, Inc., of Dallas, Tex., plans to offer assembly kits of this version of the classic World War II fighter.

Informing the Public on National Security

What began as a routine comment at an Air War College National Security Forum at Air University has mushroomed into a national Air Force briefing team—constantly in demand and traveling from coast to coast informing the public about the Soviet threat and discussing today's complex defense issues in depth.

At Maxwell AFB, Ala., Maj. Gen. Paul H. Hodges, Commandant of the Air War College, who directs the progress of AU's Air Force National Security Briefing Team, rendered this succinct assessment:

"Its popularity has far exceeded all our expectations. The team has worked extremely hard and the response from across the nation has been overwhelmingly positive."

What makes the program all the more impressive is that the briefing jobs are only part-time—an additional duty. Team members are also permanent, full-time faculty at AU schools—Air War College, Air Command and Staff College, and Squadron Officer School—and must be current on a wide range of constantly changing issues of interest to the public.

At the beginning of this anniversary year, the team took a look at its achievements: Were they substantial or artificial? Were audience reactions positive, negative, or apathetic? Were the media friendly, hostile, or patronizing?

One perception appeared overriding: The team noted what it termed an "intense thirst" by the US public for information on defense-related matters—the budget, nuclear war, the Soviet threat, and modernization.

Team member Lt. Col. David Olson of Air Command and Staff College said that audience reaction has run the gamut from grateful to skeptical, cynical to naïve. The median is probably somewhere in between the extremes.

But no one disputes the team's success as gauged by numbers. The team began early in 1983 and, as of mid-June of this year, has given some 325 presentations.

According to team officials, requests for 1984 have long since surpassed last year's bookings. Invitations continue to pour in from civic, religious, business, educational, and forum groups. The objective is to duck no media questions, and there are no "off-the-record" answers. As presented in some thirty-two states, team briefings have been reported in seventy-five newspaper articles and on sixty TV and thirty radio programs nationwide.

The briefing team, composed of seven officers, was the offspring of an idea of a California city official who attended the 1982 National Security Forum. Following a personal query to Air Force Secretary Verne Orr on why information presented at the forum wasn't being made available to the American public, the team concept was endorsed by Air Force Chief of Staff Gen. Charles A. Gabriel. AU was designated as executive agent, with



USAF National Security Briefing Team members Capt. James C. Whitaker, left, and Lt. Col. David Olson, center, present a plaque of appreciation from the Naval Weapons Center to AU Commander Lt. Gen. Charles G. Cleveland. NWC is but one of many groups that has heard the team.

Air War College more specifically earmarked as the prime mover.

Team Chief Col. Robert J. Allen of the Air War College synthesized team objectives: "We inform the public on what the strategic balance of forces is, how the shift came about that favors the Soviets, and what we are doing to restore the balance."

Public forums of every persuasion are addressed, including nuclear freeze and peace groups, Colonel Allen noted. Youngsters—many of whom have never been acquainted with people in uniform—are especially of concern to the team.

In terms of politics, audiences are told that national defense is neither Republican, Democratic, nor independent, but an issue of concern to all Americans.

The core of the briefing, a twenty-minute slide presentation, covers the Soviet military buildup with accent on the past decade of progress and a look at future US and USSR national security trends. The latter include defense spending (how much is enough?), arms control, and the arms race. The final portion is on the nuclear issue and concludes with an examination of the questions of strategic modernization, deterrence, and the triad.

Audiences vary from those who are well informed on security issues—and who ask penetrating questions—to those who are relatively naïve about Soviet capabilities. All, however, seem to want to hear from those in uniform.

—GENE KOVARIK, CHIEF OF MEDIA RELATIONS, AU, MAXWELL AFB, ALA.

with appendicitis and delivered him for medical care to Iceland.

Battling forty-mph winds and swirling snow, the H-3 helicopter from Detachment 14, 67th Aerospace Rescue and Recovery Squadron, Keflavik, Iceland, reached the ship about 250 miles to the southwest in the Atlantic, well beyond the helicopter's normal fuel range.

It was accompanied en route by an HC-130 that performed two aerial refuelings during the course of the mission and that also pinpointed the position of the Soviet vessel.

Despite poor visibility and the pitch of twenty-foot seas, helicopter com-

AEROSPACE WORLD

mander Capt. Thomas Farrier skillfully avoided the trawler's masts and other obstacles to put a parascuumen aboard the ship. He and the seaman were then hoisted safely to the hovering H-3.

The Iceland rescue unit had previously saved two Soviet seamen in May 1983.

The Vulcan Retires

In March, the RAF bade farewell to one of its most majestic and remarkable aircraft when the last Avro Vulcan was retired from service. Designed as a strategic nuclear bomber, during the last two years in the inventory the Vulcan had been used only for aerial refueling.

The Vulcan was known for its agility and, with the immense strength of its unmistakable delta wing, could even outmaneuver some fighters of its own generation.

The Vulcan was tasked originally to carry British nuclear weapons to altitudes unreachable by interceptors. When this role was outmoded by Soviet missile advances, the Vulcan donned green and gray camouflage for low-level penetration in the theater-nuclear mission.

Similar to a SAC mode, Vulcans regularly dispersed in groups of four to airfields throughout the British Isles, prepared to roar into the air in formation within two minutes of the order to scramble.

A subvariant of Vulcan was utilized for a time for maritime radar reconnaissance until replaced by the Nimrod in 1982.

Long-standing and cordial relations with Canada and the US resulted in the Vulcan being no stranger to North America. Single "Lone Ranger" flights over the Atlantic tested crews' ability to cover long distances and demonstrated the navigational accuracy demanded by the aircraft's mission.

"SAC's kissing cousins," as Bomber Command was known, were regular guests of USAF at its annual bombing competitions. A high point came in 1974 when the RAF won the Mathis Trophy for the Best Crew at Bombing and Celestial Navigation, as well as winning the Navigation Trophy.

Retirement of the remaining Vulcans was temporarily halted and a handful of the aircraft saw action in April 1982 when Argentina invaded the Falklands. The aircraft's in-flight refueling systems were hastily refurbished and bomb bays were converted to carry twenty 1,000-pound free-fall bombs. One round trip from the forward base on Ascension Island in the mid-Atlantic required five refuelings over 7,860 miles and stands as a world distance record for an operational bomber sortie.

As a gesture of kinship, the British have donated three Vulcans for display at air bases in the US.



A Vulcan bomber, modified for the aerial refueling mission, is accompanied by a Tornado fighter.



Artist's concept of the Solar Array Experiment scheduled for testing during the maiden flight of Orbiter Discovery in June. Developed by Lockheed for NASA, the solar array "wing" is to demonstrate that such devices can produce sun-generated electrical power for extended Shuttle missions. Other uses may be found for the array in orbital space stations now in the planning stage. The accordion-like wing folds into a package less than four inches thick.

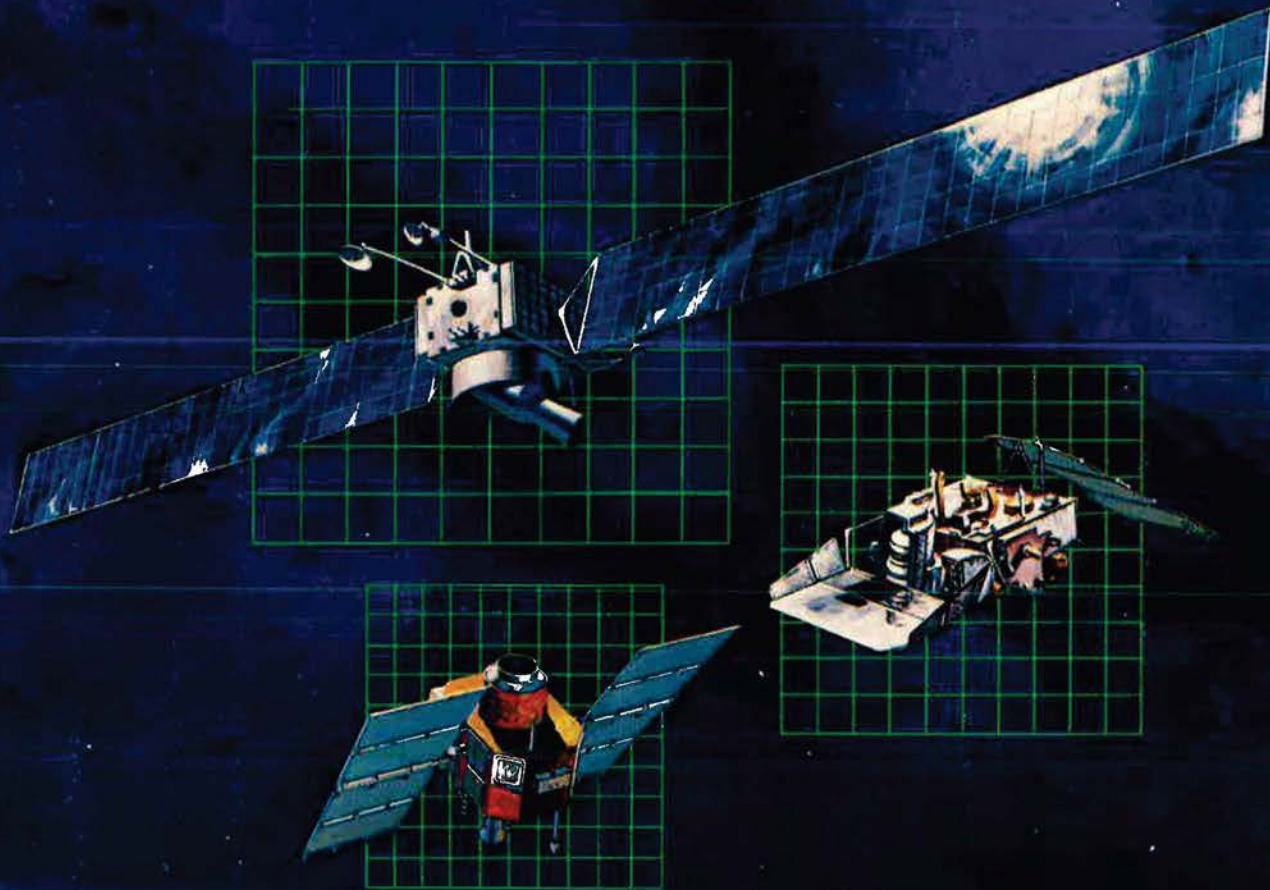
★ In another matter involving the Aerospace Rescue and Recovery Service, Maj. Rick Davis and Richard Dull and MSgt. Rodney Haralson, AFRES, and TSgt. Robert Ortega, USAF, have been presented the eighteenth annual Helicopter Heroism Award sponsored jointly by Avco Corp. and the Aviation/Space Writers Association.

The four were all assigned to AFRES's 302d Special Operations Squadron at Luke AFB, Ariz., at the time of their mission in early 1983.

Under the most extreme weather conditions and operating at haz- ardously low altitudes amidst rugged terrain, the CH-3E helicopter crew saved the life of the seriously injured survivor of a downed private light- plane. During one of the rescue's more perilous moments, Major Davis guided the helicopter on a reverse pattern down the box canyon when he was unable to get the helicopter to clear the canyon's rim.

★ For what has been termed by CINC SAC Gen. Bennie L. Davis as "the most extraordinary flight of 1983,"

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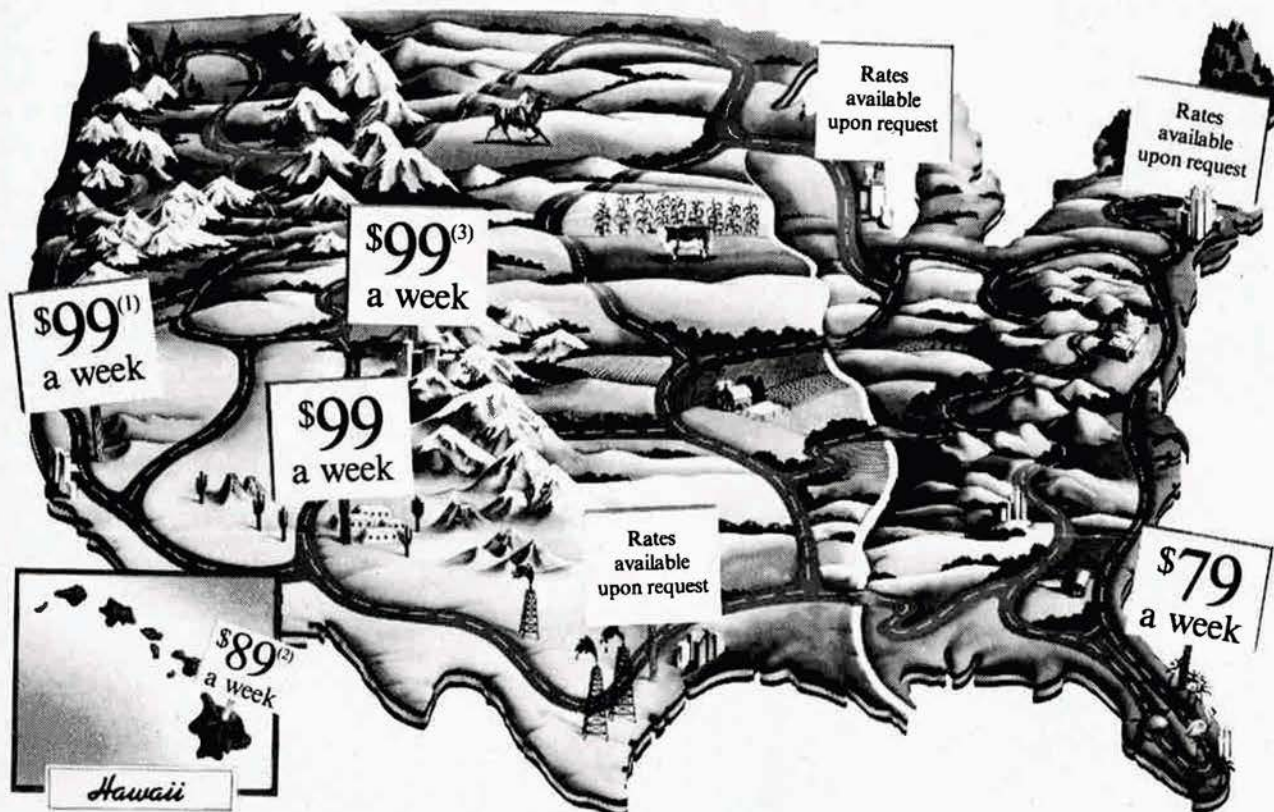
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(1) This rate not available from July 12 to August 12. A surcharge will be applied during the period July 1 to September 30.

(2) A surcharge applies during the period June 1 to September 1.

(3) A surcharge applies during the period July 1 to September 1. All rates subject to change without notice.

Capt. Robert Goodman and his KC-135A crew have been named recipients of the Mackay Trophy.

In September 1983, the aircrew assigned to the 42d Air Refueling Squadron at Loring AFB, Me., was part of the European Tanker Task

AEROSPACE WORLD

Force refueling F-4Es on a Crested Cap I exercise.

Well out over the Atlantic, one of the F-4Es' engines developed problems, so the aircraft and wingman were directed toward a landing in Canada, 520 miles distant.

By the time the KC-135A joined up, the Phantom had lost thrust and was quickly losing altitude. Captain Goodman suggested an aerial refueling linkup to tow the F-4. This was achieved despite Captain Goodman's having to "back into" the F-4 to link the refueling boom. By this time altitude was critical at about 4,500 feet.

Then, despite smooth technique, a brute-force disconnect took place. Captain Goodman dove the tanker at 1,000 feet per minute to repeat the difficult reverse closure. Contact was reestablished at 2,000 feet altitude, with the KC-135 slowing to an incredible 230 mph. Two such other disconnects followed, but, through extraordinary airmanship by all parties, the



Clockwise from above, a US Navy/Sikorsky MH-53E Airborne Mine Countermeasures helicopter prototype tows hydrofoil during tests off Panama City, Fla. US Army/Hughes AH-64 Apache Advanced Attack Helicopter fires 2.75-inch rockets during range tests. A Sikorsky S-75 flight-test helicopter developed under the Army's Advanced Composite Aircraft Program is moving closer to first flight with tests of engines and other systems.



two fighters—both of which also required aerial refuelings en route—were guided to safe landings.

The Mackay Trophy, sponsored by the National Aeronautic Association, is presented annually to an Air Force person, persons, or organization for the most meritorious flight of the year.

★ The first of USAF's eighty new C-21A operational support aircraft was rolled out at manufacturer Gates Learjet Corp. facilities in March.

The Air Force is leasing the aircraft—a military version of the Learjet 35A—for five years under a \$175 million-plus, fixed-price contract. USAF



Military Airlift Command's newest aircraft for operational support: the C-21A. See item.

may extend the lease another three years or buy the aircraft outright in five to eight years. It also has the option of leasing an additional twenty.

The contract calls for the maintenance and logistic support of the entire C-21A fleet. Also provided will be transition flight training.

MAC is to receive the new aircraft at the rate of four per month, with the first unit based at Scott AFB, Ill. Other bases to receive them: Andrews AFB, Md.; Barksdale AFB, La.; Eglin AFB, Fla.; Kirtland AFB, N. M.; Langley AFB, Va.; Maxwell AFB, Ala.; McClellan AFB, Calif.; Norton AFB, Calif.; Offutt AFB, Neb.; Peterson AFB, Colo.; Randolph AFB, Tex.; and Wright-Patterson AFB, Ohio.

Overseas bases receiving the new aircraft include Yokota AB, Japan, and Ramstein AB and Stuttgart-Vaihingen in Germany.

★ Recruiting of qualified people is under way to fly one of the Air Force's newest and most exciting aircraft, the TR-1.

If qualified, the 4029th Strategic Reconnaissance Training Squadron



Designed as the most fuel-efficient, high-thrust engine ever, Pratt & Whitney's new-technology PW4000 aircraft engine already has reached its predicted levels of performance during recent tests. Top output of 61,800 pounds of thrust was achieved.

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will underwrite a visit to Beale AFB, Calif., for a "flying interview" in the U-2/TR-1. Then it could be on to a special world of spacesuits and high-visibility missions.

Necessary qualifications include less than sixteen years' total active federal military service as a regular or reserve Air Force officer, medical certification, possession of 1,500 hours' total flying time (1,000 in jets) or 1,350 hours' total flying time (1,000 as first pilot/instructor pilot), eligibility for a top-secret clearance, and eighteen months as pilot in command.

Selectees will have a choice of assignment location, in most cases. As an example of the sort of duty to be expected, an assignment to RAF Alconbury, England, will be a two-year unaccompanied or three-year accompanied tour with no operational temporary duty commitment. Assignment to Beale AFB is a four-year or longer tour, with about 160 TDY days a year.

See AFR 36-20, paragraph 8-20, for details, or contact the U-2/TR-1 Training Chief, 4029th SRTS, Beale AFB, Calif. 95903. AUTOVON 368-2557, commercial (916) 634-2557.

★ With the cooperation of NASA and funded as a public service by Lockheed Corp., the first feature film ever to be produced in space is currently in the planning stage.

The Dream Is Alive is to be filmed by

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One factor that makes the AN/ARC-199 attractive to the military is the MIL-STD 1553B data bus interface which provides compatibility with the new avionic systems architecture. Other points in the system's favor include the small size and light weight of the AN/ARC-199 (approximately 30

pounds for an installed system) and the reliability associated with King equipment. Weight and space savings, of course, allow for an increase in mission payloads.

Utilizing four microprocessor chips, the AN/ARC-199 is able to scan 20 preset channels and to automatically recognize incoming voice messages by their addresses. Add to these features selective squelch, BITE, variable power output, secure voice and data capability plus the growth potential for frequency agility, frequency link analysis, automated communications and electronic operating instructions—and you have the potential for a truly ADAPTIVE HF SYSTEM.

King Radio has also developed the companion radio to the AN/ARC-199—the AN/VRC-86. This radio, which is functionally identical to the AN/ARC-199, is suitable for use at a fixed site or in military vehicles. Both radios work with telephone-like simplicity to allow pilots and ground based operators to

easily keep in touch with each other during tactical operations.

Since winning this first AN/ARC-199 contract in 1982, King Radio's achievements in HF haven't gone unnoticed. Another HF contract has already come our way—this time to build an advanced HF for use in the rugged operational environment of tactical fighter aircraft. King is developing the AN/ARC-200 (a derivative of the AN/ARC-199), which will be used in the RAAF version of the F/A-18 strike fighter aircraft.

If King's tactical capabilities interest you contact: Director, Special Programs Department, King Radio Corporation, 400 North Rogers Road, Olathe, Kansas 66062. (800) 255-6243. Telex WUD (0) 4-2299. Cable: KINGRAD.

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repair of orbiting satellites, the deployment of a 100-foot-high solar-array experiment, and, next August, the first space walk by an American woman astronaut—Kathy Sullivan.

The film is being prepared especially for the Smithsonian Institution's National Air and Space Museum in Washington, D. C., and is expected to be premiered there in early summer 1985. The film process, developed by IMAX Systems Corp., produces exceptional quality and has been used to create such landmark features as *To Fly* and *Hail Columbia!* seen by millions of viewers each year at the Museum.

As do the others, *The Dream Is Alive* will appear on a giant screen five stories high and seventy-five feet wide.

★ **NEWS NOTES**—Seymour Johnson AFB, N. C., has been named the third operating base for USAF's

The world's largest airship, Britain's new Skyship 600, moored following a successful maiden flight at Cardington, near Bedford, in southern England. Trials by UK Defence Ministry, French Navy, USAF, and USCG are continuing.

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The equivalent of a jet fighter's fire control radar is packed into the AMRAAM missile by the use of advanced microwave integrated circuits. The missile's microwave radar fits inside a cavity measuring 34x4 inches. The radar package consists of a microwave antenna, radio frequency processor, transmitter/receiver assembly, signal-processing electronics, and target detection device. To meet stringent space, reliability, and performance requirements, Hughes Aircraft Company engineers used hybrid thin-film microwave integrated circuits and components. These devices eliminate bulky interconnects and cables, which often take up over 90% of a conventional system's allotted space. The Advanced Medium-Range Air-to-Air Missile is in full-scale engineering development for the U.S. Air Force and Navy.

Egypt will guard its skies with a new air defense system so its forces can react more quickly to airborne threats. The system will integrate existing radars, missile batteries, aircraft, air bases, and command centers into an automated command and control system. Surveillance data and command and control information will be available instantly throughout the network of operations centers. Also to be integrated are newly acquired E2C early-warning aircraft that can detect low-level targets at long range. Hughes, already under contract to integrate existing air defense equipment, will build the first phase of the system.

Computers help production engineers spot problems before they occur at a facility for making printed circuit boards for advanced missiles. One computer at the Hughes facility in Tucson, Arizona, monitors amperage settings, temperatures, pressures, pH, conveyor speeds, and building utilities. The computer maintains a six-month history on every reading so engineers can study trends in processes and alter parameters before problems arise.

Military commanders who previously relied on second-hand information now can get vital data instantly through a new communication terminal. The ground-based terminal is connected to a display console to show surveillance information provided by E3A early-warning radar aircraft and the Joint Tactical Information Distribution System (JTIDS). Unlike previous terminals, which are operated as part of a full command and control network, the new terminal can give second- and third-echelon commanders the situation in their immediate vicinity. The new Hughes terminal, called a Stand-Alone, can be transported easily and installed in an existing facility or in a small shelter or command vehicle.

Using sophisticated seek-and-hide tactics, a shipboard radar detects incoming cruise missiles while eluding enemy electronic warfare systems. The Mk-23 Target Acquisition System (TAS) tracks sea-skimming or high-diving cruise missiles even amid interference from sea, land, bad weather, chaff, or heavy electronic countermeasures. It has a built-in control by which it can be turned on and off quickly. This feature allows TAS to continue monitoring threats and yet makes it extremely difficult for an enemy to get a bearing on the ship. The Hughes system is being installed on U.S. Navy aircraft carriers and other ships.

For more information write to P.O. Box 11205, Marina del Rey, CA 90295

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KC-10 advanced tanker/cargo aircraft. In mid-1985, a squadron of the McDonnell Douglas-built aircraft will be added to SAC squadrons already in place at Barksdale AFB, La., and March AFB, Calif. One of the latest proofs of the KC-10's versatility took place during the Grenada action. Two KC-10s from Barksdale that had performed a refueling mission were returning to base when they received a request for an urgent refueling. One transferred its remaining fuel to the other, which then refueled the thirsty aircraft operating in the Grenada area.

In what is becoming a tradition, the graduating class of the **Air Command and Staff College**, Maxwell AFB, Ala., has invited some twenty-four international aviation pioneers, record setters, heroes, and aces to participate in a program entitled "**Great Moments in Aviation History.**" A feature of the June program is a formal dinner in honor of the guests, who span aviation's heritage over sixty-six years from the first American ace in World War I to participants in the space age.

USAF has under way a contest to name its primary navigation trainer, the **T-43A**, which first entered the in-

AEROSPACE WORLD

ventory in 1973. The winner of the contest, which is open to Air Force members and DoD civilian employees, will travel to Mather AFB, Calif., later this year for the christening ceremony.

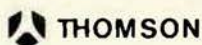
An era ended in late March at the Hagerstown, Md., plant when Fairchild Republic Co. turned over the last **A-10 Thunderbolt II ground attack aircraft**—Number 713—to the 74th Tactical Fighter Squadron based at England AFB, La. The production program ran for eleven years, with a dozen aircraft rolling off the line per month during peak assembly. Fairchild support of the aircraft will continue, however. It currently has a backlog of \$178 million for such items as spares and modification kits.

Died: Lt. Gen. Robert M. Bond, USAF, Vice Commander of Air Force Systems Command, in the crash of an



AWACS aircraft on the ramp. Keeping the AWACS fleet mission-capable is the goal of the Advanced Radar Maintenance Training Set being built for USAF by Cubic Corp.'s Defense Systems Division. The ARMTS simulator will be used for realistic training of AWACS maintenance personnel.

aircraft at Nellis AFB, Nev., in April. The AFA member, a highly decorated pilot who had logged more than 5,000 flying hours and flown 213 missions in Southeast Asia, was fifty-four.



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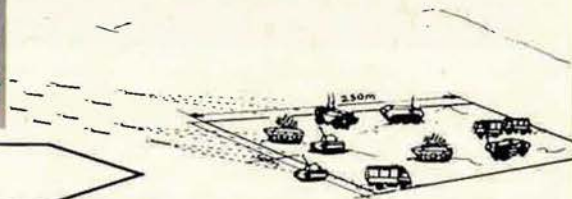
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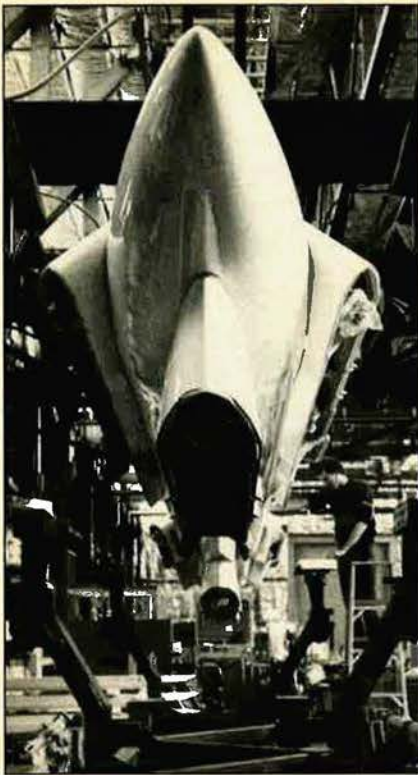
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Being readied for tests is a pylon designed to carry six air-launched cruise missiles beneath the wing of a B-52. Ogden ALC at Hill AFB, Utah, is to perform all overhaul and repair of ALCM pylons.

AEROSPACE WORLD

Died: Gen. Mark Clark, USA (Ret.), Allied commander in Italy in World War II and commander of UN forces at the conclusion of the Korean conflict, of cancer in Charleston, S. C., in April. He was eighty-seven.

Died: Marshal of the Royal Air Force Sir Arthur Harris at his home near London in April. "Bomber" Harris was an advocate of the theory—put into practice during World War II—that bomber fleets could penetrate the enemy homeland to destroy its industrial war effort. By 1944, RAF Bomber Command struck Germany by night and US Eighth Air Force conducted massive raids by day. Sir Arthur was ninety-one.

Died: CMSgt. Bernard K. Joyce, USAF (Ret.), of a heart attack in Washington, D. C., in March. He and his wife, MSgt. Kathryn K. Joyce, USAF (Ret.), demonstrated their long-time support for AFA when in 1982 he invested her as an Eaker Fellow and she him as a Doolittle Fellow in AFA's affil-

Correction

On p. 171 of AIR FORCE Magazine's May 1984 issue, one line of type was inadvertently dropped from the ALMV (ASAT) item in the "Gallery of USAF Weapons." The final paragraph of that item should have read: "Firing trials from an F-15 began in 1983 and are continuing. FY '85 budget requests include \$143.3 million for R&D and \$83 million for procurement."

ate Aerospace Education Foundation. Sergeant Joyce was fifty-five.

Died: William J. Leavitt, former long-time Senior Editor of AIR FORCE Magazine and award-winning writer on aerospace matters, of cancer in Washington, D. C., in March. Following his 1957-72 employment with AIR FORCE Magazine, Mr. Leavitt wrote for the Voice of America on a wide variety of subjects, concluding his career as news analyst and Senior Writer with his retirement earlier this year. He was fifty-six.

Died: Lt. Gen. Archie J. Old, USAF (Ret.), an Eighth Air Force combat leader during World War II who flew forty-three missions over Europe, of cancer at the USAF Regional Hospital, March AFB, Calif., in March. General Old's postwar career included key planning and operational assignments with SAC. In 1957, he commanded a flight of three B-52s that circled the globe nonstop with aerial refueling. The long-time AFA member was seventy-seven. ■

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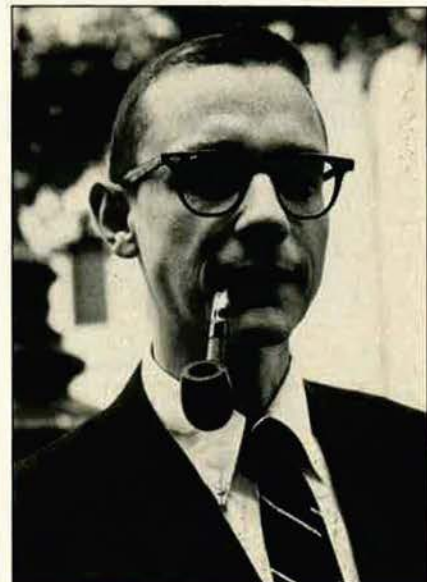
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William J. Leavitt, former Senior Editor of AIR FORCE Magazine, died of cancer in Washington, D. C., in March. See item above.

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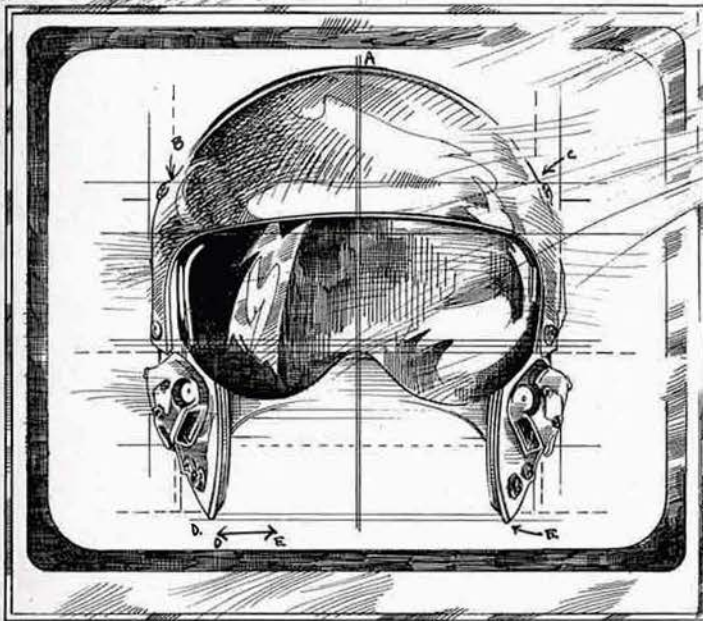
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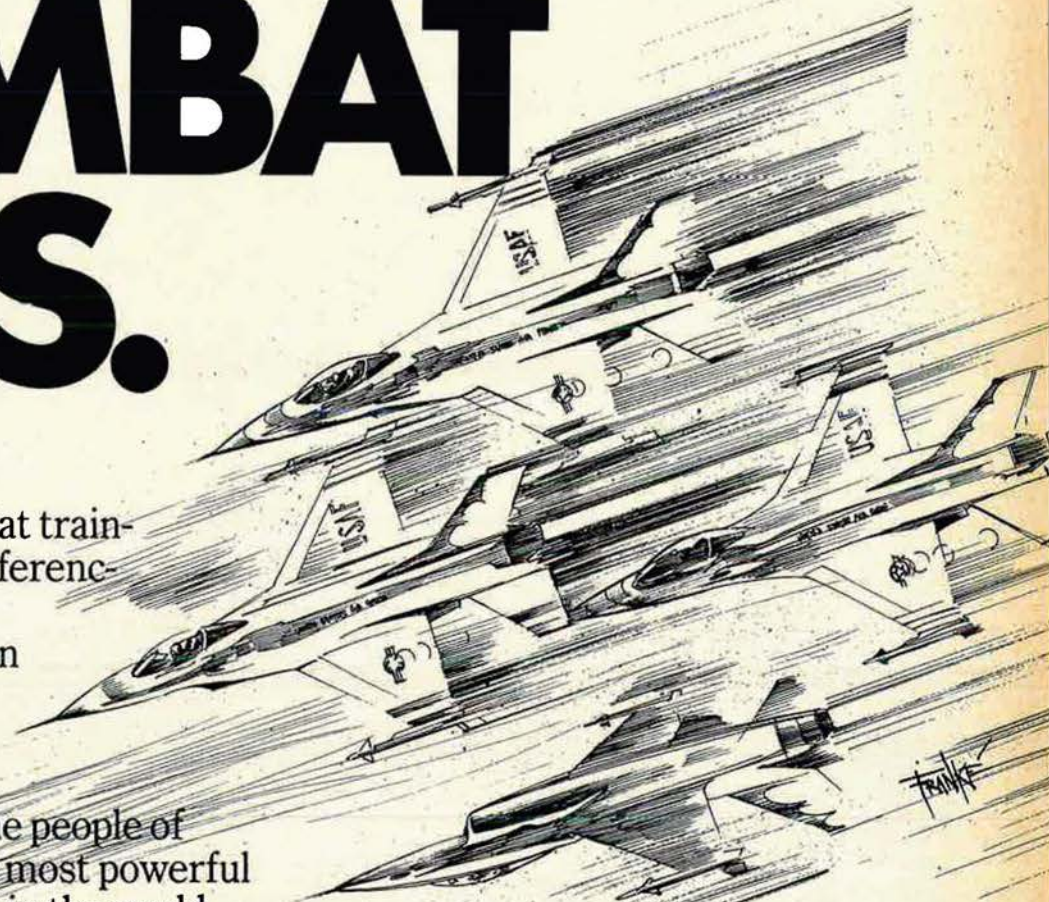
development of the combat training helmet. Video teleconferencing was able to speed the flow of critical information between private contractors and both Air Force Bases.

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AT&T

All-seeing sensors, ever-smarter weapons, and near-total system integration with computer super-chips are about to bring on big changes.

THE F-15 pilots at Langley AFB, Va., are quick to remind you that their primary mission is still air superiority. But since January, they've been flying two extra sorties a month, preparing for a new role: dropping bombs.

Initial crew training will be completed by the end of this month. Once the F-15s are outfitted with long-range conformal fuel tanks, the 1st Tactical Fighter Wing will pick up a collateral ground-attack

mission in support of the Rapid Deployment Force of US Central Command.

The big, fuselage-hugging conformal tanks will increase the F-15's internal fuel capacity by seventy-two percent and permit it to cross the Atlantic without refueling, if need be. It is conceivable that the Langley Eagles would not need their first tankers until they reached the mouth of the Mediterranean. Given this greater range and inherently greater payload, the 1st TFW is handsomely prepared to add ground attack to its existing job of providing air superiority in the event of conflict in Southwest Asia.

This is the first time the Air Force has assigned F-15s to ground-attack duties, however limited. The parallels are not exact, but this is in the tradition of previous fighters—the



WHERE TAC AIR IS HEA

BY JOHN T. CORRELL, EXECUTIVE EDITOR



Red Flag vignettes:
Main photo, an F-15 from Langley AFB, Va., takes off; an F-16 crew chief straps in his pilot for a mission (top left) against the Aggressor F-3Es (top right); left, Capt. John Charlton prepares to crank engines on his A-10. (Photos by William A. Ford, Art Director)

LANDING

F-51, F-80, F-100, and F-4—that were designed to defeat the air-to-air threat but later went on to assume air-to-surface tasking as well.

The F-15 has ruled the sky since the mid-1970s. It may still be hot, but it is no longer new. The first Eagles were delivered in 1974 at a time when the F-4 Phantom had been in Air Force service for about ten years. Yet after a decade of F-15 service, the next-generation fighter remains in concept development. Even if all goes well, production will not begin until the 1990s.

Late to Need

Looking at the competition as well as at the calendar, US tactical air planners say they are “late to need” on development of their Advanced Tactical Fighter (ATF). The Air Force has attempted to get the ATF started for the past five years, but could not get congressional support until this year. And a new generation of fighter-interceptor aircraft rolling off production lines in the Soviet Union approaches the caliber of F-15s and F-16s.

The Russians are building force structure as well as quality. Their factories produce an average of three and a half fighter aircraft per day, the equivalent of thirty-five tactical wings every two years.

Meanwhile, the combined total of combat-coded fighter and attack wing equivalents in the US tactical air forces stands at a fraction under thirty-six (see p. 53). A goal of building to forty wings by 1981 was sidetracked by funding limitations, and the new target date for achieving that level is 1989.

The original FY '85 Defense budget submission proposed procurement of 1,386 fighter and attack aircraft for the Air Force over the next five years. And that was before the budget-cutting exercises began. Even if Congress agreed to the rate of procurement first proposed, that might not be enough to field a full forty wings by 1989 without keeping older aircraft in service beyond their time. Tactical Air Command (TAC) figures that 6.5 aircraft per wing are needed each year to offset losses and force aging. When those numbers are added to the aircraft required to build new force structure, TAC says, procurement of 270 to 276 aircraft a year between now and



An F-111A from Mountain Home AFB, Idaho, shows its stuff at Nellis. The 366th TFW at Mountain Home also operates the EF-111A “Electronic Fox.”

FY '89 would be necessary to achieve forty wings.

The forty-wing goal is a compromise between the force structure that the Joint Chiefs of Staff think is needed and the level deemed affordable. The JCS number is classified, but it is far higher than forty, Gen. W. L. Creech, TAC Commander, says.

TAC Agenda

TAC has plenty to keep it occupied. It is deeply involved in improving its ability to fight at night and in bad weather and is looking ahead to getting its hands on the F-15E dual-role fighter. It is seeking better ways to get its forces deployed in an emergency and to ensure smooth coordination with the Army in theater operations.

With the advent of all-seeing sensors and ever-smarter weapons, and with VHSIC (very-high-speed integrated circuit) superchips blowing the lid off what it's possible to pack into an airplane, tactical airpower appears to be on the threshold of a new era. These developments are coming on fast and must be adjusted to and assimilated wisely.

As always, training is a big item on the TAC agenda. In TAC's combat-coded wings, fifty-eight percent of the aircrews are counted as “experienced,” meaning they have at least 500 hours in fighters and 100 hours in the fighter they are currently flying. Only two percent of the line aircrews in the active-duty wings have combat experience. (Fifty-eight percent of the super-

visors, however, are combat veterans.)

Red Flag, the pioneering exercise designed to simulate combat experience, is the best known of TAC's “Flag” training programs. Among the others are Green Flag for electronic combat, Checkered Flag for overseas deployments, and Copper Flag for air defense.

Dissimilar Air Combat Training (DACT)—flying against “aggressor” squadrons or other units equipped with aircraft different from one's own—has increased from eighty sorties in 1973 to 30,607 sorties in 1982.

A Bigger “We”

The new spirit of cooperation that is characteristic of the armed forces in the 1980s permeates the Tactical Air Command headquarters at Langley. “We” is a broader word than it once was, and in TAC usage often includes the other services, especially the Army.

“We” also refers to the Tactical Air Forces, or TAF, encompassing USAFE, PACAF, AAC, and Reserve Forces tactical squadrons as well as TAC itself. TAC organizes, trains, and equips tactical units, develops doctrine and tactics, and feeds combat-ready forces to other commands. The TAC staff does most of the stubby-pencil work on force and system requirements for all of the TAF, leading toward a single statement of need.

The Army-Air Force relationship appears to be more cordial than it once was, with less bickering about

roles and missions. "There are enough targets out there for all of us," says Brig. Gen. Mike Loh, Assistant DCS/Operations at TAC. "It's a question of how to best apply the resources we have."

In recent years, the Army has pursued various concepts leading to today's Airland Battle doctrine, which disposes it to think of the battlefield in broader perspective than is traditional for land forces. Tac air planners—who have always thought of the battle in broad perspective—welcome this trend and say it makes it easier for them to work with the Army.

Both services emphasize the en-

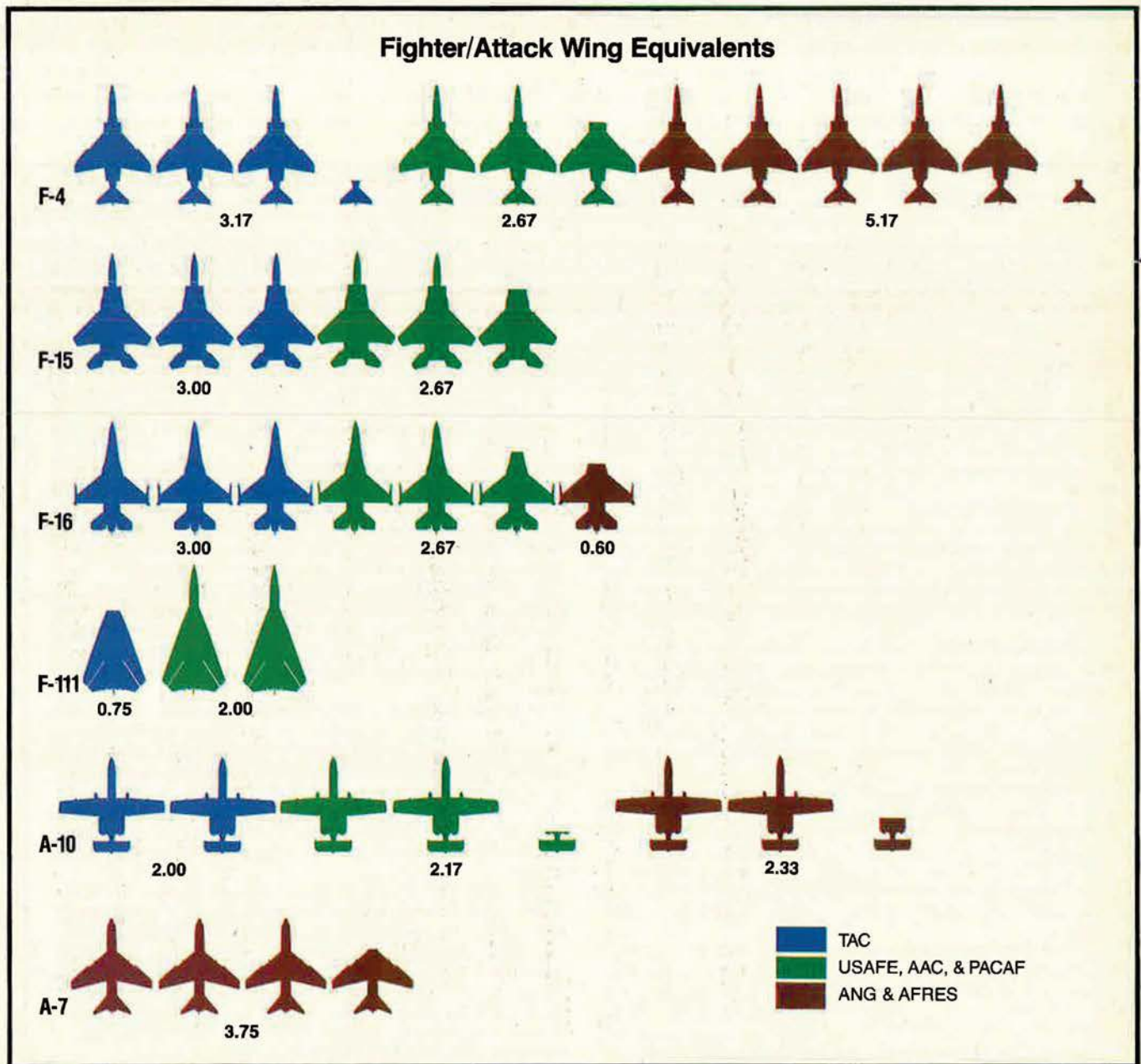
emy's rear echelons in their scenarios for possible conflict in Europe. The Air Force, aware that it would fight outnumbered, sees it as essential to hit air bases on the other side, disrupting sortie generation, and to help the Army by breaking up the concentrations of Warsaw Pact armor and other second-echelon forces before they can reach the point of attack.

General Creech says that relationships with the Army are "going magnificently" and, in the context of his six years as TAC Commander, are "at an all-time high."

In a development that's more important than it may sound, an Army

presence called the Battlefield Control Element (BCE) has been introduced into the Tactical Air Control Center (TACC) to work the Army component commanders' needs and priorities in the allocation of interdiction sorties. The Army has had representatives in the TACC all along to participate in the planning of close air support for troops in contact with the enemy but until now took no direct part in the process of targeting the follow-on echelons.

The evidence of a closer relationship has also been showing up in a series of joint publications on such topics as attack of the second eche-



As constituted, the current TAF force structure stands at just under thirty-six wing equivalents.

lon and suppression of enemy air defenses.

Dual-Role Fighter

When the first F-15E dual-role fighters are delivered in 1988, it will be none too soon.

Specialized aircraft in TAF squadrons are spread thin. The F-111 has extensive range and also the avionics to attack radar-significant ground targets in almost any combination of visibility and weather conditions. TAF-wide, however, there are only three wings of F-111s, and they are heavily tasked for theater nuclear missions. The F-15 is unsurpassed for counterair, but there are not enough of them to handle theater air defense alone.

The Air Force's swing aircraft, the F-16, can do either the air-to-ground or air-to-air job, but is limited in both. It lacks the range and payload for long-range penetration

and does not have the avionics or the all-weather weapons to make it a complete air-superiority fighter. The existing multirole fighter, the F-4, is aging and is being outpaced by the caliber of Soviet aircraft it would have to contend with.

At the insistence of DoD, the Air Force investigated upgrade and re-engining of the F-4, but found the idea inadvisable in several respects. It would cost about as much as purchase of new F-16s, General Creech says, but would result in a fighter with less capability. The older F-4s, with decades of high-G flying behind them, are already running into structural problems. TAC lost two F-4s last year to structural wing failures. The reengined F-4 may have some future as a foreign military sales endeavor, but TAC wants no part of it.

In its E-model derivation, the F-15 will add capability for ground

attack at night and in bad weather while retaining all of its air-superiority features.

A variant of the F-16XL, which lost the dual-role fighter competition to the F-15E, may show up toward the end of the decade as the F-16F, the final part of the programmed F-16 procurement. It would be a single-seater with an improved engine to compensate for its big "cranked-arrow" delta wing.

"To make the F-16F viable, we're all convinced it would need more thrust," General Creech says. "One of the reasons we selected the F-15E is that it has adequate thrust with its current engines, whereas the bigger F-16 would need more thrust—and higher-thrust engines are not now available. After all, it only has one engine vs. two in the F-15, and there's only so much you can do with half as much thrust. There is an effort under way by

The Top TAF Priorities

System requirements of the tactical air forces go far beyond what the defense budget can cover. Consequently, the statement of need presented by the TAF to Hq. USAF is arranged by order of priority. The list approved in November 1983 by the TAF commanders ran from priority one, LANTIRN, to priority 157, C³CM (command control and communications countermeasures) advanced systems. These were the top priorities:

1. LANTIRN. The Low-Altitude Navigation and Targeting Infrared for Night system will enable ground-attack aircraft to operate around the clock under all but the very worst of weather. It consists of a navigation pod and a targeting pod. USAF intends to buy a total of 720 pod sets for the A-10, F-16, and F-15E.

2. Dual-Role Fighter. The F-15E will replace F-4s and augment F-111s in a dual air-superiority and deep-interdiction role. The Air Force plans to buy 392 of them. They will be two-seat aircraft, equipped with LANTIRN and employing low-drag tangential weapons carriage. Maximum weapons load will be 23,500 pounds. Ferry range will be greater than 2,000 nautical miles.

3. Enhanced JTIDS. This will add a voice capability to the Joint Tactical Information Distribution System. The existing JTIDS provides a jam-resistant, secure data communications link. It is deployed on the Airborne Warning and Control System (AWACS) and at some ground sites. Smaller JTIDS data-link terminals will be tested in the F-15, with a production decision to come later.

4. AMRAAM. The Advanced Medium-Range Air-to-Air Missile will replace the radar-guided AIM-7 as primary armament for aerial engagements. It will go on the F-15 and F-16 and on first-line Navy fighters as well. It is a "launch-and-leave" weapon, meaning the pilot need not maintain radar lock on the target once he has fired the missile. Faced with a sky full of enemies, a pilot could have four or five of his missiles in flight at the same time.

5. F-16 procurement. The "Electric Jet" continues to exceed expectations. It already complements the F-15 in air-superiority missions, and AMRAAM will make it even more valuable. It is fast becoming USAF's primary surface-attack aircraft. The intent is to buy 150 with FY '85 money and to procure even larger numbers each year after that. The last several hundred may be

F-16Fs, single-seat variants of the delta-winged F-16XL with a higher-thrust engine. And the F-16D is, in the TAF view, the ideal follow-on reconnaissance aircraft to begin replacing the present thirteen squadrons of RF-4s sometime around the end of this decade.

6. F-15 procurement. Over the past three years, the C and D model F-15s have posted the highest fully mission-capable rates of any aircraft in the TAF inventory. USAF has tried to persuade Congress that multiyear procurement would save big money on F-15 acquisition, but Congress hasn't bought the idea yet.

7. Advanced Tactical Fighter. Concept definition should be completed shortly, with full-scale development getting under way around 1989. Operational capabilities deemed essential by the TAF include supersonic cruise, high maneuverability, long range, total integration of systems, and low-observable signatures—meaning at least some Stealth technology.

8. Precision Location Strike System/TR-1. PLSS will find enemy air defense radars and direct weapons onto them. Standing off at high altitudes, TR-1 surveillance aircraft detect the emissions and feed this data to a PLSS ground station. A very accurate picture is established by a process of triangulation.

9. Boosted GBU-15 and Standoff Weapon. Designated AGM-130, this powered version of the GBU-15 glide bomb will increase standoff range from five miles to about fifteen. That will be enough to allow launching aircraft to stay out of range of enemy defenses.

10. Compass Call conversion. These EC-130Hs will be responsible for jamming the enemy's command control and communications networks while EF-111 jammers take care of the radars.

The Next Ten. Priorities eleven through twenty are as follows: Tactical Improvement Program; fighter aircraft ID systems; EF-111A conversion and simulators; follow-on reconnaissance aircraft; chaff, flares, and dispensers; "aggressor" training aircraft improvements; AIM-9L Sidewinder self-defense capability for A-10s, A-7s, F-4s, and F-111s (F-15s and F-16s already have AIM-9L); AWACS improvements; High-Speed Antiradiation Missile (HARM); and Imaging Infrared Maverick procurement/alternate warhead.

OSD to get a growth version of one of the current F-15/F-16 engine models, and that higher-thrust engine would power such an airplane as the F-16F."

Concept of Employment

The TAF concept for employment of a mixed fighter force is different from the simplistic formulas often bandied about—such as that one must first concentrate on air superiority and leave air-to-surface for later. "The commander applies his warfighting resources against those things that are most influencing the outcome of the battle," General Creech says. "You can't predict that with absolute certainty ahead of time. Clearly, though, one must fight all the various air aspects of the battle at the same time. You can't say that you're just going to fight the air battle while the tanks are rolling unfettered across the terrain. Now, one must maintain local air superiority—not total air sovereignty necessarily—because you can't go about your business in air-to-surface and the other necessary aerial activities if the enemy keeps shooting all your airplanes down. That is a principal order of business, but not necessarily the first and only order of business."

Aircraft with an air-to-surface capability only—such as the A-10, A-7, and F-111—would be used exclusively in the air-to-surface role, of course, but they would be used shallow or deep as needs might demand as the battle unfolds. Also, the air commander has considerable flexibility in rerolling his swing aircraft, such as the F-4s and F-16s, and, later on, with the F-15E dual-role fighters.

"You can't come up with magic truisms that first you do air superiority, secondly you do interdiction, and thirdly you do close air support," General Creech maintains. "There's a temptation sometimes for people to try to put our various missions into neatly structured columns and say it always starts with this and then goes to that—but combat is not like that."

LANTIRN

A-10s and F-16s, as well as the F-15E, will be equipped with LANTIRN (Low-Altitude Navigation and Targeting Infrared for Night)



Members of the 69th Aircraft Maintenance Unit and the 347th Aircraft Generation Squadron from Moody AFB, Ga., prepare to upload Mk 82 low-drag inert bombs on an F-4E during Red Flag at Nellis AFB, Nev. The Phantom is still the most prevalent fighter in the TAF force structure. (Photo by William A. Ford, Art Director)

Pods. The navigation pod, with terrain-avoidance radar and a wide field-of-view navigation FLIR (forward-looking infrared) feature, takes the pilot into his target in darkness or below soupy weather at survivable altitudes. A wide-angle Head-Up Display (HUD) gives him a twenty-by-thirty-degree field of view. The targeting pod, says Maj. Gen. Thomas L. Craig, TAC DCS/Requirements, "reaches out and magnifies up to nine times, just sucks the target into the cockpit and you can identify the features of it on your display."

LANTIRN is the system that will, at last, bring the tactical air forces out of the World War II era of ground attack. Night/all-weather operations have been possible for years on air-to-air missions, but, except for F-111 crews, air-to-ground practitioners have been restricted for the most part to daytime and reasonably clear weather.

LANTIRN will be a big improvement on the limited night-attack capability of F-111Fs and F-4Es now equipped with Pave Tack pods. Pave Tack has a narrow field-of-view FLIR targeting feature, but no low-altitude navigational capability. It is effective for the F-111F, which has its own means of low-level ingress and egress at night, but less so for the F-4, which has no such means.

LANTIRN has both wide and narrow field-of-view FLIRs—one

for navigation and the other for precision attack. The pilot finds the target and orients himself to it with the navigation pod and then switches to the target pod and its narrow field of view. That allows up to nine times magnification of the target on the cockpit displays.

Two kinds of advantages accrue from LANTIRN: increased survivability for aircraft that have it, and more firepower directed at the enemy.

At night, the enemy cannot bring all of his defenses to bear. Interceptors without look-down/shoot-down capability pose no threat to a low-flying attack aircraft at night. Electro-optical sensors are out of action, and so are any infrared acquisition devices that need EO cuing. Therefore, much of the SAM and AAA network is degraded when the sun goes down.

Wider Window

The daily operating window for attack aircraft in central Europe will increase with LANTIRN from 4.5 hours to seventeen during dark, dank January. "With our A-10s and F-16s, we could potentially fly four, five, six sorties a day," General Craig says. "We demonstrate that regularly in surges and ORIs. But with the short winter days in Europe, we'd probably get in less than two sorties a day per airplane." In addition to increasing the number of

sorties flown, LANTIRN will deny the night as a sanctuary for the enemy.

"Imaging infrared technology has grown to the point that we can do amazing work at night," says General Loh. "With LANTIRN and the wide-angle HUD, the pilot can operate at night with the same sort of procedures and flying tactics that he employs in the daytime."

LANTIRN can be used with the full range of attack weapons, from the 30-mm gun and iron bombs to Maverick and the Low-Level Laser-Guided Bomb. Penetration and accuracy with LANTIRN are better than with radar alone, TAC officials say.

The Air Force is continuing development of synthetic aperture radar (SAR) for fighters and is putting a high-resolution SAR in the dual-role fighter.

"To make our conventional-delivery ordnance effective, we need to get accuracies on the order of ten to fifteen meters," General Loh says. "We're doing that today with day-visual delivery on the F-16, and we will be able to do it at night with LANTIRN."

The Advanced Tactical Fighter

The quality of the new, fourth generation of Soviet fighters has intensified USAF's need for the Advanced Tactical Fighter (ATF). The MiG-31 Foxhound, which was the first Soviet fighter with look-down/shoot-down capability, is operational. Two counterair fighters, the Su-27 Flanker and the MiG-29 Fulcrum, are, says a senior TAC staffer, "approaching the point of rubber on the ramp." These aircraft show tremendous advancement in avionics and weaponry and rival current USAF fighters in capability.

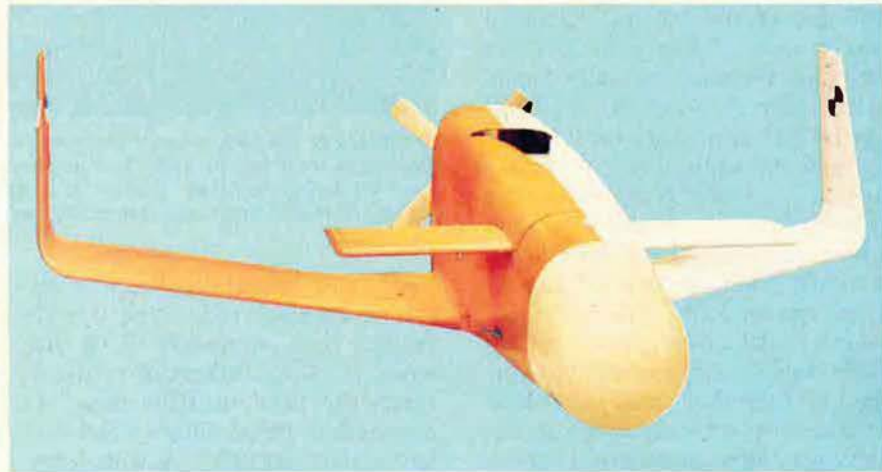
As envisioned by the Tactical Air Forces, the ATF would have such features as supersonic cruise, high maneuverability, long range, and high durability. It would represent an impressive but not extravagant move up from current fighters.

"The one thing we are *not* looking for in this is an airplane that's pressing the forward edge of technology in all categories," says General Craig. "We don't think we can afford it."

General Craig says the aircraft would be powered by an advanced

engine that might yield up to four times the reliability of the best engines now being built. It would also have to achieve significant gains in fuel efficiency and higher operating temperatures to support the super-temperature requirement.

"As far as maximum speed goes," says General Loh, "we need to be able to operate where the fight is, and we don't envision the Advanced Tactical Fighter going much beyond the maximum speed of current fighters. The difference is that it will operate at those speeds far more effi-



The expendable Pavé Tiger drone, armed with a Chaparral warhead, would orbit until an enemy jammer came on the air, then home on the signal and attack the emitter. (Boeing photo)

ciently, with less fuel consumption and more persistence than current fighters."

Acceleration and sustained supersonic cruise at military power give the pilot who has them a tremendous advantage over an enemy who does not.

"If you can maneuver and accelerate without using afterburner while he's forced to be in full afterburner to even try and make a fight of it, then he can't stay," General Loh says. "He's going to leave or run out of gas."

"It also allows you to engage and disengage at your option rather than his. He can't catch you. He can't even get to you while you roam across an area, maintaining local air superiority. You have a persistence, an ability to stay and fight."

The ATF will be loaded with VHSIC computer chips, cutting down on cost and weight while increasing capability and mean time between failure of components. The chips will also facilitate an unpre-

cedented degree of integration of aircraft subsystems. Composite materials will be used, too, but in their case advantages must be traded off against disadvantages.

"Can we do better with the new materials than with the old aluminum?" General Craig asks. "Can we build it stronger? When you start assessing those composite materials, they can bring your weight down and put your strength and fatigue resistance up. But they may cost you in terms of performance. Also, the more composites you add,

the higher the cost goes, so there's a limit."

STOL and the ATF

There's no intention to seek Harrier-style vertical/short takeoff and landing (V/STOL) features in the new fighter, but it should be able to operate from smaller strips than current fighters need.

"STOL is important," General Loh says. "Today, we require approximately 4,000 feet to operate fighters. If push came to shove, we could operate from surfaces 4,000 feet long and fifty feet wide. What we want to do with the ATF is cut that in half and be able to operate from 2,000-foot surfaces. That means you need to be able to take an airplane off and land it in about 1,500 feet to allow some margin on both ends for touchdown and rollout. We think that's achievable without complicating the system unnecessarily."

"If you take a standard NATO runway, 8,000 feet long by 100 to 150

feet wide, that represents four operating strips. If you double that by going down to 2,000 feet with the ATF, you can now have eight surfaces and you only need to clear one of them to operate from. So, in effect, you double your resistance to runway closure.

"The thrust of our effort today is to make our main operating bases and forward operating locations more survivable rather than focusing on the concept of VTOL dispersal for survivability. There are some great limitations to that kind of dispersal, not the least of which is that there's no place to hide anymore—and hardening can be a far bigger factor in your survivability than is your location. Also, VTOL fighters simply do not have the performance, speed, range, and load-carrying capability to do most tac air missions."

Attempting to operate from sod strips, *Autobahns*, and the like would introduce its own set of problems and spread the already thin logistics support still thinner. TAC uses dispersal to a greater extent than it did in the past because of the collocated operating base (COB) program, which began in 1972. In that program, US augmentation forces go not only to USAF main operating bases in Europe but also to a multitude of allied bases where survivability provisions include sheltering of aircraft, point air defense, and rapid runway repair.

Munitions

The Advanced Medium-Range Air-to-Air Missile (AMRAAM) will soon begin replacing the AIM-7 Sparrow as the prime air combat weapon for both the Air Force and the Navy.

The AIM-7 must be guided all the way to its target by radar on board the launching aircraft. AMRAAM, with an active radar seeker, needs no such help. Once launched, it homes on the target by itself. The pilot can disengage and go after a different target—or several of them—while his first missile is still in the air.

The Air Force is also planning to equip its air-to-surface fighters with the all-aspect AIM-9L Sidewinder for self-defense. The AIM-9 is a heat-seeker, used mainly for short-range visual engagements. It is car-

ried currently by both the F-15 and the F-16.

The future for air-to-ground munitions involves both direct attack and standoff weapons.

"Our basic concept is that we're going to roll the defenses back," General Craig says. "We're not going to overfly unengaged SAMs and take our losses coming and going."

For close-in work, perhaps within five miles of the target, Maverick, the GBU-15 glide bomb, and the Low-Level Laser-Guided Bomb would be used. That puts the attack aircraft within range of terminal defenses, but avoids the requirement to fly straight into their teeth. The boosted GBU-15—the glide bomb with a rocket motor added—would be effective at short standoff range, enough for the launching aircraft to stay away from terminal defenses. The medium- to long-range standoff munition would be the Joint Tactical Missile System (JTACMS), effective from more than 100 nautical miles out. Launching aircraft would avoid all defenses.

JTACMS is to be a joint-service program, and system definition has not been easy to nail down. Some Office of the Secretary of Defense (OSD) agencies have favored a big ballistic missile with inertial naviga-

tion only and with area-type submunitions for the attack phase. The Air Force wants more accuracy and proposes to get it by acquiring both terminally guided and Global Positioning System-guided versions of JTACMS that are of a size that's reasonable to hang on a fighter airplane. The Air Force also wants a terminally guided variant with a 1,000-pound unitary warhead for use against bunkered SAM radars and other "hard to get at" priority targets.

Precision guidance for these munitions is expensive, but it will not be the big cost-driver on the six-figure price tags of future missiles. TAC staffers say that the smart seekers on a Maverick missile represented about fifty percent of the overall unit cost, but that similar precision guidance will account for only around fifteen percent of the cost of a GBU-15.

It's a bargain at any price, according to TAC officials, because it cuts down drastically on the number of missiles that must be fired to destroy a target. JTACMS will be used by B-52s in theater operations as well as by fighter aircraft. TAC and SAC have synchronized their requirements for the JTACMS standoff missile, and both support it strongly.

The Active/Reserves Mix

Congress is pushing all of the services to put more of their force structure into the Guard and Reserve. The tactical air forces already have more than a third of their combat-coded fighter and attack squadrons in the Reserve Forces, and say that's about the limit. (USAFE has thirty-one combat squadrons and PACAF has twelve. Alaskan Air Command has two. TAC holds forty-nine, and forty-eight are in the Guard and Reserve.)

The TAF cannot support a mix that has more than a third of the force structure in the Reserve Forces because of the need to maintain the current number of units abroad and because the Reserve units do not participate in overseas rotation.

If too much of the Stateside force structure goes to the Guard and Reserve, that would mean longer or more frequent overseas tours for active-duty people because of fewer Stateside assignments for them to rotate back into. Constant duty abroad would certainly harm active-duty morale, and would probably hurt retention, too.

Provided the force structure increases as planned, TAC says more units can be placed in the Reserves, but that the overseas consideration will require maintenance of approximately the same active/Reserves ratio as now.

TAC has the highest praise for its Reserve Forces. In TAC-gained units, the average aircrewman has fourteen years of military flying, and forty percent of the crew members have combat experience. They are well-equipped and are evaluated against the same performance criteria as the active forces.

Active forces can deploy instantly and are available for crises and contingency deployment at any time. On the other hand, Reserve Forces must be called up in a crisis and are allowed twenty-four hours to assemble. They could be on their way within forty-eight hours. However, in some deployments, hours would count. Under Project Coronet Lightning, for example, selected TAC active-duty units are tasked to deploy within twelve hours of notice. All TAC combat squadrons must be able to deploy inside of twenty-four hours.

TAC and Standoff

Persistent allegations that TAC does not support the concept of standoff weapons are wrong, according to TAC.

"Nothing could be further from the truth," General Creech says. "TAC and the tactical forces have led the charge on the need for conventional munition standoff weapons. As a matter of fact, we were pushing the standoff glide bomb, the GBU-15, at a time when hardly anyone else in government supported us. It's a very effective weapon. In a recent follow-on test and evaluation, we dropped ten GBU-15s against standoff targets, and they were all direct hits—every one.

"Precision guidance not only means improved lethality—it also means greater cost-effectiveness and economy of effort. The latter is extremely important. We're outnumbered and we can't afford to send two or three times the number of sorties, or number of standoff weapons, to do the same job we could do with one sortie or one weapon using precision terminal guidance.

"Despite that reality, there's been a recent trend among some in government to support weapons with accuracies well-suited to nuclear warheads but ill-suited to conventional warheads. Since conventional warheads don't yield much bang for each pound of weight in the delivery vehicle, accuracy becomes the driver for weapons effectiveness. That's even more the case for bunkered or hardened targets. Now one can offset imprecise accuracies to some appreciable extent by using area-type submunitions, but area submunitions are suitable for only a part of the targets we will need to kill.

"We also have budgeting for a boosted version of the GBU-15 that doubles its range, and we plan to have two kinds of warheads—one for area submunitions and one a unitary version for point targets. Also, we have been highly desirous of procuring even longer-range standoff weapons for some time. We did vigorously oppose MRASM (the Medium-Range Air-to-Surface Missile) as did the Congress because it cost too much and it did too little. It was a very expensive weapon, over-designed for the conventional role,

and it had a puny payload, so it wasn't cost-effective. But that didn't mean we didn't want a long-range standoff weapon. We did.

"In the context of JTACMS, some people were trying to force a ballistic solution too large for our fighters and with imprecise guidance [large CEPs], and we didn't automatically sign on to that. But we have been pro-standoff for many, many years, and we have been pro-JTACMS also. But we know the targets we need to kill, we know what it takes to kill them, and we understandably have little interest in a weapon that has marginal mission effectiveness and/or highly debatable cost-effectiveness.

"We want a family of standoff weapons. There's not one all-purpose solution, because then you go to the highest common denominator and it's too costly for all the many needed applications."

C³ and Electronic Combat

Working in concert with the attack aircraft, the Joint STARS radar will identify moving targets on the ground. The Air Force has proposed carrying the radar aboard a Boeing 707 with a C³ station in back, giving an option for airborne control of the ground attack in much the way that the E-3A AWACS can exercise on-board control of aerial engagements or provide target data to ground control centers.

TR-1 surveillance aircraft and the Precision Location Strike System (PLSS) would, in the meantime, be feeding back data on the whereabouts of emitters. In addition, the TR-1 aircraft, when used in conjunction with its ASARS-2 radar, will provide precise intelligence on a variety of fixed targets. F-4G Wild Weasel aircraft, armed with a new weapon, the AGM-88A High-Speed Antiradiation Missile (HARM), would go for the air defense radars. "When a Weasel is in the area with HARMs on it, it's going to make it awfully expensive for any enemy to turn his emitters on," General Craig says.

The highly centralized command and control structure of Soviet forces lends itself to disruption, and disrupting it is the mission of the EC-130H Compass Call aircraft. EF-111s, with the first overseas unit newly deployed in the United King-

dom, will jam early warning, acquisition, and ground-controlled intercept radars.

Destruction of high-priority electronic targets—such as big enemy jammers—would be the job of Pave Tiger drones. Pave Tiger is built to orbit until the emitter comes on the air, then dive down to knock it out with a Chaparral-type warhead.

Voice Communications

Even as US forces seek to degrade or destroy the enemy's C³ assets, they will give major attention to keeping their own channels open. Jam-resistant UHF and VHF voice communications are deemed essential. Soviet forces are prepared to conduct large-scale jamming operations, and Green Flag exercises have demonstrated how devastating the effect of such operations can be.

More than a thousand US fighters have already been equipped with the Have Quick modification to UHF radios, which counters the R834 first-generation Soviet jammer. The Soviets, however, are improving their jammers. The Defense Department hopes to field an improved antijam radio for tactical air forces well before the end of the decade. The preferred alternative, DoD says, is enhanced JTIDS.

The Joint Tactical Information Distribution System (JTIDS) uses time-division multiple access technology. It splits each second of time into 128 parts. Each communicator on the net pulses his message into the system as a data burst when his assigned fraction of time rolls around. Basic JTIDS provides jam-resistant, secure communications with a digital data link, but has no extensive capability for voice. Enhanced JTIDS will be for voice communications.

"The United States Air Force just cannot go to war if we can't talk to each other and to the Army," General Craig says.

"Being able to operate with all of our current communications is the goal," General Loh says. "The business of doing without communications is a nonstarter. You can't do without communications. We've tried all sorts of schemes in the face of comm jamming—going to different frequencies, visual signals—and they flat don't work. And whoever tells you they work is wrong." ■

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THE FIGHTER ROADMAP

USAF's procurement strategy for producing the greatest possible combat capability.

BY LT. GEN. ROBERT D. RUSS, USAF

ABOUT forty-three years ago, five men assigned to the War Plans Division of the Air Staff developed an ambitious aircraft procurement plan called AWPDP-1 (Air War Plans Division). Completed in just seven days, AWPDP-1 specified the procurement necessary to conduct a global war against the Axis powers. The first priority of the plan was to defeat the Luftwaffe and then to perform strategic and tactical strikes against industrial and military targets. To carry out the Allies' strategy, the Plan called for some 63,000 operational aircraft and a total of 2,200,000 men and women. One of the Plan's authors, Maj. Gen. Haywood S. "Possum" Hansell, Jr., called AWPDP-1 "The Plan That Defeated Hitler." (See *General Hansell's article on this plan in the July 1980 issue of AIR FORCE Magazine, p. 106.*)

More recently, the Air Force has developed another procurement plan, the Air Force Tactical Fighter Roadmap. While there may be more differences than similarities between AWPDP-1 and the Roadmap, I think both plans point toward the same objective—articulation of a realistic procurement strategy that will produce the greatest possible combat capability in light of a large and increasingly belligerent threat.

The Tactical Roadmap is a natural outgrowth of two events. The first is the successful publication of other master plans (Munitions Acquisition Plan, Air Defense Master Plan, and Airlift Master Plan). These documents have been very useful in developing and articulating our procurement needs in those areas. In the tactical area, we've had a variety of planning tools to determine

our force size, mix, and capabilities. The Tactical Fighter Roadmap now coalesces these various planning efforts into a unified whole.

Second, the rapid qualitative improvements to an already large Soviet force (some ninety US tactical fighter wing equivalents) and our continued fiscal constraints have required us to formulate a logical, fiscally attainable procurement strategy.

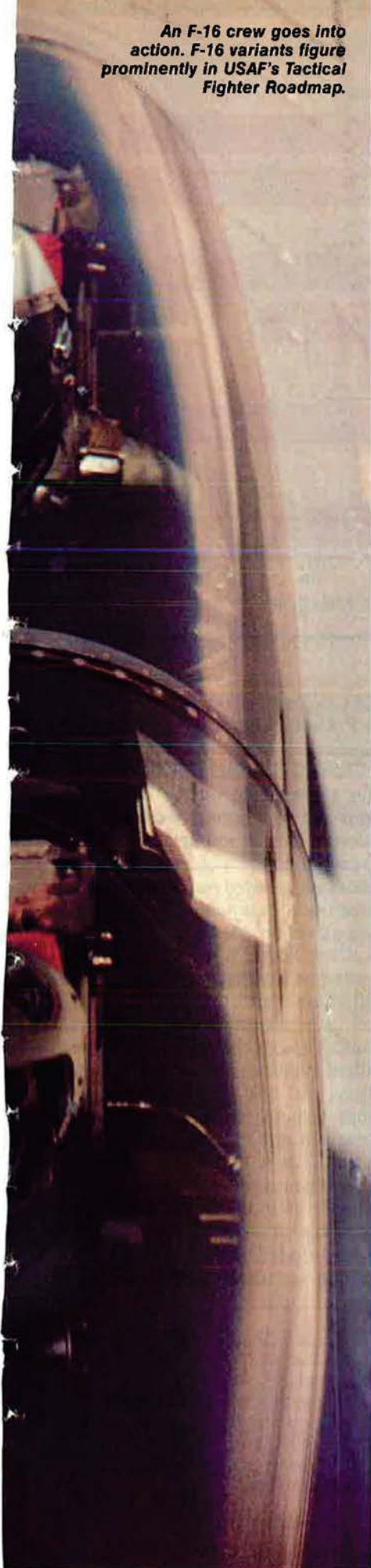
The Current Force

Before developing a plan or procurement strategy, it is necessary first to understand the composition of our current force of thirty-six tactical fighter wings and how we plan to use that force in combat. Our air forces must be capable of performing a variety of missions. We must be able to attain air superiority to allow friendly ground forces to operate with a minimum of interference from hostile air attacks. Achieving air superiority requires that we be able to destroy attacking enemy aircraft—defensive counterair—and also destroy opposing aircraft and airfields in hostile territory—offensive counterair. In addition, defense suppression is an essential component of our counterair mission.

Direct support of the ground commander is of paramount importance. These close-air-support missions support ground operations by attacking hostile targets in close proximity to friendly surface forces. Further, friendly tactical air must be able to locate and destroy enemy targets deeper in enemy territory. Consequently, interdiction missions are an important part of integrated air and land operations.



An F-16 crew goes into action. F-16 variants figure prominently in USAF's Tactical Fighter Roadmap.



Performing these missions requires a mix of aircraft with a variety of capabilities. The F-15 is currently used in the all-weather air-to-air role with a limited secondary air-to-ground role. The F-16 is the swing fighter, being used in both the air-to-air and air-to-surface roles. The F-4 has moved to a predominantly air-to-ground role but retains residual air-to-air capability. The A-7 and A-10 are used for close air support with limited interdiction capabilities, and the F-111 is our only long-range, around-the-clock, interdiction aircraft. Of the six types of aircraft in our inventory, only two, the F-15 and F-16, are still in production.

A major part of this force requires replacement due to aging, and some need improved capabilities to meet a more sophisticated threat. As we turn to the aging issue, we need a context. Fighter aircraft are retired from service when they become technically obsolete or are no longer maintainable.

A brief review of some fighters since the Korean War will help to illustrate this point. Referring to the diagram on the next page, we note that the F-84F and F-86F were retired relatively early due to technical obsolescence. The trusty F-100 simply wore out, as did the F-105. The F-101 and F-104 became technically obsolete and had to be retired. Though they have served us well, F-4Cs and F-4Ds, procured predominantly during the Vietnam era, will have to be phased out of the inventory in the 1990s because of

the increasing cost of maintaining these aircraft.

The point is that the useful life of our tactical aircraft varies with aircraft type. Technical obsolescence and the reliability and maintainability degradation that accompanies old age determine that useful life. The useful life is extended if an aircraft can be moved to a role that requires less performance with age. Such was the case with the F-4, which was moved to primarily air-to-surface missions when the more capable F-15 was introduced in the air-to-air role. The F-111, too, will remain in our inventory for some time. It is not routinely subjected to high G loads, flies longer but less frequent sorties, and still has excellent capabilities.

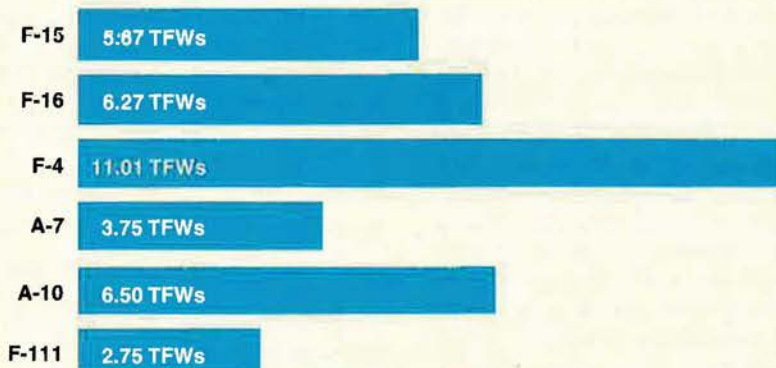
Based on an assessment of the current force, a specific procurement strategy has been outlined in the Tactical Fighter Roadmap. This strategy addresses our tactical fighter requirements from three perspectives:

- Procuring the required numbers of fighters to flesh out, modernize, and sustain a forty-TFW force plus our air defense force;
- Buying the needed mix of fighters to accomplish specialized and multirole missions; and
- Developing the quality improvements to enable fighters to accomplish demanding combat missions.

Procuring the Required Numbers

As pointed out earlier, our tactical

Air Force Tactical Fighter Roadmap Current Force



Total: 35.95 Tactical Fighter Wings (72 aircraft per wing)

air forces have sufficient aircraft to fully equip thirty-six equivalent wings with seventy-two combat-ready aircraft each. To flesh out, modernize, and sustain our goal of a forty tactical fighter wing force, as well as equip our air defense forces, we need to procure 260-280 aircraft per year.

Unfortunately, recent fighter procurement rates (176, 159, and 180 in FYs '82, '83, and '84 respectively) have not permitted needed growth while maintaining a capable force. As a result, our current force will average almost eleven years of age before increased production rates allow the average age to decrease and stabilize at about ten years.

If we don't get increased production rates, the consequences are inevitable: We will have to accept a smaller force or an older and less-capable force that is more difficult to maintain.

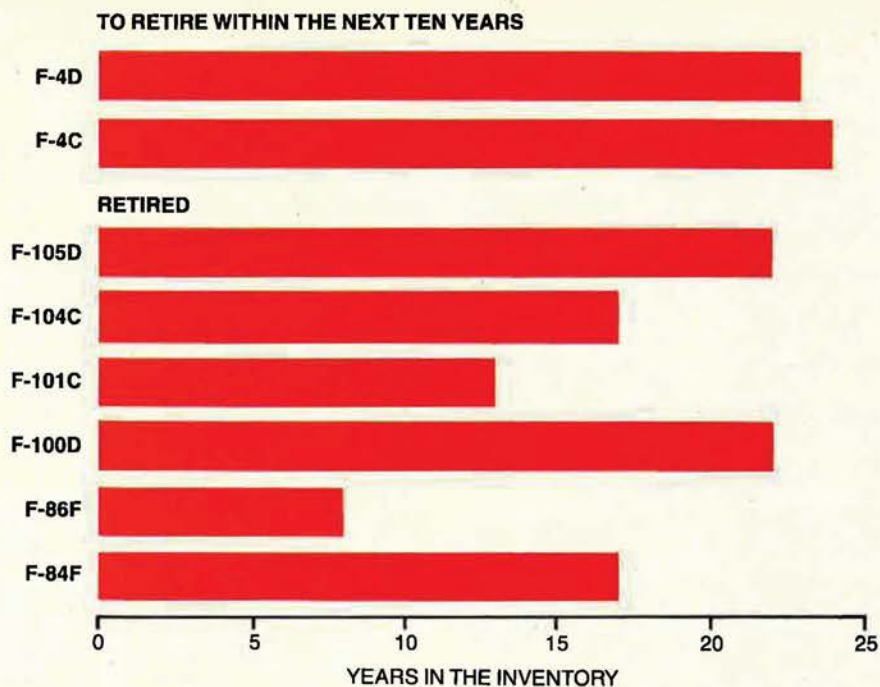
Procuring the Desired Mix

While total numbers are important, procuring the correct mix of air-to-air and air-to-ground fighters to meet the theater commanders' requirements is of equal importance. The fighter force mix must, therefore, provide a balance of specialized fighters for the many air-to-air or air-to-ground missions as well as multirole fighters that can be used in either mission role.

Though the correct fighter mix is difficult to define precisely, the competing requirements for flexibility (multirole aircraft) and specialized systems demand that a prudent mix be developed. On the one hand, we know that the theater commander needs a certain percentage of multirole aircraft to respond to the changing battlefield situation. On the other hand, due to the inherent difficulties of training aircrews for multiple missions and the increased capability afforded by the specialized aircraft, a certain percentage of our aircraft should be specialized for air-to-air or air-to-surface missions.

In light of these considerations, a composite perspective of experience and war plans indicates that at least forty percent of our forces should be multirole aircraft. Today, our some seventeen wings of multirole F-4s and F-16s make up thirty-four percent of the force. The F-15 presently fills the specialized air-to-

Fighter Inventory Service Life



air requirement while A-10s, A-7s, and F-111s perform only air-to-surface missions.

Qualitative Improvements

Increasing capabilities are required to meet the critical and demanding mission requirement to operate deep in enemy territory, around the clock, and in any weather. Increased range and payload and better night/adverse weather capability are needed in both air-to-air and air-to-surface mission areas. We'll look at the air-to-surface mission area first.

The centerpiece of our air-to-surface qualitative improvements is the dual-role fighter, or F-15E. We need the F-15E for two reasons. First, our present force of F-4s and F-16s hasn't the range to attack long-range interdiction targets. This is particularly true in the Pacific and Southwest Asia theaters. The F-15E with three 610-gallon tanks

and Conformal Fuel Tanks will better F-4 and F-16 range by about fifty percent.

Second, the dual-role fighter will also allow us to attack targets at night and in marginal weather conditions. This is important because Soviet doctrine places heavy emphasis on resupplying first-echelon troops and equipment at night. So long as we do not have a capability to attack Soviet targets at night and in adverse weather, the Warsaw Pact will enjoy a sanctuary for resupply and uninterrupted combat operations. Though the F-111 has an excellent night and all-weather capability and can reach the longer-range targets, we have only 200 of these aircraft in our tactical force today. That is not nearly enough.

To complement the limited number of F-111s, the Air Force plans to procure 392 F-15Es (twelve combat-coded squadrons plus two training squadrons). While our tac-

Prior to assuming his present duties as the Air Force's Deputy Chief of Staff for Research, Development and Acquisition, Lt. Gen. Robert D. Russ served as the Vice Commander of Tactical Air Command. A command pilot with more than 4,500 hours of flying time, including 242 combat missions in Southeast Asia, General Russ is a graduate of both the Air Command and Staff College and the National War College. Commissioned through the ROTC program, General Russ entered active duty in 1955 and has since held a variety of command and staff positions at wing, major command, and headquarters level.

tical needs are much greater than 392 aircraft, it is a realistic goal considering mission requirements and fiscal constraints.

Another important tactical modernization program and an essential component of the dual-role fighter is LANTIRN—Low-Altitude Navigation and Targeting Infrared for Night. LANTIRN provides terrain-avoidance navigation and attack under weather at night. Using its FLIR (forward-looking infrared), LANTIRN relies on its navigation pod for visual night navigation and improved visual target acquisition and identification. The targeting pod facilitates IR Maverick cuing and includes a laser designator for precision bombing. We plan to buy 720 pods for use on some of the F-16s and A-10s and on all of the F-15Es.

In the near term, our air-to-air qualitative improvements center on the AMRAAM (advanced medium-range air-to-air missile). With its active radar seeker, the AMRAAM possesses a launch-and-leave capability. Additionally, its high speed and long range afford the employing aircraft opportunities for multiple kills per engagement.

Another Roadmap feature is a follow-on to the F-16—the F-16F—which will possess an improved air-to-air capability and a significantly enhanced air-to-surface capability. Much as we evolved the F-4E from the F-4D and the D from the C, the F-16F will be a product improvement of the F-16C. While we really cannot, at this point, define the precise configuration of this aircraft, there are a variety of promising technologies in various stages of evaluation that may be incorporated in the F-16F.

One candidate is the Advanced Fighter Technology Integration (AFTI) program, which is presently exploring new flight-control systems, voice-commanded avionics, helmet-mounted sights, a dorsal fairing for increased avionics volume, as well as other technologies. In addition, the F-16XL—with its fuselage extension and cranked-arrow wing for longer range and increased payload—is promising. Since the modifications mentioned above are expected to increase aircraft weight and may impact its performance, we believe it prudent to plan for an increased-thrust deriva-

tive of the current engines for the F-16 and possibly F-15.

New Engines and Aircraft

Turning to the engine strategy that supports the fighter procurement strategy, the near-term goal is increased reliability and maintainability. We have run a competition between the Pratt & Whitney F100-PW-220 and the General Electric F110-GE-100 and have elected dual-sourcing to satisfy our F-16 and F-15 needs. We will also evaluate improvement programs for these two engines to ensure that they can compete in the 28,000- to 30,000-pound-thrust class. Such a derivative engine could be available in the late 1980s for the F-16F and for possible inclusion in the later F-15s. Finally, we will continue to develop the advanced engine for our next air-to-air fighter—the ATF.

The Advanced Tactical Fighter (ATF) will be needed in the 1990s to counter new Soviet aircraft that are anticipated in the middle of the next decade. Various capabilities are being considered for the ATF. To operate more effectively and survive in a hostile environment, we are looking at efficient supersonic performance, low signatures, high maneuverability, and advanced integrated avionics/armament. Carrying the battle to the enemy demands long-range capability. We are also exploring short takeoff and landing (STOL) to enhance our ability to

cope with enemy attacks on friendly airfields. Sustainability and supportability will receive the same priority as performance. Finally, as in the case of all other fighters, as the aircraft ages, it will inevitably move to the air-to-surface role, so we must provide some inherent air-to-surface capabilities.

A Realistic Procurement Strategy

In summary, the Tactical Fighter Roadmap outlines the forces needed to achieve our military objectives and then proposes a realistic procurement strategy that recognizes existing fiscal constraints. With the fighter procurement profiles specified in the Roadmap, we can flesh out, modernize, and sustain a forty-TFW force at ten years' average age and still modernize our air defense forces. We also develop a force with sufficient specialized and multirole aircraft to provide the theater commander the flexibility needed to respond to the changing battlefield situation. Lastly, the Roadmap proposes the necessary qualitative improvements to our air-to-air and air-to-surface systems.

I have summarized, in very general terms, the new Tactical Fighter Roadmap. During the coming months, the Air Staff will be working with the Tactical Air Forces to refine the Roadmap to ensure that it produces the needed Tactical Fighter Force. ■



F-15 Eagles take off at sunrise from Kwang Ju AB, Korea. USAF has selected the F-15E variant as its Dual-Role Fighter (DRF).

FROM WORST TO FIRST

BY JOHN T. CORRELL, EXECUTIVE EDITOR

TAC has achieved a sortie-generation miracle by abolishing centralization and putting its faith in its squadrons.

OVER the past five years, Tactical Air Command (TAC) has accomplished a miracle by putting its assets on the flight line and its faith in the troops.

From the time the Vietnam War ended until 1978, the sortie rate for fighters and the numbers of hours that TAC pilots were flying had been on what Maj. Gen. Jerry D. Holmes, TAC DCS/Logistics, calls "the slippery slope." When it bottomed out in the second quarter of 1978, fighter aircraft in combat-coded squadrons were averaging only 11.5 sorties and seventeen flying hours a month.

"Line jocks were getting about seven sorties a month," General Holmes says. "That's enough to stay safe, but it's not enough to stay combat-ready. We couldn't go back to Congress and ask for more flying hours, because we weren't even flying the time that we were already getting. We were flying less and less every year."

Today, the sortie rate is running at twenty a month—up by seventy-three percent—and fighter aircraft are averaging 28.1 flying hours a month—an increase of sixty-five percent. Since 1979, TAC has been using all of its allotted flying hours—and getting them flown early.

The reason, TAC says, is that it abolished the old centralized maintenance and supply organizations and moved the support people and spare parts out to the flight line. It also gave squadrons the responsibility of deciding how to apply these assets to getting the sorties generated and the flying hours flown.

The sluggish, centralized support structures have been replaced with the Combat-Oriented Maintenance



Crew chief SSgt. Kevin K. Bailey straps Col. Nick Kehoe into "their" aircraft at Langley AFB, Va. (Photo by William A. Ford, Art Director)

Organization (COMO) and the Combat-Oriented Supply Organization (COSO).

No longer does a TAC pilot fly just any wing aircraft. He flies one assigned to his squadron, with the squadron's color on the tail stripe. The aircraft is cared for by squadron maintenance specialists, who draw parts from a flight line "parts store." The squadron schedules its own sorties. A chart, prominently displayed out front, tells everybody

how the unit is doing. No longer are limping outfits hidden in aggregate wing statistics on sorties and maintenance effectiveness.

End of Job Control

Centralized Job Control, once all powerful, is gone. "It was manned by senior NCOs, pulling strings and on the radio, dispatching people here and there, and controlling everything from a central office," General Holmes says. Now, he

points out, "the red-tail aircraft are flown by the pilots with the red scarves and fixed by the guys with the red hats." The red maintenance phase dock is theirs exclusively, and they aren't dispatched over to the blue squadron to fix blue-tail aircraft.

It works.

The break rate for airplanes hasn't changed much. About nineteen percent still return from a sortie needing some sort of maintenance before they can fly again. The difference is in the fix rate.

"Back in 1978," says General Holmes, "we were fixing only twenty percent of the aircraft that were broken within eight hours. Today, we're fixing sixty-two percent within eight hours, and getting a lot of them fixed in two hours."

Worst to First

Five years ago, TAC had the worst aircraft mission-capable rate of any USAF combat command. Today, its rate is the best among them—and by a substantial margin. In going from worst to first, TAC also became the combat command with the highest degree of decentralization in its maintenance and supply operations.

"Prior to the decentralization, we had authority vested in the wing headquarters and in the wing people, with the responsibility out on the flight line," General Holmes says. "We had separated the authority from the responsibility. When you do that, the people who are supposed to accept the responsibility won't do it—they won't really do it until you give them some authority."

Just as nobody ever washes his rental car, maintenance people did not lavish extra care on an aircraft that belonged to everybody. Under COMO, the crew chief's name is on the aircraft, and he sees that it gets the best.

"The pilot has his name on it, and the crew chief has his name on it," General Holmes says. "Now there are more pilots than there are air-



At Nellis AFB, Nev., Sgt. Marc McGhee in the Expediter truck checks with F-16 crew chief SrA. Vikki Anderson to see how the work is progressing and if she needs any assistance. (Photo by William A. Ford, Art Director)

craft, so the junior pilots aspire to get their names on one. If your aircraft is going into phase or is in repair, then you fly a different one. But if you're on the schedule and your aircraft's on the schedule, then you fly your own airplane."

In between the heyday of centralization and the COMO revolution, TAC tried a limited concept called POMO, which stands for Production-Oriented Maintenance Organization. It took a great many people out of the back shops and put them on the flight lines, but they were still controlled and dispatched centrally. Maintenance specialists had no particular identification with individual squadrons.

What It Wasn't

General Holmes is ready for unbelievers who suspect that there are other explanations for what has happened since 1978.

"We did it without any increase in manpower," he says. "We did get some moderate increases in maintenance manpower in late 1982, but that was because the number of wartime sorties we were programmed to fly went up. But we came up the slippery slope from 1978 through 1982 without any more people."

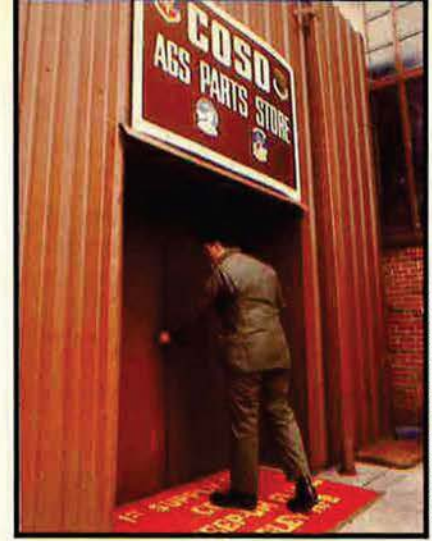
Skeptics might suggest that new A-10s, F-15s, and F-16s—easier to

keep repaired than older aircraft—have been responsible for the climb in utilization rates. But the older aircraft have achieved a sixty-four percent increase in sortie rates since 1978, nearly as impressive as the seventy-three percent with the new birds.

"Another thing it was not," General Holmes says. "It was not because we got a big influx of parts for those aircraft. As we came up the recovery, we actually got worse in parts." The percentage of TAC fighters grounded for parts was 12.5 percent in 1977, 14.9 percent in 1978, 15.8 percent in 1979, 16.4 percent in 1980, fifteen percent in 1981, and 14.2 percent in 1982.

Nor was it a more experienced maintenance force with higher skill levels. In 1976, fifty-four percent of TAC maintenance people were first-term airmen, and the figure has been higher than that ever since, peaking at 62.5 percent first-termers in 1980. The shortage of seven- and nine-level maintenance people grew more acute after 1978, and has been in double-digit percentages in recent years.

"It wasn't the different types of aircraft, it wasn't parts, it wasn't career airmen, and it wasn't skill levels," General Holmes says. "We feel that the fundamental problem



—Photos by William A. Ford, Art Director

was our previous centralized maintenance organization.”

Aircraft Maintenance Units

Under COMO, a typical wing will have three aircraft maintenance units (AMUs), each dedicated to supporting one tactical fighter squadron. An AMU is supposed to be run by a major, but many have captains or lieutenants in charge. Maintenance specialists have been moved out of the back shops remote from the flight line into the AMUs, which are located close to the squadrons. Each AMU does its own scheduling. It's a great deal of responsibility for a captain and his AMU.

“There is some risk in doing that,” General Holmes acknowledges, “but I'll tell you there's a whole lot less risk in letting him do it in peacetime rather than send him to war and say: ‘Okay, good luck, captain—do the best you can.’ That's putting him out on his own to go fight a war, and he's never done it before. We tell them what the annual sortie rate will be, but how they get it done is up to them.”

COMO also functions to organize TAC in peacetime as it would operate in wartime. “You don't deploy and fight as a wing in TAC,” General Holmes says. “Eighty-seven percent of our fighting forces would go as single squadrons to bases where there would be no other American squadrons deployed.”

On practice deployments in the old days, squadrons would pick up a support team from the back shops

and the centralized maintenance organizations. “It was hard to get your act together because you had to assemble, literally, a bunch of strangers,” General Holmes says.

Avoiding that situation is one reason why TAC no longer tasks maintenance people across squadron lines and why pilots from one squadron do not fly an aircraft assigned to another.

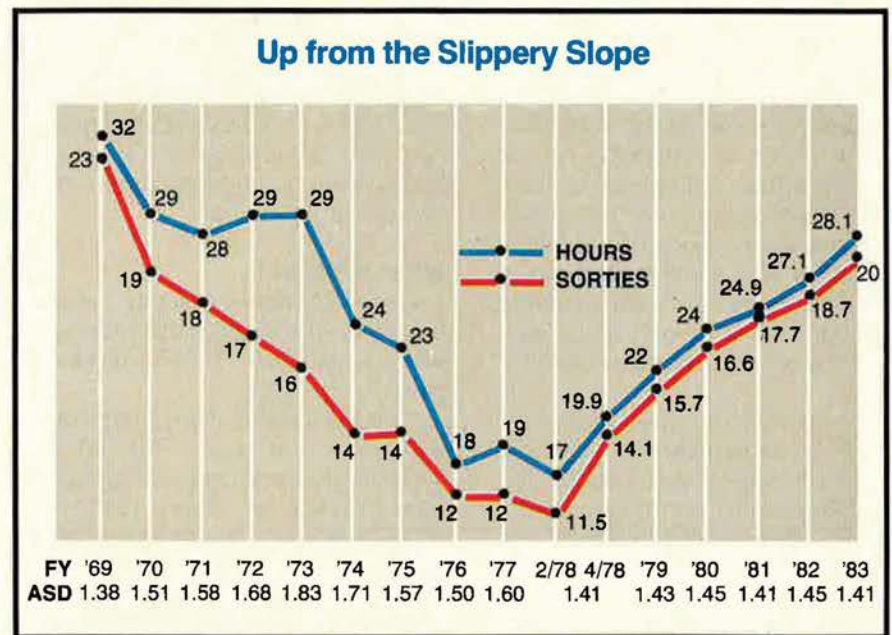
“Squadrons deploy to wartime locations that may be many miles apart,” General Holmes says. “If you had to dispatch a specialist or a crew chief back and forth between one up in northern Germany and one down in southern Germany,

he'd need a 600-knot motorcycle to get his job done.”

Complementary COSO

COMO alone, however, was not enough. The supply operation had to be decentralized as well, and that was done under COSO. “With the old organization, you had virtually every part on base—including aircraft parts—in the central supply warehouse,” General Holmes says. “If you needed a part for an airplane, you had to call Demand Processing, and they had one of the busiest telephones on the base. The aircraft was just another customer.”

Mechanics on the line had a small



The utilization rate for TAC fighters began its recovery in 1978 with the institution of COMO/COSO and has been improving ever since. “ASD” indicates Average Sortie Duration.



COSO in action (from far left): A1C Tim Foreman removes an IFF reply evaluator from an F-15. From the supply section he picks up the paperwork from A1C William Kneppshield to order a replacement part from the Aircraft Generation Squadron parts store. At the parts store, SrA. Michael Houllhan accepts the order and pulls the part from stock.



bench stock but had to get everything else from the central warehouse. War Readiness Spares Kits (WRSK) were "fenced." It was possible to get into them in peacetime, but only after doing what General Holmes called "a kabuki dance." Before COSO, it took an average of 3.5 hours to get a part from WRSK and an hour and a half even to get one from peacetime operating stocks.

"We took the aircraft parts that were in the warehouse and put them down on the flight line," General Holmes says. "We started a parts store, and now the airplane becomes the number one customer on the base. It has the highest priority. We put squadron supply support down in the AMUs instead of having it centralized."

The average time to get a part in TAC during FY '83—either from peacetime stocks or WRSK—was ten minutes.

"We don't have many more parts now than we did," General Holmes says, "but the parts we do have are in the hands of the mechanics. Even if a guy isn't going to get a part, he knows within minutes that he isn't going to get it."

The period of uncertainty about whether a part would be available once burned up hours. A maintenance supervisor never knew when to shift his work force to another job, because the part might be along any minute and he'd only have to shift them back again.

The fix rate for TAC fighters has been climbing, and the percentage of aircraft out for either mainte-

nance or supply has been dropping. The mission-capable rate is up, and the mission scheduling effectiveness rate—the degree to which the day's operations go off as planned—is now near ninety percent.

The Look Programs

The primary architect of the massive shift to decentralized maintenance and supply and to the unit-goals concept has been Gen. W. L. Creech, who took command of TAC in May 1978. Along with COMO and COSO came action to upgrade living and working conditions for the troops, especially those in maintenance. In General Creech's judgment, maintenance people were getting the short end of things back in 1978. To correct that, TAC launched a series of "Look" programs.

The first was "New Look," to

upgrade flight-line maintenance facilities. Many a crew chief and specialist was accustomed to shivering all winter and sweating all summer. Portable latrines were often the only relief facilities available.

New Look changed all that, and was followed by Proud Look (for the maintenance people in transportation), Smart Look (munitions maintenance), and Bright Look (maintenance training).

TAC got no additional money for these programs. Instead, General Creech took the funds from his overall budget in 1979 and decreed that something be done right away about the sorry conditions in maintenance work areas. A significant part of the program was to open self-help centers, and the AMUs have made aggressive use of them. "Before" and "After" photos of work areas bear little resemblance to each other.

The lot of maintenance people in TAC has improved greatly, but General Creech doesn't want anyone to forget too soon how things used to be. On one of his trips, he collected a chair, taped up and missing a caster, that was in use by an AMU. He brought it back to TAC headquarters, where the DCS/Logistics is required to keep it on hand as a reminder.

"He said that when we get our standards up to the level our maintenance professionals deserve—and to the level commensurate with their responsibility—then we'll have a ceremony out at the TAC Command flagpole and retire that chair," General Holmes says. ■



General Holmes displays The Chair, which TAC headquarters keeps as a reminder of how it was in the AMUs.

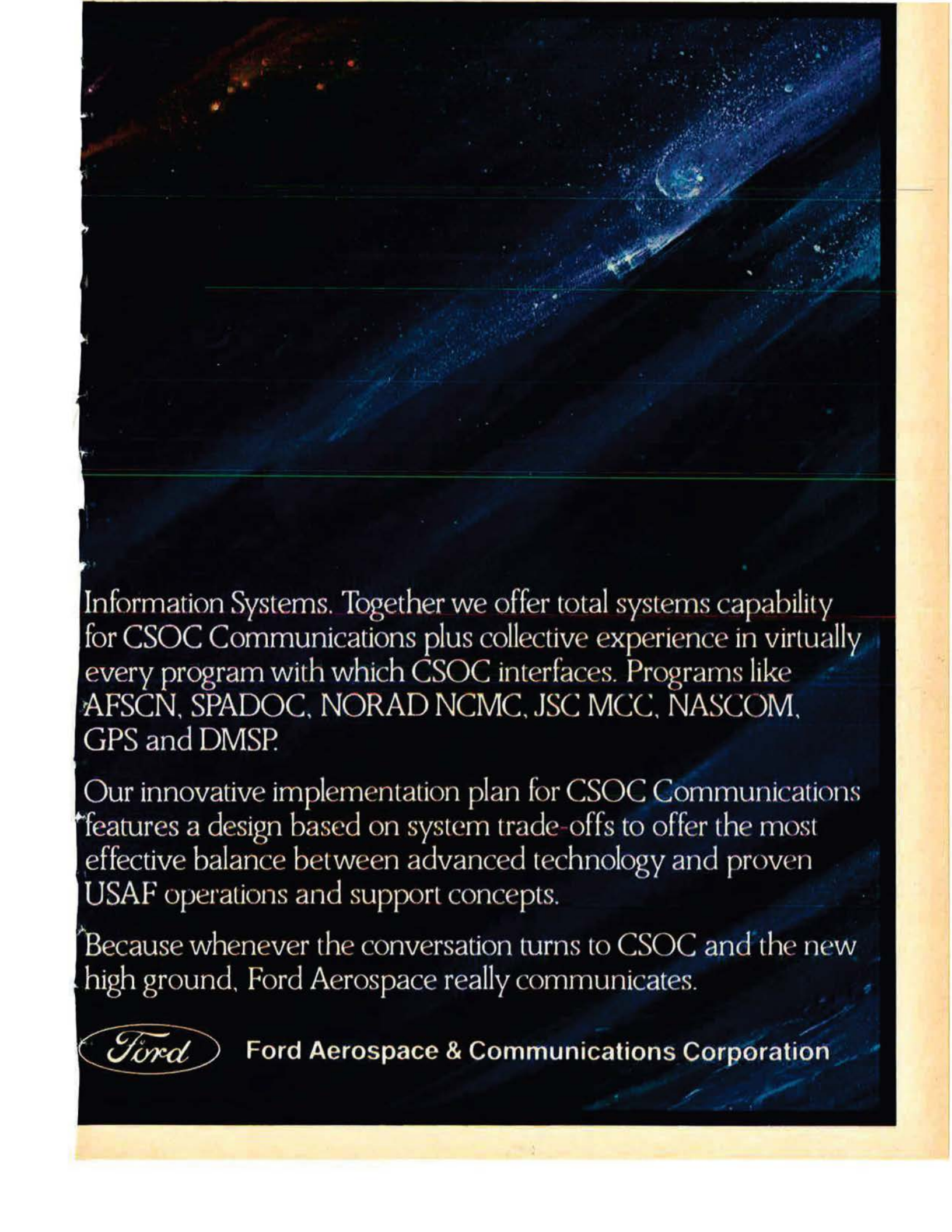
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Big World of the Sentry

Incredibly, the critics once said AWACS was an airplane without a mission!

BY GARRY MITCHELMORE

THE Air Force's E-3A AWACS aircraft have become the prime means of showing the US flag around the world. Their deployments to such global trouble spots as the Middle East and North Africa (see p. 72) have often been the quickest means of demonstrating US resolve and military capability in those areas.

What irony.

Ten years ago, critics of the then-embryonic AWACS program tried to persuade Congress to abort it on grounds that the E-3As were aircraft in search of a mission. Foremost among such critics, Sen. Thomas F. Eagleton (D-Mo.) went so far as to describe AWACS as "apparently an irresistible gadget which has no real utility."

The critics advanced two main arguments. They claimed there would be no need for AWACS aircraft to help defend the US against Soviet bombers because there was—and would be—no threat from such bombers. They also derided

USAF's plans to use the AWACS in tactical air warfare and charged USAF with having made up that mission as a fallback justification of the AWACS program.

Now the AWACS program figures heavily in the Reagan Administration's plans to strengthen continental air defense against Soviet bombers, which are indeed a threat. Moreover, the E-3As have already demonstrated their indisputable utility in command and control of tactical aircraft.

Home base for the E-3A is Tinker AFB, Okla., with USAF's 552d Airborne Warning and Control Division. Also at Tinker are the following sister units involved in tactical missions:

The 8th Tactical Deployment Control Squadron, flying EC-135 and WC-135 aircraft out of Tinker; the 7th Airborne Command and Control Squadron, flying EC-130E aircraft out of Keesler AFB, Miss.; and the 41st Electronic Combat Squadron based at Davis-Monthan AFB, Ariz., which flies specially configured EC-130H aircraft designed to disrupt enemy defenses and communications.

However, it is the E-3A that justifiably gets the most attention. To date, the investment in the total system exceeds \$4 billion. And it is the Sentry that gets the press when it deploys in world crisis situations.

Now six years in the operational inventory, the E-3A is a veteran performer. Under Tactical Air Command control, the system deploys to major exercises, such as Red Flag in the Nevada desert. It also deploys on a rotating basis to Kadena AB, Okinawa, Japan, and Keflavik, Iceland, where the aircraft then come under the control of CINCPAC and CINCLANT, respectively. More visible to the nation have been the many deployments ordered by the Joint Chiefs of Staff to world trouble spots. These "no-notice" deploy-

ments began with aircraft being sent to Saudi Arabia in March 1979. Since then, the deployments have included another one to Saudi Arabia, four to Egypt, and others to Korea, Okinawa, Germany, and the Sudan.

Beats Expectations

The remarkable fact about the E-3A record, especially since it deploys on a no-notice basis, is that it has always met or exceeded what was expected of it. The design of the airframe, radome/radar, computer, displays, and subsystems has been so good that there have apparently been no major surprises in lessons learned—except for the good surprises.

"The E-3A has performed exceptionally well," says Brig. Gen. William K. James, 552d AWAC Division Commander. "The system's reliability and performance are far better than had been earlier anticipated, and it is a prime, visible example of how well high technology can work."

The E-3A usually gets to the deployment scene first, ahead of support aircraft.

"We have operational capabilities right away," says General James. "But don't get me wrong. We can't sustain our operations indefinitely. Like everybody else, we do drag a logistics tail. But we get simply outstanding support from both MAC and the Oklahoma City ALC [Air Logistics Center]. We couldn't do the job without them, and they deserve a great deal of credit."

This electronic marvel called the E-3A has unique characteristics that make it so valuable in crisis situations. It is, first of all, a defensive system—nonthreatening. In its major role of air surveillance, it can function as a needed eye in the sky, surveying air traffic in all directions, but most often looking at specific areas from which unfriendly forces



Although the E-3A operates on a no-notice deployment basis, it keeps exceeding what was expected of it.



Above, an E-3A lifts up from Tinker AFB, Okla., in the predawn light of a summer morning. Left, an AWACS taxis out for another mission.

may fly. Capable of picking up low-flying fighter aircraft as far away as 200 nautical miles, the Sentry serves as an early warning line for friendly forces.

But if and when a potential aggressor is ready finally to commit to combat, he must also consider the sting of the E-3A, which is capable of controlling friendly fighters in multiple capacities. In both roles, the E-3A functions as a deterrent. In all deployments its primary function has been in the air-surveillance mode, with a secondary function of training fighter pilots of supported countries to work within its umbrella. So far, no shots directed by a flying Sentry have been fired in anger.

Options for JCS

Such a versatile system also gives the Joint Chiefs choices never before at their disposal. Historically, fighter aircraft have not deployed with the E-3A from the CONUS, but have been furnished by host nations or nearby US air forces. But a fighter escort is always an open option and was chosen in the last deployment to North Africa.

From the 552d's perspective, the task is to be operationally ready, regardless of the basing concept or who furnishes the weapon systems to work in conjunction with the E-3A. General James feels his squadrons are ready, even though they don't usually stand a traditional alert. "We have the right peo-

ple and parts to do the jobs," says General James. "Our spares kits that we carry to the forward operating locations are one good example. These kits, just like our other capabilities, have been fine-tuned—not that we don't strive to improve always!"

A typical deployment for the E-3A is, well, atypical. There are no standard numbers, either for aircraft or crews. A no-notice deployment, specifically, is generated by factors beyond US control. The response in E-3A numbers, however, will be based on how those factors are read. Two aircraft may deploy, or perhaps six. As the new NATO E-3A wing emerges at Geilenkirchen, Germany, some pressure for deployment may be taken off the 552d AWAC Division.

Perhaps it was more than good planning that saw to it that the 552d was headquartered in Oklahoma. When the 552d deployed to Ram-

stein AB, Germany, in December 1980 as the Polish crisis escalated, the crews and aircraft had to work through six months of European weather at its worst. With the planning dedicated to the Sentry and its CONUS experience in Oklahoma's changing weather, the crews didn't find the severe weather a major detriment to operations while deployed. Division staff quickly point out that the deployment to a bare base in Egypt has the same results—no major problems with heat and sand.

Crew Backups

If there has been a major lesson taught by deployments, it is to ensure that there are backups in typically one-deep crew positions. The depth in air-surveillance personnel and weapons controllers may range from three to eleven. It's the one-deep computer technician or air-

borne radar technician who needs augmentation. If one of them is sick or injured, a mission can be jeopardized. The Division takes steps to ensure that doesn't happen.

Many in the 552d feel that the E-3A, which works well at home, works even better on deployments. One is Lt. Col. Robert H. Crawford, Jr., Chief of the Tactics Division. "This system seems to work better when almost continually airborne," he says. "When in heavy use, the crews get more familiar with a particular aircraft and related equipment. They therefore seem to develop a better anticipation of what problems might arise and how to handle them if and when they do so. In deployments, the aircraft may be aloft fourteen hours in a day, and when it's back on the ground, whatever is wrong is fixed."

Although the flying hours on deployment are nearly 100 percent

surveillance, the E-3A offers the flexibility of weapon systems training at the same time. And the 552d people find, not surprisingly, that tactics differ from country to country. The Royal Saudi Arabian Air Force pilot will do things differently than do Egyptians, Germans, or the US Navy. The difference in tactics can be explained partially by the different airframes. For example, a foreign pilot flying an F-5 may need guidance to near-visual contact before firing on an enemy. An F-15 could launch its missile from much further away.

E-3A Leaves Impression

Communications during tactical training may also differ. Many host-country fighters are equipped with VHF radios whereas Stateside E-3A operations are primarily conducted using UHF. E-3A controllers have learned that though En-

E-3A DEPLOYMENT LOG

AWACS stays ready—and busy.

Overseas deployments of E-3A AWACS aircraft began two years after the 552d Airborne Warning and Control Wing (now Division) took delivery of its first E-3A on March 23, 1977, at Tinker AFB, Okla.

On March 9, 1979, two AWACS aircraft were sent to Saudi Arabia and were engaged in surveillance within twenty-four hours of their arrival. At the time, North Yemen and South Yemen were engaged in border warfare. One E-3A kept track of air activity inside the Yemens and transmitted data to the second E-3A parked on the ramp at Riyadh, the Saudi capital.

Seven months later, on October 27, 1979, two E-3As flew nonstop from Tinker to Osan AB, Korea, following the assassination of South Korean President Park. The aircraft, providing "deep look" surveillance of the Korean peninsula, served notice on North Korea not to take advantage of the situation. They also enhanced US and South Korean air defense capabilities.

In May 1980, relations between South Korea and North Korea again reached the flash point. Two AWACS aircraft flew from Tinker to Kadena AB, Okinawa, Japan, as renewed evidence of US support for South Korea. They remained at Kadena until a permanent E-3A was activated there in July 1980.

In September 1980, following the outbreak of war between Iraq and Iran, four E-3As and nearly 200 aircrew and support personnel were deployed to Riyadh, Saudi Arabia. Their mission, still being carried out, was to provide around-the-clock air defense radar coverage. Its success had a direct bearing on Saudi Arabia's decision to buy five E-3A aircraft.

In December 1980, at the peak of civil tension inside Poland amid apprehension that the Soviet Union would intervene, four E-3As were deployed from Tinker to Ramstein AB, Germany. They monitored air activity in and around Poland for four months as highly visible evidence of US military concern.

In October 1981, two E-3As and some 200 operations and support personnel deployed to Egypt following the assassination of Egypt's President Anwar Sadat. The aircraft flew nonstop, for fourteen hours, from Tinker to Egypt, where they worked with the US Navy's Sixth Fleet and trained with Egyptian ground controllers.

The presence of the E-3As in Egypt was credited with ending air raids on Sudan by Libyan forces in Chad. Those raids stopped almost as soon as the E-3As arrived. The aircraft returned to Tinker in November.

In February 1983 they were back. Four E-3As deployed to Egypt to take part in joint training exercises with the Egyptians. Again, their deployment coincided with the heightening of tension between Libya and Sudan.

In August 1983, two E-3As, together with eight USAF F-15s and two KC-10 tanker aircraft, flew to Khartoum, Sudan, to help the Sudanese fight off Libyan-backed rebel forces. At that time, the Libyan air force was conducting air raids against Chadian government forces in northern Chad. Shortly after the USAF AWACS, fighter, and tanker aircraft came on the scene, the fighting stopped.

In September 1983, an E-3A was deployed to northern Japan to assist with search-and-rescue operations in the Sea of Japan following the Soviet downing of a Korean Airlines 747 carrying 269 crew and passengers.

On March 9, 1984, two E-3As were sent to Egypt in response to a Libyan bombing of Khartoum. They teamed up with the Egyptian Air Force, and Libyan military activity in the area ebbed.

—BY JAMES W. CANAN





Mission crew members work at their consoles in an E-3A Sentry. The deep-looking radar provides surveillance and early warning, and AWACS is superbly equipped to control friendly fighters in various capacities.

glish is the standard language for working with the Sentry, some allowances must be made. When under stress, a foreign flyer may revert to his native tongue. Sentry controllers must allow for such contingencies and may have to adjust for delayed or foreign-language responses. One way or the other, the way E-3A people survey and control leaves major impressions on those with whom they practice.

Being acutely aware, from experience, that demands on the E-3A can vary widely, the Division does its best to stay one jump ahead of the game—by anticipation. Division personnel stay current with world events and Air Force message traffic. If a particular area seems to be heating up, they may begin rehearsing for deployment to that area.

Those who operate the consoles aboard the flying surveillance and control platform have big assignments. First of all, they are tasked to be "local area familiar" with almost the entire world. That's truly a formidable task and results in personnel who may know the earth's major outlines and contours better than many Ph.D.s in geography.

"Familiarization with the local area is quite important," Colonel Crawford says. "Our people are in the E-3A, and the radar return is going to look much as it did when we practiced Stateside. But that is completely different than what a fighter pilot sees flying the same area. He has a visual image that we

don't have. It's important for us to know how a mountain range might affect surveillance coverage of a particular airfield. And we must know commercial air traffic corridors and how that might affect our interactions."

Another major factor to anticipate prior to a deployment is communications. If the forward operating location is a bare base, for example, there may not be AUTOVON available to help in support roles. Also, distance and communications are factors to consider in command and control of deployed aircraft.

High Utilization Rates

The no-notice deployments have helped prove that the airframe and radar can perform far beyond the originally calculated utilization rate. The airframe, for instance, was conceived to have a sixty-five-hour-per-month utilization rate. Now, the average utilization rate is approximately ninety-five hours. The airframe can be subjected to more than 200 flying hours per month. This has been proven in Saudi Arabia, where the Division

has the most experience in foreign deployment.

With little fanfare, in October 1983 the Division marked three years of continuous deployment to Saudi Arabia. Flying two sorties daily, the Division has averaged 23.8 hours per day airborne surveillance in this area where the continuing Iran-Iraq conflict could potentially spill over to involve US allies. By virtue of maintaining four aircraft and five crews in Saudi Arabia, the flight time there amounts to approximately thirty percent of the Division's average annual flying time of 28,000 hours.

Typically, the crews fly fourteen-hour sorties with one refueling, constantly sweeping the skies and digesting the information returned by the radar. Deployed crews usually remain on station for a little more than three weeks and fly every other day.

No Accidents

A remarkable achievement for the Division is the fact there has been no major accident involving an E-3A in its thousands of hours of flying time in Saudi Arabia. In fact, since becoming operational, the Division has flown approximately 110,000 hours worldwide without a major E-3A accident.

"The book says we can't do what we're doing in Saudi Arabia with so few airplanes and people, but we are," says Lt. Col. Jesse W. Shanks, Chief of Operations Training Division. "We can attribute our performance there to a superbly designed system and outstanding people. Our people like their work. They certainly don't find working with AWACS boring. It's a lifestyle unlike any other that I've been associated with."

What Colonel Shanks refers to in part is that flying crews typically average 127 days TDY per year. That includes technical and professional training as well as E-3A deployments. Many crewmen keep a

Garry Mitchelmore is a lieutenant colonel in the Air Force Reserve and serves as the Individual Mobilization Augmentee to the editor of Airman magazine. A career public affairs officer, he completed five and a half years of active-duty service in 1971 and has been a Reservist since 1973. Mr. Mitchelmore holds a bachelor's degree in journalism and a master's in speech communication from the University of Oklahoma. When not wearing the blue suit, he is the Director of Public Support for Mental Health Services of Southern Oklahoma.



High utilization rates for the E-3A are a credit to the system and to the outstanding people who maintain it.

bag packed and handy. They aren't on alert, as such, but they must be ready to move out. For instance, when South Korean President Park Chung Hee was assassinated in October 1979, the Division deployed aircraft to that country in just under twenty-three hours—and seventeen of those hours were the flying time.

Plenty of Volunteers

When the Joint Chiefs levied a deployment to Egypt in February 1983, the notice to the Division came at about 7:00 p.m. on a Friday night. Time wasn't quite so critical in getting to Egypt, but it was a tough day and hour to gather people for a deployment. Many had weekend plans, baby-sitters for the evening, or were on leave in and out of the state. The word got around quickly, though, and early on Saturday morning there were twice as many volunteers as were needed—including one crewman who came back from leave in Colorado.

The Division recognizes there are many aspects to maintaining the esprit shown by such actions. One concept initiated is a "formed

crew," where a specific crew will know, to the best of the Division's ability, when and where it will go on *scheduled* TDYs in upcoming months. This allows the flyers and their families the opportunity to prepare for extended absences. The formed-crew concept is not, however, carried to the extent that it once was in SAC. For instance, it is not necessary that the entire crew take leave at the same time—which is rather difficult to arrange when a minimum of seventeen crewmen are involved. Unscheduled TDYs, because of no-notice deployments, just have to be.

Esprit is also maintained by a friendly competition between the E-3A flying squadrons to see who can best take care of families left behind. People within the units are considered "on call" if and when problems arise for a family while the head of the house is gone. If a wife has car trouble, there will be someone in the squadron who will fix it or see that it gets fixed. There's also help available with finances, getting to the dispensary, and whatever else is required. Spouses remaining at

home will be invited to squadron parties and get newsletters to keep them abreast of what is going on. An extensive E-3A orientation program is available for spouses.

Deploying crewmen are acutely aware that they have both a military and a diplomatic job to do. Strict attention must therefore be paid to dress and grooming standards—as well as to conduct in off-duty periods. They know that they are highly visible to citizens of host countries.

They also recognize that host nations bend over backward to help the AWAC people by furnishing the best that is available. Crews will be given the best beds and food possible to help alleviate the drudgery of multihour, repetitive missions. The hosts themselves assign their best military and civilian people in liaison roles. The red carpet will be rolled out as far as it will reach, even on a bare base.

Along with no-notice deployments, extended periods away from home, and long hours in the air, there are also real rewards. One is exposure to cultures throughout the world, plus bargain purchases in

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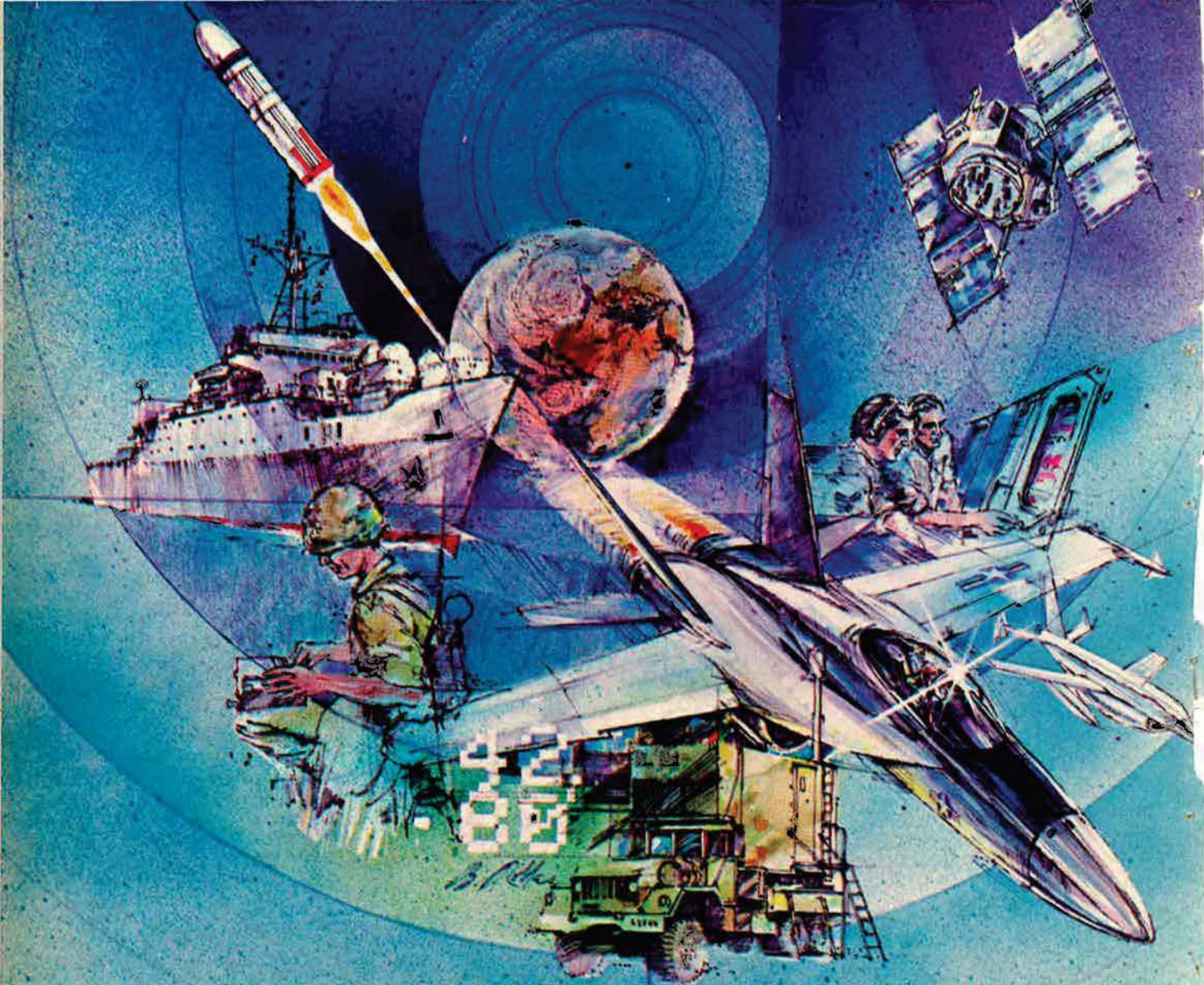
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souvenirs. The four-year Sentry tour with the 552d is a first to many. In the weapons control and air surveillance career fields, frequent moves and many isolated tours are par for the course. In addition, the enlisted promotion rate for E-3A people is well above average.

Colonel Crawford sums up the attitude of meeting challenges: "Our people like being on the leading edge—where the action is. Even when we deploy in the US to a Red Flag exercise, the weapon systems, targets—everything's different than previously. No mission or deployment is ever quite like another."

Though training, maintenance, and scheduled and nonscheduled deployments keep the E-3As going

at a hectic pace, the Division has learned that the Sentry, if anything, is underrated. Consequently, suggested improvements have led to the development of a major modification package that will increase the system's capabilities and usefulness.

The package, built by Boeing Aerospace Co., will be ready for first installation in September 1984. The package includes increased and faster computer capabilities, anti-jam communications, improved maritime surveillance capabilities, additional radio communications, and five additional display consoles per aircraft. Two of the consoles will be dedicated to a special commander's console arrangement.

Installation of the thirty-two kits by the Oklahoma City ALC is scheduled for completion by early 1987 at a total cost of \$397 million. Those who work with the Sentry will again have to push themselves to stay up with the advanced technology placed in their hands.

There's nothing quite like the Sentry. It's a unique system flown and maintained by unique people. They are the first to swear that there have been no major traumas associated with the system but that they do learn each day how good it is and can be. They give the most credit to design, training, judicious operations, and superb maintenance. To them, the E-3A is a system most prefer to stay with. ■

THE SENTRY'S MEN

USAF and AFA Salute the Team of the Year.

The Air Force has selected five noncommissioned officers from the Airborne Warning and Control System (AWACS) field for the Team of the Year Award for 1984.

The annual award, presented by the Air Force Association, focuses attention on various enlisted career fields by recognizing the performances of outstanding members in them.

This year's team is composed of SSgts. Richard M. Lucci, Henry H. Morgan, Robert J. Spohn, and Sgt. Robert A. Williams, Tinker AFB, Okla.; and TSgt. Randall L. Hankey, Kadena AB, Japan.

Sergeant Lucci is an Instructor Communications Technician assigned to the 964th AWAC Squadron. He is cited for his exceptional knowledge of the sophisticated E-3A communications system. His prompt diagnosis and correction of in-flight communications problems allowed important missions to continue with little or no loss of communications capabilities. His expertise was proven during Operation Early Call in February of last year when communications became inoperative just prior to a critical phase of fighter intercept. Working under adverse conditions and against the clock, Sergeant Lucci was able to repair the equipment and reestablish communications with the fighters.

Subsequently, during Operation Urgent Fury in October, the E-3A HF data link with the Navy malfunctioned. Again under severe pressure, Sergeant Lucci repaired the system to ensure continuous communications.

Sergeant Morgan is an Airborne Communications Systems Operator with the 963d AWAC Squadron at Tinker. He played a critical role in his unit's record-high effectiveness rating during a Middle East deployment. He also played a key role in the first AWACS intercept of a Soviet Bison aircraft during a recent NATO North Atlantic deployment. His timely and innovative management of numerous degraded radio frequencies allowed the AWACS aircraft to remain on station and to effect the intercept. Sergeant Morgan has also frequently been selected to brief foreign dignitaries because of his detailed knowledge of E-3A systems. He has been singled out for upgrade to instructor status.

An Airborne Surveillance Technician with the 964th, Sergeant Spohn has been credited with developing air track identification procedures that provided quicker identification of potentially hostile aircraft. His versatility has proven a major asset on every deployment and exercise, including the combat readiness exercise Bold Eagle; the joint US/Philippines air defense exercise Cope Thunder; two JCS-directed rapid force deploy-

ments, Early Call and Bright Star; and the joint US/Caribbean rescue operation Urgent Fury.

Sergeant Spohn's skillful operation of the aircraft's sensor systems enabled extended detection of potentially hostile aircraft, ensured maximum time for command and control decisions, and enhanced the safety of E-3A operations in North Africa during a period of instability there. Sergeant Spohn has also been lauded for his E-3A capabilities briefing during an interoperability exchange with US Naval forces operating in the Persian Gulf and for his instruction of foreign military members on the AWACS surveillance system.

Sergeant Williams is a Computer Display Maintenance Technician assigned to the 963d AWAC Squadron. His maintenance expertise enabled AWACS aircraft to continue providing information to ground and naval forces in the Persian Gulf during a Mideast deployment. Singled out for upgrade to instructor status, Sergeant Williams accumulated more than 208 days of worldwide temporary duty in an eleven-month period. These included a rapid deployment precipitated by the infamous Soviet downing of a Korean airliner and another short-notice deployment to Iceland. His keen system knowledge has proved invaluable in troubleshooting computer-radar interface problems.

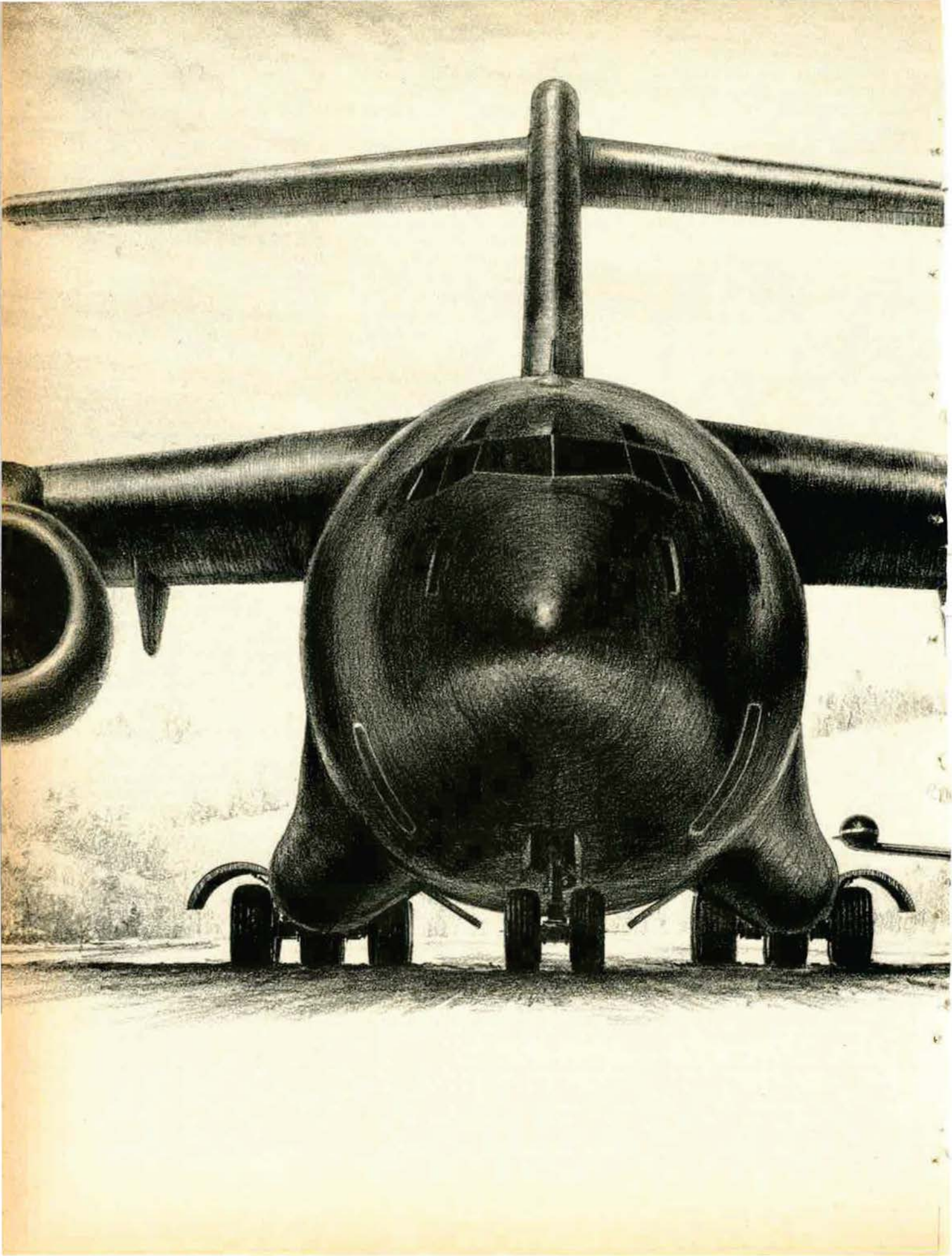
Sergeant Hankey, an Airborne Radar Technician with Kadena's 961st AWAC Squadron, is cited for his scheduling abilities that enabled his unit to undertake a record 103 sorties in fewer than two months during critical support operations. He was responsible for scheduling all sorties, although there were more than twice as many as usual for that time period.

During this period, which included the downing of the Korean airliner and President Reagan's visit to Japan and South Korea, Sergeant Hankey assigned all his unit's personnel as well as more than 120 additional temporary-duty members in twelve different crew specialties. As an integral member of the squadron contingency support staff, he worked shifts of twelve to fourteen hours, seven days a week, for sixty-six days, except when flying as an Airborne Radar Technician on contingency induced missions of more than eighteen hours duration.

As the squadron ART staff instructor, he ensures that the highest degree of proficiency is maintained by other unit technicians by providing both academic and in-flight training on the complex E-3A systems.

Ceremonies honoring the award recipients were conducted by the Air Force Association in Washington, D. C., in May.

—BY WILLIAM P. SCHLITZ



WHICH PLANE CAN USE THE SHORTER AIRFIELD?

It may surprise you to learn that the new McDonnell Douglas C-17 military airlifter will require a runway no longer than that needed by some turboprop executive aircraft.

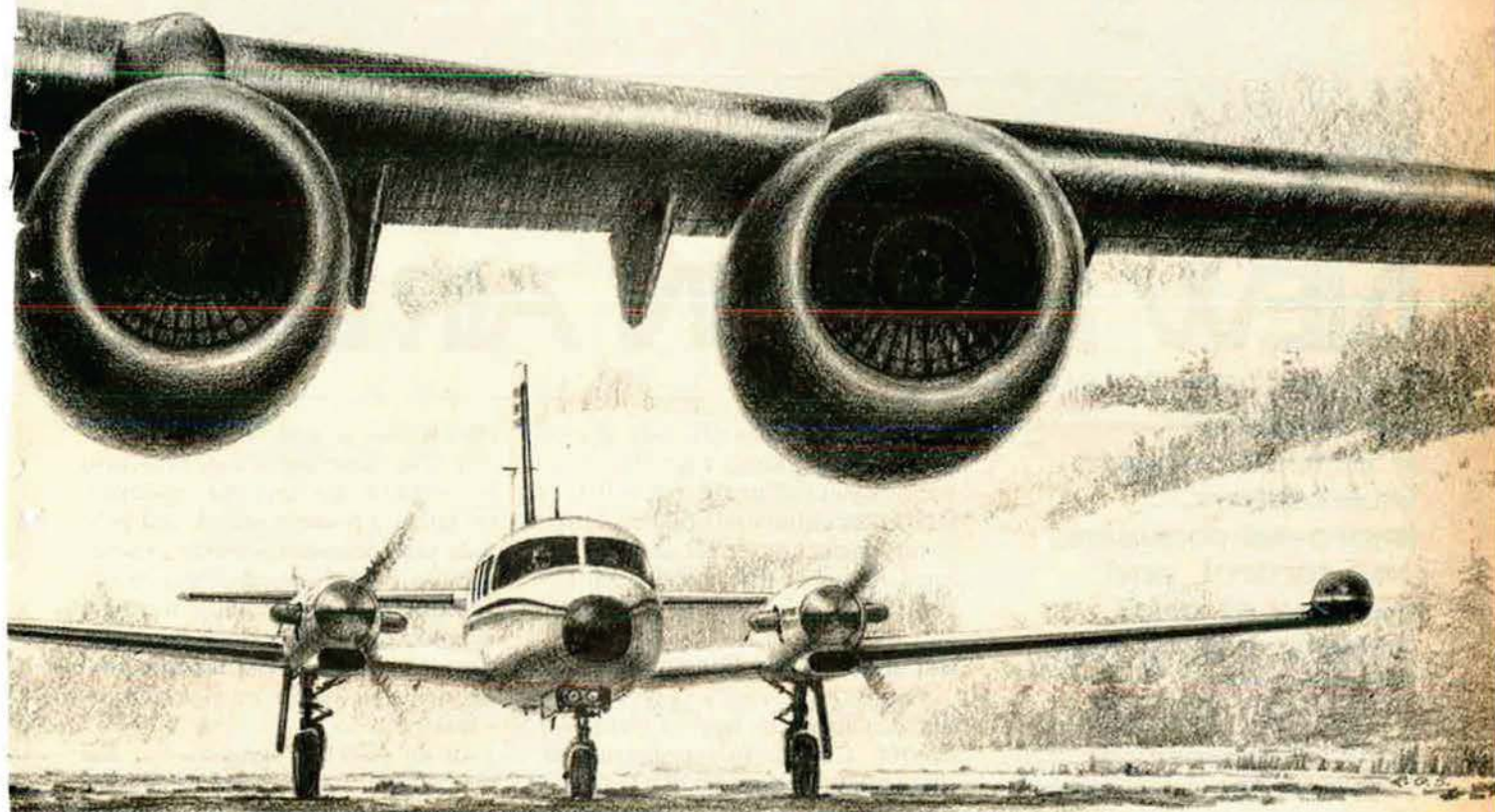
Proven technology makes this possible. With a supercritical wing design and an innovative propulsive lift system, engine exhaust blows on the wing flaps to increase wing lift. This allows a much steeper angle of approach to the field, a lower landing speed at airfields as short as 3,000 feet. And that is routine for the C-17.

On the ground, the C-17's exceptional maneuverability speeds cargo delivery. This aircraft can be completely turned around in just 90 feet. It can back into small ramps. With its thrust reversers directing engine exhaust

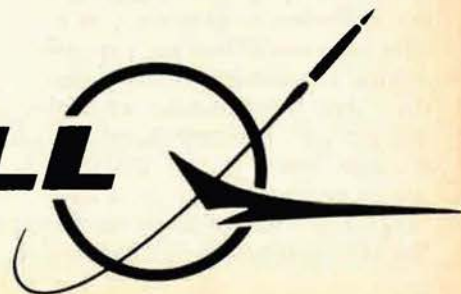
upward, the C-17 can be unloaded with the engines running without disrupting ground operations.

With this short-field capability, the C-17 will do what no other military airlifter is able to do: Sustain a flow of the heaviest military cargo (tanks, artillery, even helicopters) from the U.S. directly into theaters of operation where only short fields and limited ramp space are available.

The C-17. Brings the mission down to earth.



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NEW LOOK IN AIR DEFENSE

BY LT. COL. DONALD D. CARSON, USAF

It includes modern interceptors, improved command and control, and training at small airfields a long way from home.

FOR the first time since the 1950s, dramatic improvements are under way in USAF strategic air defense forces. Force modernization and dynamic new training programs are beginning to provide a measurable increase in defense capability.

This turnaround marks a significant shift from decades of neglect when critics asserted there was no bomber threat to this country. In recent years there has been controversy over whether or not the Soviet Backfire bomber was a real threat to

the United States. However, this point became moot when the Russians began testing their new Blackjack intercontinental bomber. There is no longer any doubt the Soviets have a bomber that could reach US targets.

Evolution of the Mission

For the past twenty years, US air defense concerns have centered on Soviet ICBMs. In recognition of this serious threat, NORAD developed missile-warning systems capable of detecting Soviet missiles upon launch. These warning systems can predict where the missiles will impact. This warning provides time for the National Command Authorities to direct precautionary launch of the SAC bomber force before Soviet missiles can strike their targets. So sophisticated are our warning systems that it is not likely that the Soviets could launch a missile

attack that would be undetected.

These same detection systems, however, do not have the capability to detect a bomber attack and provide the necessary warning. As improved cruise missiles and other standoff weapons evolve and are adapted to the Blackjack fleet, the Soviet bomber may again gain pre-eminence in the Soviet offensive arsenal.

In an effort to reduce costs for managing US air defense forces, responsibility for providing, equipping, and training active strategic air defense forces was transferred from Aerospace Defense Command to Tactical Air Command in 1979. This reorganization placed with TAC the responsibility for day-to-day peacetime management and training of all USAF fighters based in the continental United States. Air defense forces received another boost in 1980 when President Rea-

Air defense F-15s fly by the Wright brothers memorial at Kitty Hawk.



E

gan announced that one of his Administration's goals would be to modernize strategic air defense forces. The results of this emphasis have been dramatic.

New Aircraft for ADTAC

Before the move to Air Defense, Tactical Air Command (ADTAC), strategic air defense forces were equipped with 1950s-vintage aircraft, command and control systems, and ground radars. Today, two active-duty fighter-interceptor squadrons (FIS) are operational in the F-15 Eagle. In 1981, the 48th FIS at Langley AFB, Va., became the first F-106 squadron to convert to the F-15. The 318th FIS at McChord AFB, Wash., got F-15s last year, and the active-duty fighter-interceptor squadrons at Minot AFB, N. D., and Griffiss AFB, N. Y., will convert to the F-15 during 1985 and 1986 respectively. The remaining

active F-106 squadron is at K. I. Sawyer AFB, Mich.

ADTAC also equips and trains forces for Air Forces Iceland (AFI). AFI employs F-4Es from the 57th FIS at NAS Keflavik.

When ADTAC took over management of strategic air defense forces in 1979, ANG fighter-interceptor squadrons were flying F-101 Voodoos, F-4 Phantoms, and F-106 Delta Darts. ADTAC retired the last F-101s during 1983, and those units now are flying F-4s.

All Guard interceptor squadrons equipped with the F-106 and F-4 are expected to convert within the next few years to either the F-15 or F-16 with the Advanced Medium-Range Air-to-Air Missile (AMRAAM). Both the F-15 and F-16 offer capabilities in firepower, range, and radar that the Guard squadrons have never had before.

Instead of the aging AIM-4s and early-model AIM-7/9s in use today, strategic air defense F-15s and F-16s will carry the latest in missile technology, including the all-aspect look-down/shoot-down AMRAAM. These missiles will provide greater reliability, maintainability, and much higher probability of kill.

In the 1982 William Tell weapons meet—which included the most difficult profiles ever attempted in the history of the event—F-15s won three of four competition events. In addition, five of the six top-scoring teams and all five competitors for the "Top Gun" award were flying F-15s. Although F-16s did not compete in this William Tell, their performance in future competitions is expected to be outstanding.

The F-15 has a true all-weather, look-down/shoot-down capability. Although both the F-4 and F-106 have a limited look-down/shoot-down capability, they fall far short of what is needed against a high-speed bomber flying on the deck at night or in bad weather. When equipped with AMRAAM, the F-16 also becomes an all-weather look-down/shoot-down fighter-interceptor.

There will be eleven ANG and four active-duty fighter-interceptor squadrons. Therefore, ANG interceptors will continue to provide the bulk of today's strategic air defense force. The eleventh Guard F-4 squadron at Duluth IAP, Minn., will

Many of the older interceptors have been replaced with more modern aircraft. ADTAC F-15s and F-16s will carry the all-aspect AMRAAM missile.

be operational in 1984. These dedicated forces are few when compared with the sixty-nine fighter-interceptor squadrons maintained in the late 1950s. Given other commitments worldwide and budget constraints, we are unlikely to see air defense forces of that magnitude again.

Navy, Marine, and TAC general-purpose fighters are tasked to augment ADTAC in air defense of the United States. If increased readiness conditions went into effect, augmentation forces would be made available to NORAD to fight alongside ADTAC. Augmentation forces train with ADTAC and follow the same rules of engagement.

Improved Command And Control

The new look in air defense includes significant improvements in command and control. The Semi-Automatic Ground Environment (SAGE) system introduced in the 1950s provided the basic air defense command and control network for twenty-five years. In 1983, SAGE was replaced with the Joint Surveillance System (JSS) of Region Operations Control Centers (ROCCs). The JSS includes a ring of forty-seven CONUS radars whose data are shared by the Federal Aviation Administration (FAA) and the Air Force. These sites provide both peacetime air traffic data necessary for FAA daily operations and the data needed by the ROCCs to perform the North American peacetime air sovereignty mission.

In Checkered Flag deployments, crews operate from hundreds of smaller airfields that had been overlooked before. The facilities are limited, but would be adequate in case of war.

The United States is divided into four NORAD air defense regions. These four will be tied with the two Canadian regions and one Alaskan region to complete the NORAD air defense command and control network for North America. Day-to-day peacetime surveillance will be maintained from the ROCCs. During increased readiness, each ROCC could be augmented by airborne E-3 AWACS aircraft. This combination of air and ground C² systems will enable fighters to locate and intercept incoming bombers with greater accuracy and at greater range than was possible under the SAGE system.

Radar coverage and early warning on the US east, west, and south coasts will be greatly enhanced when the Over-the-Horizon Backscatter (OTH-B) radar system becomes operational later in this decade. This system will detect aircraft beyond the line of sight, out to approximately 1,800 nautical miles. Construction of the first sixty-degree sector of the East Coast OTH-B is under way.

Northern radar coverage, where auroral conditions would make an OTH-B inadequate for full-time surveillance, is currently provided by the Distant Early Warning (DEW) Line of 1950s-vintage radars deployed across Alaska, Canada, and central Greenland. The DEW Line, which became operational in 1957, will be replaced by the North Warning System (NWS). The NWS, which complements OTH-B, will deploy a mix of long-range minimally attended radars, short-range unattended radars, and upgraded communications. These new systems will offer improved coverage and radar performance and greater reliability at a significantly reduced

annual operations and maintenance cost. The NWS will overlap with OTH-B coverage to provide a contiguous atmospheric early warning barrier around North America.

Realistic Training

In the past two years, ADTAC initiated several Flag programs. Two of the most effective have been Checkered Flag and Copper Flag.

In past years, air defense flying exercises were conducted either from the squadron's home airfield or from its alert detachment base. Although convenient, these locations, with their full communications and support capabilities, did not provide realistic wartime training environments.

With the advent of the ADTAC Checkered Flag program, air defense aircrews and support personnel deploy and train at airfields that have shorter runways and fewer facilities than those used on a daily basis. Checkered Flag has opened up hundreds of previously overlooked airfields from which strategic air defense forces could fight. ADTAC has also evaluated the practicality of using selected segments of the interstate highway system as landing strips during wartime emergency. State governments, local communities, and the FAA have been supportive of every effort to make the Checkered Flag deployments more effective.

Checkered Flag deployments of up to six aircraft are routinely scheduled to support NORAD exercises that test the ROCCs' ability to exercise command and control of widely dispersed fighter forces in a wartime scenario. Checkered Flag is a regular part of each squadron's annual program and provides excellent training for all personnel.

A second new program, Copper Flag, began in 1982. It is a two-week strategic air defense exercise held three times a year at Tyndall AFB, Fla. Blue force participants include active and ANG fighter-interceptor squadrons and TAC, Navy, and Marine Corps augmentation forces. These fighters fly missions against B-52, EF-111, EC-130, EA-6B, and other aircraft equipped with chaff and electronic countermeasures to realistically simulate the bomber threat as well as against numerous fighter and trainer aircraft. Targets fly at a variety of altitudes and speeds during day and night. The exercise is proving to be one of the most demanding and rewarding ever conducted, with aircrews, battle staff, and weapons controllers training against realistic targets.

The Future

The future of strategic air defense looks brighter than at any time in recent history. New fighters, armament, communications, and radars are modernizing forces that needed overhauling. New systems, such as the E-3 and JSS, offer capabilities not available in previous command and control systems. Future systems, such as OTH-B radars, NWS, and AMRAAM, will add even more capability to strategic air defense forces. The next few years will see transition into modern aircraft completed as ANG air defense squadrons acquire the F-15 and F-16.

This is the capable strategic defense force that will face the growing Soviet bomber threat for the remainder of this century. ■

Lt. Col. Donald D. Carson, USAF, is currently assigned to the North American Plans Division at Hq., Tactical Air Command, Langley AFB, Va. The author of several books and numerous magazine articles on aerospace topics, Colonel Carson has extensive experience in air defense planning and operations, including service as the Chief of Air Defense Plans/Chief of Staff, Air Defense, Tactical Air Command (ADTAC). A veteran of 131 combat missions in Southeast Asia, Colonel Carson was the Education With Industry trainee at AIR FORCE Magazine during 1973-74.

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Space Systems Division,
Valley Forge, PA.



Airpower Made D-Day Possible

By Gen. T. R. Milton, USAF (Ret.), CONTRIBUTING EDITOR

The battered Luftwaffe didn't show up, so the invasion force was not threatened from the air.



Somehow or other, forty years have slipped by since The Sixth of June. It was a day unique in history, the likes of which the world will never see again. More than 5,000

ships had moved out of clogged British harbors the evening before, an armada headed for an uncertain fate. The enemy just over the horizon knew an invasion was coming, either in Calais or Normandy, and the English-language broadcasts from across the Channel predicted a sad end for the invaders.

The actual date of the invasion was a closely held secret. Certainly, those of us out in the hinterlands had no precise knowledge of when the great event was to come off, and we were forbidden to speculate. To make that point clear, a major general, after an indiscreet remark in a London hotel, was summarily demoted to colonel and shipped home. The date of D-Day was definitely not a subject for casual conversation.

Late in the spring of 1944, however, word came that General Eisenhower was going to visit our station at Bassingbourn, and we divined a connection with coming events. Group commanders and senior staff types converged in great anticipation, for the Supreme Allied Commander was the most important star in our firmament. General Ike arrived in style, on a special train with a flatcar that bore his limousine. The car rolled down its ramp, small Allied flags fluttering from the hood ornament, Miss Kay Summersby at the wheel. She was not, we observed, your run-of-the-mill Army driver.

When we assembled in the Officers' Mess to hear what the Supreme Commander had to say, General Eisen-

hower was brief and superbly eloquent. He thanked us for what we had done and then went on to speak of the critical days ahead when he expected an even greater effort. If there were any airplanes seen on D-Day, he said, they had better be ours.

For us, it was a stirring moment. Whatever people may have thought of Ike's rhetoric later on, that day he was a superb motivator. Up until then, the invasion had not been very much on our minds. We had been fighting an air war for two years, and the RAF had been for far longer than that. Airmen had become used to thinking of Europe, from Norway to the Med, as enemy territory, with England as our

While the celebrations this June are rightfully focused on those courageous men who landed in Normandy, the air forces should at least come in for a moment's thanksgiving.

sanctuary, a sanctuary thousands had failed to reach. At last, the bad days of 1943 were behind us, and things were definitely looking up. Still, the war seemed to have an interminable future. When this exalted figure told us of an invasion of Europe, we knew that D-Day was not far off.

The teletype started clacking at Bassingbourn and at all the other air stations late in the evening of June 5. Although it was almost a nightly occurrence, this machine typing out where we were to fight the war the next day, this time it was different. The yellow paper rolled off the teletype literally by the yard. It was the order to end all op-orders, the one for the invasion of Europe. Of course, we could not have known the agony that went into Ike's decision to go ahead on The Sixth of June. Weather had forced a cancellation the day before,

and the Channel weather was still treacherous, but the landings needed a high tide and further scrubblings would doubtless have given away the plans.

So off they went, the thousands of ships and, that same night, a huge fleet of troop carrier airplanes, mainly C-47s, loaded with paratroopers and towing gliders. It took them more than two hours to cross London, an immense migration of birds. We stood outside in the soft English night and watched them pass. Our turn would come some hours later, when dawn broke over the coast of Normandy.

In one of the ironies of war, the death struggle on the Normandy beaches was in sharp contrast to the tranquil skies above them. Had it not been for a few bursts of inaccurate flak, we would scarcely have known we were over enemy territory. Instead, we were fascinated by the scene from our safe perch: Ships as far as the eye could see, smaller boats darting about on evasion courses designed to protect them from enemy bombers that never appeared, puffs of smoke our only indication of the desperate battle taking place below.

There has never been anything like that day. More than 9,000 Allied aircraft flew more than 25,000 sorties in the twelve hours ending at 0900, June 6. The Luftwaffe, meanwhile, presented with history's most vulnerable target, failed to appear. The months before D-Day had been hard ones for the Royal Air Force and the USAAF, but the effort had paid off. Deep strikes by the Eighth against oil and transportation, decimation of the Luftwaffe in the air and on the ground by our fighters, and the marvelous precision of the Ninth Air Force medium bombers against airfields and bridges had made it all possible.

And so, while the celebrations this June are rightfully focused on those courageous men who landed in Normandy, the air forces should at least come in for a moment's thanksgiving. Without air supremacy, the invasion of Normandy would have been an unimaginable disaster, D-Day a time for mournful reflection. ■

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Problem: Develop a longer-lived sensor for measuring exhaust gas temperature of an advanced technology demonstrator engine.

Solution: Using fluidics technology, we designed a rugged sensor to survive the corrosive, hostile environment of an afterburning jet exhaust.

Missile Systems

Problem: Solve the flutter problems of Mach 3 missile control surfaces.

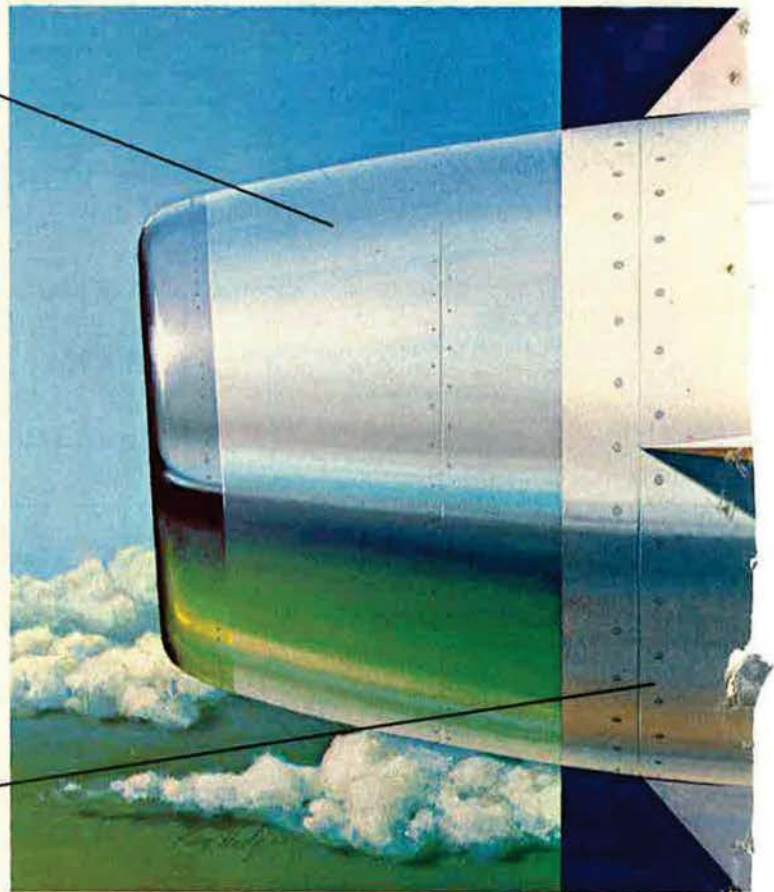
Solution: Using sophisticated modeling techniques to analyze flight dynamics, we designed, built and demonstrated—within three months—an extremely high response (50Hz) pneumatic fin actuation system at a lower cost than alternate approaches.

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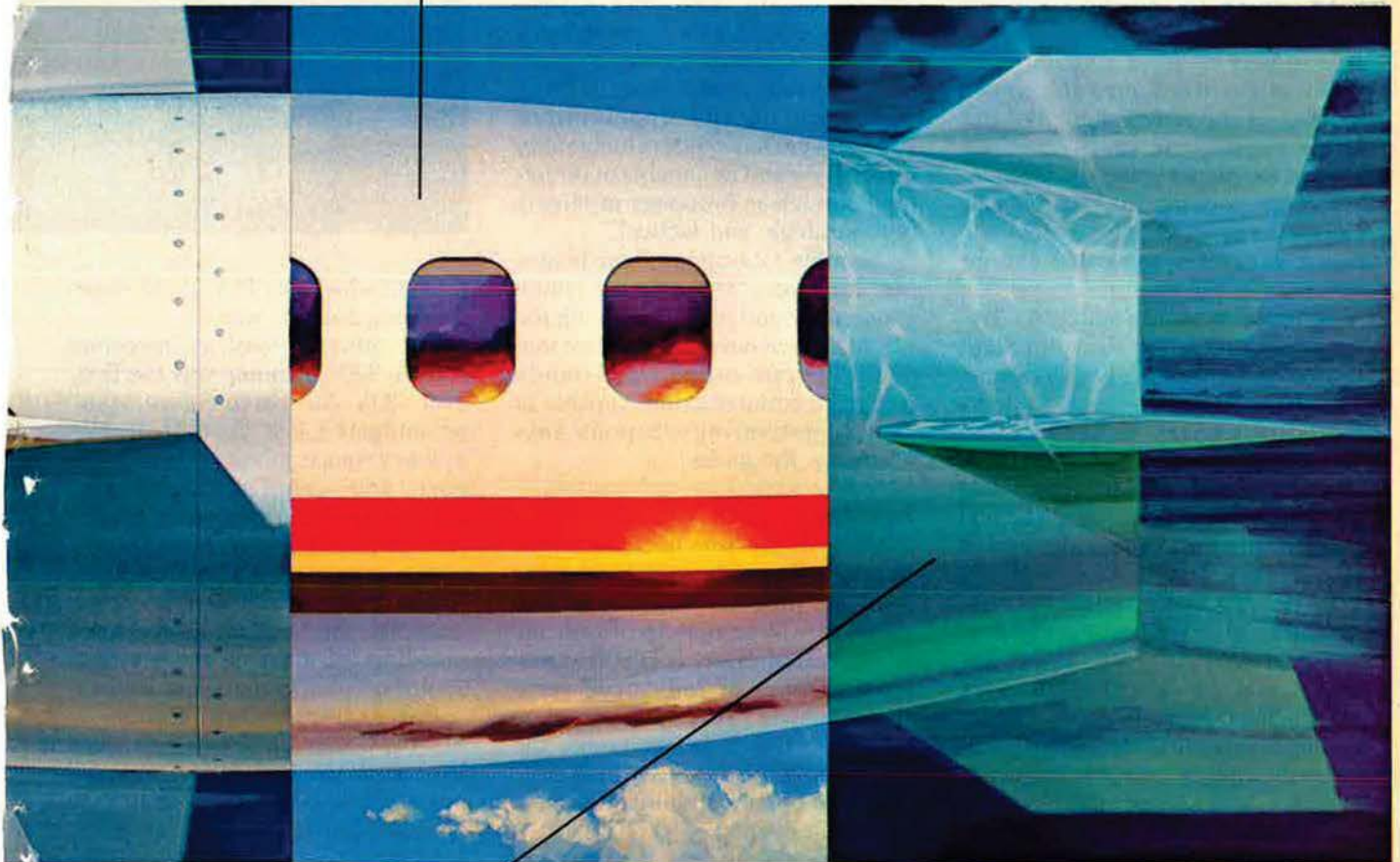
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BOLD NEW MISSIONS IN SPACE

USAF stakes out the transatmosphere and works up a revolutionary combat machine for quick deployment there.

BY JAMES W. CANAN, SENIOR EDITOR

OUR goal is to build a military flying machine that will be able to take off from a military airfield, insert itself into the upper reaches of the atmosphere and the lower regions of space, and go around the planet in ninety minutes. We're not looking for a cargo machine. We're looking for a killer Air Force weapon system that can go out and get the enemy."

In those words, Stanley A. Tremaine, Deputy for Development Planning at Air Force Systems Command's Aeronautical Systems Division (ASD), describes the Transatmospheric Vehicle (TAV) that USAF may well have available for space, strategic, and tactical combat missions before the end of this century.

In concert with aerospace contractors, Mr. Tremaine's shop at Wright-Patterson AFB, Ohio, has determined, he says, that "the TAV is feasible." Now, he says, "we're getting into a much deeper study of its configuration, possible missions, logistics, and supportability."

A contract for the TAV Phase Two investigative study of such elements was scheduled to be awarded as this issue of AIR FORCE Magazine went to press. ASD sent out its Requests for Proposals (RFPs) last March. Clearly, the TAV has transcended the pipe-dream stage.

Whatever its technological make-up, the TAV's potential combat at-

tributes already seem clear enough. It is shaping up as a revolutionary multirole weapon system. Its proponents see it as operating in lower space and in the upper atmosphere—perhaps interchangeably on the fly—and as capable of directing nonnuclear firepower at targets both strategic and tactical.

"Wouldn't it be great," postulates Mr. Tremaine, "if the Soviet Union suddenly found itself faced with the US Air Force having a machine that could operate on its own, totally free from counteraction, capable of rapidly delivering weapons anywhere on the globe?"

Impetus for TAV

USAF is far from deciding which missions would be suitable for the TAV or, indeed, whether it will need, or will be able to afford, the spacecraft-aircraft. It is still studying a number of "advanced aerospace vehicle" concepts, including the TAV. But it began taking the TAV idea more seriously, and talking more openly about it, following two main events.

One was President Reagan's so-called "Star Wars" speech of March 23, 1983. In it, the President stated his goal of a nonnuclear defense against ballistic missiles—a defense that would need to exploit space. This has evolved into the Strategic Defense Initiative (SDI) technology development and integration pro-



gram in which the TAV could someday play a major role.

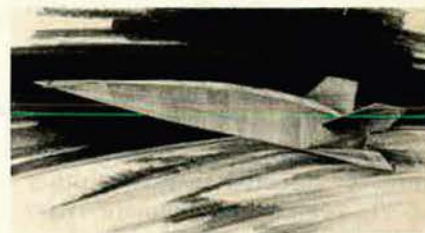
The other, at least as important spur to TAV planning was the first-ever "US Air Force Space Plan" promulgated last year. It divides military space missions into "support" and—more notably—"combat" categories. In its newly enunciated emphasis on developing space-combat doctrine and weapons, Space Plan puts USAF's official stamp on the longtime go-for-space pleadings of many of the service's senior officers and civilian leaders.

For example, Gen. Robert T. Marsh, Commander of AFSC, had long asserted that USAF "should move into warfighting capabilities in space—that is, ground-to-space, space-to-space, and space-to-ground capabilities."

Space Plan lays the doctrinal groundwork for all that. In its acknowledgment of USAF's need to be able to fight not only in but *from* space, it goes well beyond the 1982 long-range planning document, "Air Force 2000." The new Space



Artists' concepts of USAF's prospective multimission Transatmospheric Vehicle (TAV) show variants designed by Lockheed (left), Rockwell International (above), and McDonnell Douglas (below).



Plan (in its unclassified version) has this to say:

"To prevail in theater conflict, the Air Force must seize the initiative and quickly achieve both air and space superiority.

"Air superiority will require the capability to effectively attack and neutralize enemy airfields, destroy aircraft before they can employ their weapons, and destroy surface-to-air weapons.

"Space superiority is required to ensure that our space-based assets are available to support theater forces. Superiority in space will require a robust force structure and the capability to destroy hostile space systems."

Military superiority in space, in protection of force-enhancing satellites, is becoming ever more essential—in fact, downright mandatory—for the US. All manner of US satellites now do much more than enhance the effectiveness of US air wings, fleets, and divisions; those satellites have become those forces' *sine qua non*. As Chief of Naval Op-

erations Adm. James D. Watkins put it: "Satellites make fleets out of ships."

"The usefulness of space assets in support of military forces is far greater than we envisioned it would be ten years ago," declares Under Secretary of the Air Force Edward C. (Pete) Aldridge, Jr., the Air Force Secretariat's top official for space.

"We did not anticipate the number of communications satellites we would have and the degree to which we would depend on them," Secretary Aldridge continues. "Nor did we anticipate how extensively we would be utilizing space for targeting, command and control, navigation, and photo reconnaissance in support of arms control."

Especially noteworthy among new, highly sophisticated systems now being tried out in space are the DSCS III communications satellites and the Navstar Global Positioning System (GPS) satellites. The real eye-popper is yet to come—the constellation of Milstar multipurpose

satellites that, says Secretary Aldridge, "will essentially be the military command and control system for all the services."

Secretary Aldridge expresses concern that public attention to future weapons in space may detract from "an appreciation of the contribution and importance of the space systems we are now operating, as well as those we are acquiring for future operations.

"Almost all our space budget for the next decade will be dedicated to improving the kind of missions we do right now," the Under Secretary adds. "If and when we ever decide to pursue a TAV, it would not be able to operate without the communications, targeting, and weather support supplied by the less-glamorous space systems."

Safeguarding Space Systems

Protecting such space assets and many others on benign but classified missions against the amply demonstrated Soviet antisatellite (ASAT) capability is the goal of USAF's ASAT program. Arms-control developments or political pres-

sures may slow or undo that program. From philosophical and national security standpoints, however, the safeguarding of US satellites seems to have widespread acceptance as a justifiable, solely defensive measure.

There is a big difference, however, between using force only to protect space assets and applying force from space to shoot down bombers or ballistic missiles and even to shoot up runways and armor. This distinction is drawn—and thus inferentially underscored—in USAF's Space Plan.

It subdivides its candidly outlined "combat" category into two parts: "space control" and "force application." As defined by Maj. Gen. Neil Beer, Space Command's Deputy Chief of Staff for Plans: "Space control is synonymous with space superiority." Under this heading fall such strictly defensive weapons as USAF's F-15-launched, rocket-boosted, heat-seeking Miniature Vehicle (MV) ASAT weapon, now in the very early testing phase, and whatever directed-energy or other ASAT devices may ensue from AFSC-Space Command technology programs.

Force application is something else again, something far more portentous. Whereas space control means "counterspace operations" and "space interdiction," as stated in USAF's Space Plan, force application means "ballistic missile defense" and—strikingly—"space-to-earth weapons." And that, in turn, strongly implies future strategic and tactical missions from space.

"Let me add a word of caution," says Secretary Aldridge. "There are lots of implications here, in putting vehicles into space that can attack targets on the ground, that we haven't thought through as part of national policy and national security objectives."

Despite all such caveats, the TAV's potential as an enforcer in and from lower space cannot be ignored by USAF, and isn't. The TAV is no mere technological toy being tinkered with by ASD alone. As Space Command's chief planner, General Beer has been an active participant in the TAV's embryonic evolution. The Strategic Air Command, too, has become very interested in it.

Defining TAV

The TAV Phase I concept definition study was done for ASD by Battelle Memorial Institute in consultation with aerospace contractors Boeing, General Dynamics, Lockheed, McDonnell Douglas, and Rockwell. Each of the aerospace companies is expected to become involved in the TAV Phase II study as well, and each has its own ideas about what the TAV should look like and do.

Prior to the onset of the TAV concept program, Boeing had proposed a horizontal-takeoff spacecraft called the Reusable Aerospace Vehicle (RASV) and an Air-Launched Sortie Vehicle that would be launched from atop one of the company's 747 jumbojets. Both concepts were breeding grounds for TAV technologies.

"We're looking at several classes of vehicles," says Mr. Tremaine. "Basically, we want something that would fly off of a military airfield. One idea would be to run it along the ground and launch it off of some sort of surface-action machine."

Mr. Tremaine claims that the TAV will represent "no breakthroughs in physics." Its propulsion system will embody technologies "pretty much the same as we have now." Its aerodynamics technology will be much advanced, however, and it will mark "a revolution in structural materials," Mr. Tremaine asserts.

McDonnell Douglas spells out the

main elements of its TAV as "the aerodynamics of a slender cone, a propulsion system with the abilities of both an air-breathing jet engine and a rocket motor, and a fuel of liquid hydrogen and oxygen."

"The hydrogen and oxygen fuel is an attractive option for power to enable our version of the TAV to go in and out of the atmosphere," explains Paul A. Czysz, McDonnell Douglas's TAV program manager. Adds his deputy, Art Robertson: "It [the TAV] may need to take off, streak directly to a 100,000- to 500,000-foot flight path, and then descend into the atmosphere to fly more or less like a conventional aircraft—but at higher speeds."

In order to withstand the extreme heat that would build up on a hypersonic reentering TAV, McDonnell Douglas plans to use a metal radiator shield to reflect it, and is considering the use of heat pipes as well. It would put such pipes in sections of the TAV that are most susceptible to thermal effects. The pipes would "carry the heat to other areas, where it would dissipate," says Mr. Czysz.

The TAV's gross takeoff weight, allowing for an exceptionally heavy fuel load, is expected to approach or exceed one million pounds. At this juncture, no one can say just how big the TAV will be. Whatever its dimensions, it could serve as a bomber or a fighter. But many other missions beckon as well.

AFA Chapter to Salute Space Division's Thirtieth Anniversary

On June 29, AFA's Los Angeles Airpower Chapter will host its annual "Salute to Space Division." This year's Salute will honor the accomplishments and the commanders of Space Division and its predecessor organizations over the past thirty years.

Space Division's most remote ancestor, the Western Development Division of the Air Research and Development Command (which evolved into Air Force Systems Command), was established in Inglewood, Calif., in July 1954. In 1955, the Division was moved to the Arbor Vitae facility in Los Angeles, Calif. It was renamed the Air Force Ballistic Missile Division in 1957. Four years later it was divided into two separate organizations: the Ballistic Systems Division and the Space Systems Division. Ballistic Systems Division headquarters were established at Norton AFB, Calif., in 1962, while the Space Systems Division remained at the Los Angeles facility, which was redesignated Los Angeles AFS in 1964.

In 1967, the two Divisions were reunited and became the Space and Missile Systems Organization (SAMSO), with headquarters at Los Angeles AFS. On October 1, 1979, SAMSO was deactivated and two new organizations were established: the Ballistic Missile Office, headquartered at Norton AFB, and the Space Division, headquartered at Los Angeles AFS. Space Division and its predecessor organizations have been responsible for many of the technological advances that have changed the nature of military affairs over the past thirty years. That tradition will surely continue as the Air Force plans for its future in space.

Capabilities and Missions

An obvious one is reconnaissance on demand. In keeping with this, Lockheed, which has investigated hydrogen-powered aircraft for many years, developed its TAV concept as a follow-on to its SR-71 Blackbird, which already flirts with the exoatmosphere.

The Lockheed "Skunk Works" TAV program manager, Melvin "Gene" Salvay, says that while the Lockheed spacecraft-aircraft is "primarily engineered for high-altitude weapons deployment," it also could be "effectively used on reconnaissance missions or as a supersonic or subsonic cargo carrier."

Smaller than a C-5, the Lockheed vehicle would be 205 feet long and sixty feet high, with a wingspan of ninety-five feet. The company claims it would be able to carry payloads of up to 20,000 pounds in its cargo bay and fly at speeds of up to Mach 30 in a circular path around the earth at an altitude of 100 miles.

On a suborbital ballistic trajectory reaching a maximum altitude of 300,000 feet, the TAV could arrive in New York twelve minutes after takeoff from Los Angeles, the company predicts. Moreover, it says, a nonstop flight from New York to Sydney, Australia, reaching a maximum altitude of 375,000 feet, would take no more than half an hour. Subsonic flights at 40,000 feet would also be possible.

Lockheed sees its TAV as operated by a crew of two in "an ultra-modern cockpit featuring extensive use of CRT displays.

"Designed to function under current logistics practices of the Strategic Air Command and the Space Command, the Transatmospheric Vehicle could be developed in time for operations in the 1990s," the company claims.

Two great attractions of the TAV are its prospectively very quick takeoff time (maybe five minutes from the word go) and its presumptively unprecedented ability to execute "aerodynamic orbital plane changing" in the upper atmosphere or lower space.

Existing spacecraft—satellites and the Shuttle Orbiter—cannot manage such a maneuver because they are constrained by limitations of thrust and aerodynamics. Early versions of the TAV may not be able



USAF's antisatellite (ASAT) weapon, shown here in an F-15 centerline captive-carry test, is crucial to the execution of the "space control" mission delineated in the US Air Force Space Plan. The TAV would benefit that plan's "force application" mission.

to do it either. For openers, the TAV is being conceived as capable of traversing the globe in a suborbital trajectory. But TAV enthusiasts already have their sights trained on possible variants that would be capable of some very fancy space-flight featuring drastic "orbital transfer" alterations of flight paths and inclinations. Those variants would be capable of maneuvering much more freely in the transatmosphere than any space system now in being.

Doing What the Linebacker Does

McDonnell Douglas's Czysz disclaims any nuclear-attack notions or intentions for the TAV. "With it," he says, "we would be able to go completely conventional. We could do what every linebacker does: Sack the quarterback without destroying him—hit his throwing arm in many different ways."

Which ways? For example, by embedding needle-like kinetic projectiles into enemy tracking and fire-control radars, thus overwhelming their antennae, or by pranging titanium spikes into runways, along which no aircraft could thenceforth take off or land.

"We could avoid annihilating things—simply cause them not to function," Mr. Czysz declares. "We

would deny the enemy the ability to launch an attack."

Kinetic-energy weapons, such as railguns, do indeed seem to be on their way. In congressional testimony earlier this year, Dr. Richard D. DeLauer, Under Secretary of Defense for Research and Engineering, said that space-based kinetic-energy weapons could be used against Soviet ICBMs during their boost and midcourse stages.

As part of its five-year, \$26 billion SDI technology program, the Defense Department plans to flight-test "a number of kinetic-energy weapon designs," Dr. DeLauer testified. The development of such weapons will receive about \$5.5 billion over the next five years—roughly the same funding that the development of directed-energy weapons, such as lasers, will receive.

Lasers too could wind up in the TAV's weapons bay. But USAF officials refuse to speculate on this, or on most other aspects of the TAV.

"We're only in the exploration phase," says Brig. Gen. Robert D. Eaglet, AFSC's Deputy Chief of Staff for Plans and Programs. "We're looking at missions we might want to do with it in the future, as well as new, unprecedented missions it might make possible. We'll probably be in position

around next April to know enough about it to drop it, go low level, or get serious and go into more detailed considerations."

General Eaglet concedes that "a lot will depend on affordability." Right now, he says, the TAV "appears to be too expensive for production during this decade, or to the middle of the next."

Adds Secretary Aldridge: "I'm cautiously optimistic about the technologies of the TAV. I clearly support the technologists' way of thinking about it. But we don't want to proceed too rapidly with something we might not be able to use or afford."

Tough Choices

This raises a question that may well bedevil USAF, and indeed the nation, in the years immediately ahead: Are space defense and offense becoming so vital to national security as to demand top funding priority? Even at the risk of skimping on funding for tried-and-true terrestrial systems?

The affordability question is even broader than that. It may also entail tough choices of pace by USAF among nonspace systems, such as fighters, bombers, ICBMs, and airlifters.

Lessons learned about technologies and their integration in the Advanced Tactical Fighter (ATF) program would undoubtedly pay off in the development of the TAV. Moreover, many USAF officials believe that slighting the development of the ATF or dragging feet on the TAV will lead to disaster in the face of the growing Soviet technological and numerical threats in space and in all other combat arenas.

The harsh fact is that space may soon become the last, best place for the US to establish and maintain combat superiority—and for that, it will need combat machines that can traverse the transatmosphere.

In this vein, some officials now believe that a manned, highly maneuverable spacecraft-aircraft such as the TAV would give the US offensive and defensive capabilities in the twenty-first century, maybe sooner, that familiar bombers, fighters, and missiles will not be able to match. They see the TAV, or something like it, as the nonpareil ABM and ASAT weapon in years to come.

This raises still another question of growing concern to the Air Force: Will DoD's SDI program, as it picks up steam, coopt such programs as ASAT and, later possibly, the TAV that USAF must control in order to perform the extraterrestrial missions it has now set forth for itself?

That question also extends to many other USAF space development programs, including the hardening of materials against lasers and bringing on the Advanced Warning System satellites to supplant existing early-warning satellites.

Even though the SDI program is now headed by USAF Lt. Gen. James Abrahamson, formerly Deputy Administrator of NASA and head of its Space Shuttle program, USAF seems increasingly wary of SDI encroachment, the General's blue suit notwithstanding.

"The SDI people are looking for zingers—projects that catch the public eye," says one high-ranking Air Force officer, "and we have some. If we don't watch it, ASAT, for example, could wind up piggy-backing on SDI."

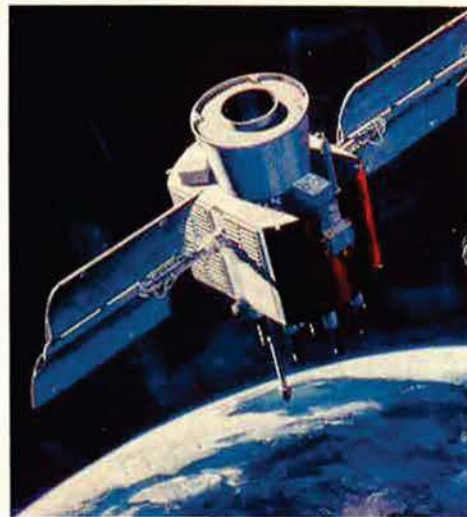
The other side of the coin is that the SDI program's solid backing by the White House and apparently growing support in Congress (presuming it continues) could actually add impetus to Air Force programs folded into it.

The Soviet Space Threat

Amid all the shaking down of US plans for space, one thing is abundantly clear: The Soviet threat in that medium is all too real and forbidding.

In his report to Congress last April justifying continued testing of USAF's F-15 ASAT weapon and arguing against immediate negotiations for an ASAT treaty, President Reagan spelled out that Soviet threat.

His report reaffirmed that the Soviets have an operational ASAT system that could be used any time, quick off the mark, against low-orbiting US satellites. Moreover, it said, the Soviets are testing land-based lasers of probable ASAT capability, and could also use, as ASATs, their nuclear-armed Galosh ABM interceptors now emplaced around Moscow. They also could bring electronic warfare to bear



Protecting new force-enhancing space systems, such as the DSCS III satellites (top) and Navstar GPS satellites (above), is a prime USAF mission.

against US space systems, and are believed to be developing a high-altitude orbital interceptor, said the report.

"There is no doubt that the Soviets have the technology for high-orbit ASATs," declares Maj. Gen. J. H. Storrie, the boss of USAF's Space Directorate under the Deputy Chief of Staff for Plans and Operations at the Pentagon. Rhetorically, General Storrie asks: "What would our reaction be if the Soviets decided to use one [an ASAT weapon]?"

The Soviet threat goes way beyond ASATs. Its dimensions are starkly summed up in the 1984 edition of the DoD document, *Soviet Military Power*, as follows:

"A major Soviet objective is to expand warfighting capability in space and achieve a measure of superiority in that arena. . . . It is clear the Soviets are striving to integrate their space systems with the rest of their Armed Forces to ensure superior military capabilities in all arenas."

The threat is also spelled out in the "Military Posture" statement for FY 1985 that the US Joint Chiefs of Staff presented to Congress early this year. Noting that the Soviets' annual space budget growth rate of fifteen percent has exceeded the growth rate of their overall military budget, the report goes on to say:

"Most of their space effort is purely military, with much of the remainder being joint civil-military programs. The Soviets have developed a substantial logistical base, which includes active launchpads, mission control sites, and space support ships.

"The Soviets also have a significant production capability and a large inventory of satellites and launch vehicles, which provide them with a capability to place large numbers of satellites in orbit quickly.

"This capability has allowed the Soviets to sustain an average annual launch rate of more than 100 satellites during the past few years. Part of the difference in launch rates between the United States and the Soviet Union can be explained by the longer average lifetime of US satellites. In recent years, however, the Soviets have made significant technical advances in their satellite programs.

"The USSR has achieved a two-to-one advantage over the United States in manned space days. . . . The Soviets have already demonstrated a number of the capabilities needed to support a manned space station.

"Research and development, reconnaissance, operation of weapons and sensors, and other military missions could be performed from such stations.

"The introduction of a Soviet reusable, manned orbital ferry is expected by the late 1980s."

Pulling Together

In stark contrast, the US launched only nine military satellites last year, is only now beginning to plan for a purely civilian-manned space station, and is fast becoming overly dependent on the Shuttle Orbiters as its means of launching military satellites. The Pentagon's production base for satellite-launching rockets will disappear next year unless their funding is resumed. Such

a loss, Secretary Aldridge flatly predicts, would be "disastrous" for the military space program.

There are, however, heartening signs. USAF's Logistics Command is beginning to work with Space Command and AFSC in devising space-support architecture and techniques. More broadly, all USAF commands with a vested interest in space have begun pulling together, as General Eaglet puts it, "quite well."

"The military exploitation of space has gained broad acceptance, and we are no longer reluctant to exploit it," General Eaglet declares. Adds General Storrie: "We are moving out in this place called space."

General Storrie's Space Directorate at the Pentagon is destined for extinction, as originally planned. The process began with the formation of USAF's Space Command in 1982 and of the Naval Space Command last year. Now, with an eye to a Unified Space Command involving all the services, the Joint Chiefs of Staff have set up the Joint Planning Staff for Space at the Pentagon under USAF Maj. Gen. Thomas Brandt, formerly Space Command's Deputy Chief of Staff for Intelligence. That staff, says General Storrie, "makes up the core of the [coming] unified command, which will put my shop out of business."

The job of the Joint Planning Staff for Space is a big one. As enunciated by USAF, it involves:

- Analyzing the responsiveness of space systems to the National Command Authorities (NCA) and the JCS, and mission support to the unified and specified commands.

- Recommending assignments of operational commands for Department of Defense space systems and forces.

- Coordinating the development of plans and memoranda of understanding for space systems supporting joint operations as directed by the JCS.

- Taking part in reviews of the CONPLANS and OPLANS of commanders in chief that are supported by DoD space operations.

- Developing and coordinating joint space policy, strategy, mission areas, and doctrine.

- Coordinating the development of DoD space systems to preclude

their duplication and to make sure they are interoperable.

- Factoring space into JCS exercises.

Separate Space Service?

Looking beyond the Unified Space Command, now taken as a given, some officers in all the services and at least a few officials at the DoD and White House levels foresee the creation of a fourth branch of the military: a US Space Force.

"It is a very good possibility," asserts General Eaglet. "In fact, it's a likelihood. Space is a medium, just like air, sea, and land, and there are a lot of things different about space. So why not a separate force for it?"

General Eaglet and most other like-minded officers doubt, however, that the Space Force idea will build up "any serious momentum," as he puts it, "within the next ten years." Some, however, see it coming sooner.

For example, one Administration official involved in planning for force application from space believes that "the SDI program could be the catalyst for the Space Force as a means of bringing together all the R&D elements [of the program] and getting a handle on the production and deployment of [its] systems."

For the moment, it seems sufficient that the Air Force has come to grips with exploiting space as a combat medium. Space Command, asserts General Beer, is "on the rise—we have great support and the right people in the right place, and we are excited."

It is, however, crunch time. "Where we will be in space twenty years from now will be dictated by the decisions made and the actions taken in the next one to five years," General Storrie declares.

This assessment is especially pertinent to decisions and actions on how, and with what, to apply force in and from space. "Ten years in the future, I would think that our space menu for force application will be as filled out as our other mission categories are now," General Eaglet predicts.

A lot may be riding on whether that menu contains a maneuverable, manned weapon system such as the Transatmospheric Vehicle. ■



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WE UNDERSTAND HOW IMPORTANT IT IS TO LISTEN.

SOVIET MILITARY POWER, 1984

From genetic engineering for military purposes to a revamping of the Soviet tactical air forces, the buildup is relentless—and ominous.

BY EDGAR ULSAMER
SENIOR EDITOR (POLICY & TECHNOLOGY)

THE USSR has greatly increased its offensive military capability and . . . significantly enhanced its ability to conduct military operations worldwide." In turn, the "Soviet buildup is made possible by a national policy that has consistently made military materiel production its highest economic priority," Secretary of Defense Caspar W. Weinberger asserted in the Preface of the recently released *Soviet Military Power, 1984*, the free world's most comprehensive and authoritative assessment of Soviet vs. US military capabilities.

The new report, the third in as many years, provides a panoramic review of Soviet military activities and the geopolitical strategy associated with them, and the makeup of "STAVKA," or the National Command Authority, that governs both. While documentation of numerous new and expanding Soviet military programs is thorough, the unclassified *Soviet Military Power, 1984* again contains no satellite photography. Senior Pentagon officials are known to have urged the US intelligence community to consent to the release of some "overhead" evidence of Soviet weapons development and deployments to boost the credibility and impact of this annual report on the Soviet threat, especially for European and other foreign readers. The contention is that such photographs could be reproduced in a way that would not compromise sensitive data on the quality of such US intelligence products. The intelligence community presumably did not concur.

Ominous Buildup

Soviet Military Power, 1984 brings out significant and ominous details concerning force levels and advanced weapons developments. For one, the Soviets last year fielded two new classes of submarines, bringing to eight the number of submarine types being produced at this time. Three different strategic bombers are in development or production. Five new long-range cruise missiles are being developed. A new SLBM, the fully intercontinental SS-N-20 carrying up to nine warheads, has just achieved full operational status while a completely new, very large design, the SS-NX-23, has entered flight-testing.

Soviet ballistic missile defense capabilities have advanced to the point where a nationwide system can be fielded "relatively quickly." Heavy investments in directed-energy weapons might enable the Soviets to develop prototypes of ground-based lasers suitable for ballistic missile defense by the late 1980s, and of space-based particle-beam weapons in the late 1990s.

Testing of a prototype laser antisatellite weapon might occur in the late 1980s while the prototype of a space-based particle-beam weapon initially capable of disrupting and, eventually, destroying US military satellites might become a reality early in the next decade. Directed-energy weapons of a tactical variety are even further along, with a "territorial-defense laser" probably under development and ready for operational deployment as a point-defense weapon between the mid and late 1980s. Lasers of this type, the report suggests, will probably be able to inflict structural damage on aircraft at close ranges and to "cause electro-optical and eye damage at greater distances." Also, by the 1990s limited initial deployment of airborne lasers designed for anti-satellite defense, protection of aircraft, and cruise-missile defense is likely. Intensive Soviet efforts in the field of radio-frequency weapons operating in the microwave and millimeter-wave bandwidths are about to yield prototypes of systems that "not only could damage critical electronic components but also inflict disorientation or physical injury on personnel." In the novel field of genetic engineering, the Soviets are working toward improving the effectiveness of disease-causing biological warfare agents.

In the military space arena, the Soviet Union is developing a number of new launch vehicles, including a reusable space plane, a heavy-lift vehicle capable of placing payloads of more than 330,000 pounds into low-earth orbits (about five times the maximal US capability), and at least two versions of manned space stations. Within the next two to three years, the Soviets are expected to put into orbit a permanently manned space station capable of accommodating up to twelve cosmonauts. In the 1990s they are likely to deploy a very large modular space station that could house as many as 100 people.

Such a station could be used as a stepping-stone to interplanetary exploration, but the Soviets, the Defense

Department document suggests, are likely to use it for "command and control, reconnaissance, and targeting functions." In the view of US intelligence experts, such a space station, "during wartime, could perform . . . more offensively oriented missions as well." The US document suggests that the Soviets have embarked upon a long-term, broad-based effort to expand their operational warfighting capability in space.

The Soviet Military Establishment

The role of the Soviet Communist Party in the operation of the USSR's military establishment is pervasive. The CPSU controls military concepts, resources, and senior personnel, according to *Soviet Military Power*. The top Party leadership establishes military doctrine and approves military strategy, in the main through the the USSR Defense Council, which is the senior and most critical decision-making body for all aspects of



ABOVE: Important new launch and support facilities at the Tyuratam Space Complex are nearing completion. **RIGHT:** Soviet sailors recover the new Soviet space plane.



national security policy. In peacetime, the Council's power over the Armed Forces is exercised directly through the Ministry of Defense and the Soviet General Staff. The Defense Council's authority covers virtually all major military issues. The senior cadre of Soviet political, military, and economic leaders makes up this body's membership.

In an administrative sense, the Ministry of Defense is at the center of the peacetime military command structure and is responsible for building and maintaining the country's Armed Forces. The top level of authority in the Ministry includes Marshal D. F. Ustinov, three First

Deputies, and eleven Deputy Ministers, the highest-ranking of whom is the Chief of Staff, Marshal N. V. Ogarkov. In addition to the Deputy Ministers who are commanders in chief of the five services, other ministers and chiefs are responsible for such fields as civil defense, rear services, military construction, and technological matters. Marshal Ustinov serves as the principal link between the military and CPSU. The Chief of the General Staff is the military leader who heads the unified military establishment and who oversees the chiefs of the five services.

The General Staff is the key link between the political leadership, especially the Defense Council, and the Armed Forces themselves. For one, it is responsible for translating strategy, doctrine, and policy into action. These command responsibilities, the US intelligence community believes, make Marshal Ogarkov the single most important individual in the day-to-day operations of the Armed Forces.

In wartime, the STAVKA, or headquarters of the Supreme High Command (VGK), would exercise control over all military operations, with the Supreme Commander in Chief—the CPSU's General Secretary—serving as its chairman. The STAVKA would control the Armed Forces through intermediate-level commands established in given Theaters of Operation (TVD). The TVD commander, a subordinate of the General Staff and the Supreme High Command, would control the forces, such as fronts, armies, and fleets, within his area of jurisdiction. Within the Soviet Union proper, the military districts provide the VGK with control over a range of domestic wartime functions—such as mobilization, civil defense, and air defense—designed to limit disruption of the rear. The Soviet Union is organized into sixteen military districts that in effect are extensions of the Ministry of Defense.

The Soviets, thus, have in place a military command structure that is dominated and controlled by the CPSU and fine-tuned for smooth transition to wartime operations with minimal disruption.

Changing Doctrine and Strategy

The Soviet leadership, especially its military element, has always recognized the grave consequences of nuclear war. Over the past twenty-five years, however, Soviet nuclear doctrine has undergone significant modifications in the wake of fundamental advances in Soviet strategic capabilities, according to the *Soviet Military Power* document. The USSR's dogma of the 1960s posited that any war with the US, *eo ipso*, would be nuclear from the outset. Since then, it has undergone a couple of facelifts: In the 1970s, Moscow expanded its doctrine to allow for the possibility of a conventional phase in a NATO-Warsaw Pact war. It appears now that the Soviets think that such a conflict could remain non-nuclear.

The best available evidence, nevertheless, suggests that current Soviet military doctrine and strategy for global war continues to revolve around the assumption that any conflict between the USSR and this country could easily escalate to nuclear levels. By extension, an effective nuclear strategy and force execution by Moscow would decide the outcome of such a conflict. At the same time, Soviet military doctrine remains wedded

to the recognition that territory can be held only with troops and that—even on a nuclear battlefield—final victory could be won only by ground armies reaching and controlling their ultimate objectives. Concomitantly, Soviet doctrine prescribes continuing conventional arms offensives during and after any nuclear phase of a general war.

Translated into generic target planning, the Soviet doctrine aims at the preemption of the adversary's nuclear delivery systems as well as his command control and communications, air defenses, and politico-administrative centers. The specific war aims of the Soviets seemingly concentrate on ensuring the continuity of Communist control over the surviving elements of the military, police and internal security organs, and the population. Another central Soviet objective is to minimize losses to the national infrastructure, in the main the Party's leaders, scientific-technical elites, and other es-



Some 250,000 KGB troops are used primarily for international operations and to seal Soviet borders.

sential personnel, as well as—to the extent possible—to the general population and the economy. Linked to these goals is the ability to repair crippling damage, organize recovery, and provide for the continuity of the Soviet politico-military-economic system.

Other crucial components of this strategy are defeat and occupation of NATO and use of Europe's economic assets to expedite Soviet recovery, neutralization of the United States and China by disorganizing and destroying their military forces, and domination of the postwar world in which "socialism" will have replaced "imperialism" as the basic politico-economic system.

A Militarized Soviet Society

The entwining of the CPSU with the military establishment makes the latter a fundamental part of the Soviet system and Soviet society. The Armed Forces are meant to provide both external and internal security. They include—in addition to the five combat services—the troops of the Committee of State Security (KGB) and the Ministry of Internal Affairs (MVD).

According to the new US document, the KGB forces

consist of at least 200,000 to 250,000 border guards and another 30,000 to 50,000 troops assigned to special units charged with providing reliable and secure communications to top Party and government entities. The KGB forces are equipped with tanks and artillery, enabling them to seal the country's borders and to engage, as was the case in the late 1960s during border clashes with the People's Republic of China, limited numbers of foreign troops.

The MVD, whose strength is pegged at thirty divisions at present, is meant to back the police in case of internal disturbances as well as to guard the *gulags*, or concentration camps, and the inmates working on forced-labor projects.

The roots of the special relationship between the Communist Party and the military go back to the October Revolution. M. V. Frunze, the Bolshevik military leader who replaced Leon Trotsky in 1925 as head of the Red Army, captured the nature of this special relationship when he called for the "militarization of the entire population." The Soviet law on Universal Military Service and paramilitary training for Soviet citizens of all walks of life have translated Frunze's prescription into reality. Every male citizen is subject to military service until age fifty.

The Universal Military Service system, in turn, is supported by a vast military-educational complex designed to prepare young people for military service as early and as extensively as possible. Grade-school children learn about the military through visits to war memorials, through class projects that teach them about war heroes and the campaigns of local military units, and by direct contact with forces stationed in the area. Soviet youngsters in the eight- to fifteen-year-old group generally join the Pioneers, an organization controlled by the CPSU. The Pioneers imbue youngsters with promilitary attitudes and discipline. In addition, there is DOSAAF, the Volunteer Society for Cooperation with the Army, Aviation, and the Fleet that most Soviet youngsters join at age fourteen. DOSAAF consists of more than 330,000 units scattered throughout the country and a membership of more than 80,000,000. This organization provides comprehensive preservice basic training to Soviet youngsters and is being run by Soviet Fleet Admiral Georgiy M. Yegorov.

The general public also participates in a nationwide civil defense program. Civil defense is managed by the Ministry of Defense and is led by an active-duty general officer.

As a result of this comprehensive militarization of the general population, the USSR has in being a military manpower pool of about 50,000,000 reservists, according to US estimates. Of this total, some 9,000,000 have completed their active-duty stint—a minimum of two years—within the last five years.

Detailed mechanisms and procedures are in place to mobilize and sustain these reserve forces—along with the active-duty force—under a variety of wartime contingencies. The mobilization system also integrates the military, government, economy, and general population and can move the Armed Forces from a peacetime to a wartime footing relatively rapidly. The mobilization system includes an extensive network of "military commissariats" that combine the functions of US draft

boards, Armed Forces Reserve Centers, and the Veterans Administration. These commissariats are controlled by the General Staff.

In a general mobilization, this system could bring several million reservists and tens of thousands of trucks and other equipment into action in a few days. Additionally, entire support systems of the national economy can be brought under military control, including the national rail system, the nation's only but huge airline, Aeroflot, the merchant fleet, and elements of the national communications system.

Global Warfare Capabilities

In a global conflict, Soviet strategic policy seeks the destruction of Western nuclear forces on the ground and in flight to their targets and assurance of national survival even if nuclear weapons reach the homeland. Another strategic imperative is the ability to support and sustain combined arms combat in several theaters of military operations. Several overarching strategic missions ensue, according to US analysis: protection of the Soviet state, support of the land war in Eurasia, and checkmating of any US capability to conduct or support warfare at home and beyond this country's shores. These factors spell out a series of specific tasks that range from the destruction of Western strategic weapons and command and control systems to strategic defense. The Soviet strategic forces mirror these requirements.

The centerpiece of the Soviet offensive strategic forces is their ICBM component numbering 1,398 silos. About half of these have been reconstructed or extensively modified during the past five years to withstand strikes by currently operational US ICBMs.

These silos house the world's most modern ICBMs—the SS-17, in about 150 silos, the SS-18 Mod 4 in 308 silos, and the SS-19 Mod 3 in about 360 silos. The SS-18 and SS-19 ICBMs are at least as accurate and carry more Multiple Independently Targetable Reentry Vehicles (MIRVs) than the Minuteman III, the most modern operational US ICBM. The current force of SS-18 Mod 4s, by itself, could destroy more than eighty percent of the US ICBM force even when—in the interest of certitude—two warheads are targeted against each US silo, according to US intelligence estimates. The force of SS-19 Mod 3s has nearly identical capabilities. In addition, these missiles could be used against targets in Eurasia. This is also true for the SS-17s.

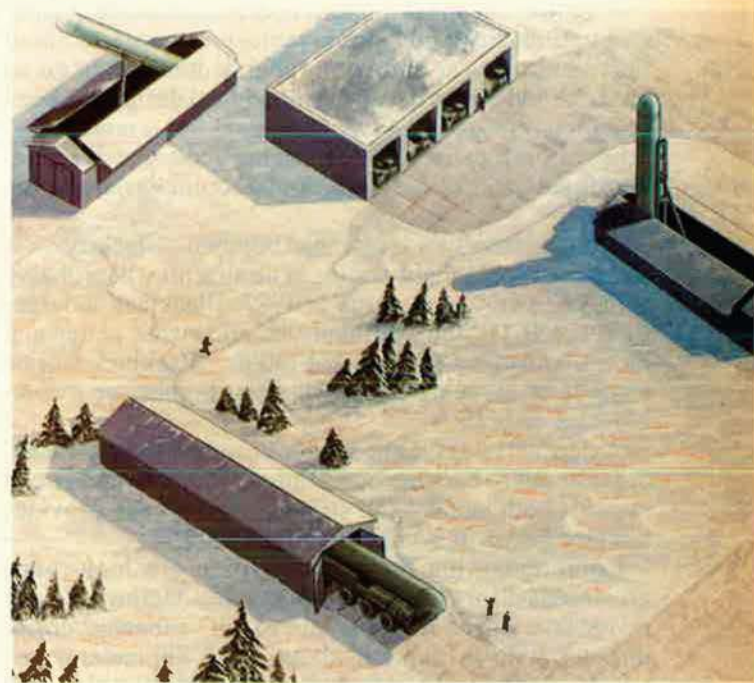
The remaining 580 Soviet ICBM silos house older ICBMs of the SS-11 and SS-13 type that could be launched against area targets in the US or Eurasia. The new US assessment suggests that no significant numbers of additional current-generation Soviet ICBMs will be deployed except for one further modified version of both the SS-18 and SS-19.

The Soviets are developing new, solid-propellant ICBMs with increased counterforce capability and survivability as a follow-on to the present generation of liquid-propellant designs. One of these new designs is the medium-size SS-X-24, which at first will probably be deployed in silos. This weapon, US intelligence believes, will be more accurate than the best current-generation ICBMs. Mobile deployment of the SS-X-24 might occur a few years after the system achieves initial operational capability in 1985.

The other new design, the SS-X-25, is approximately the same size as the US Minuteman. This weapon is apparently meant for mobile deployment, with a home base using launcher garages with sliding roofs. Massive, off-road wheeled transporter-erector launchers and associated mobile support equipment to allow for "refires" from these launchers are being developed for the SS-X-25.

As of March of this year, the Soviet SSBN (SLBM-launching submarines) fleet numbered sixty-four boats fitted with at least 986 nuclear-tipped missiles. This force is significantly larger than its US counterpart. In addition, the Soviets maintain a force of fifteen older submarines of this type that carry forty-five missiles and are assigned to theater missions.

Two-thirds of the ballistic missile submarines are fitted with long-range SLBMs that enable them to patrol in waters close to the Soviet Union—or even stay in home



The new Soviet SS-X-25 ICBM will probably be based in shelters with sliding roofs and be carried on transporter-erector launcher vehicles for mobility.

ports—and still strike targets in this country. Two of the Soviet SSBNs are of the *Typhoon* class, the world's largest submarine, one-third larger than the US *Trident* class. These submarines can operate under the Arctic Ocean ice cap, thereby adding to the protection afforded by the 8,300-kilometer range of the SS-N-20 SLBMs carried by the *Typhoon*. There is evidence that three or four additional *Typhoons* are under construction. By the early 1990s, the Soviets might have as many as eight of these advanced submarines in their operational force.

While the Soviets have removed ten older *Yankee-I* boats from service as ballistic missile submarines in accord with the terms of SALT II, these units have not been scrapped. There is reason to believe that they will be converted to other missions, such as attack submarines or cruise-missile launchers. SALT II limits the number of SSBNs to sixty-two and the number of deployed SLBMs to 950.

Strategic Aviation

Soviet strategic bombers and strike aircraft in peacetime are assigned to five air armies in a manner that permits rapid deployment against targets in Europe, Asia, and the US, according to the new DoD document. Current assets include some 170 Bear and Bison bombers, 235 Backfires (including 105 units assigned to Naval Aviation), 455 medium-range Blinder and Badger bombers, 450 shorter-range Fencer strike aircraft, and 530 tanker, reconnaissance, and electronic warfare aircraft.

As of late, the Soviets have shown a greatly increased interest in long-range strategic bombers. An entirely new variant of the Bear bomber (the H version, probably designed to carry long-range cruise missiles) is now in production. In addition, older Bear air-to-surface-missile-carrying aircraft are being reconfigured to carry the newer, supersonic AS-4 ASM in place of older subsonic missiles.

Backfire, the most modern operational Soviet bomber, continues to enter the inventory at a rate of about thirty units a year and will probably continue to do so until the end of this decade. The original design has been modified repeatedly. As a result, Backfire is now a long-range aircraft capable of performing nuclear-strike, conventional-attack, antiship, and reconnaissance missions.

A completely new long-range bomber—Blackjack—is now undergoing flight-testing. The aircraft will probably achieve operational status in 1987. Blackjack is larger than the B-1B and will likely be somewhat faster and have about the same combat radius. Blackjack will be capable of carrying cruise missiles, bombs, or a combination of both.

A new aerial refueling tanker based on the Il-76 Candid is about to become operational. This new tanker can support both tactical and strategic aircraft and provides a major boost in Soviet global mobility.

Complementing the bomber force are long-range cruise missiles. Five new designs are coming into the inventory. Three of these are small, subsonic cruise missiles with a range of about 3,000 kilometers, and which can be launched from sea-, ground-, and air-based platforms. The sea-based variant, the SS-NX-21, can be fired from standard torpedo tubes. The air-launched version of the small cruise missile, the AS-X-15, is expected to reach operational status later this year with deployment on the new Bear-H ALCM carrier aircraft. The ground-based variant is the SSC-X-4. It will probably achieve operational status next year. These three designs are slightly larger than their US counterparts.

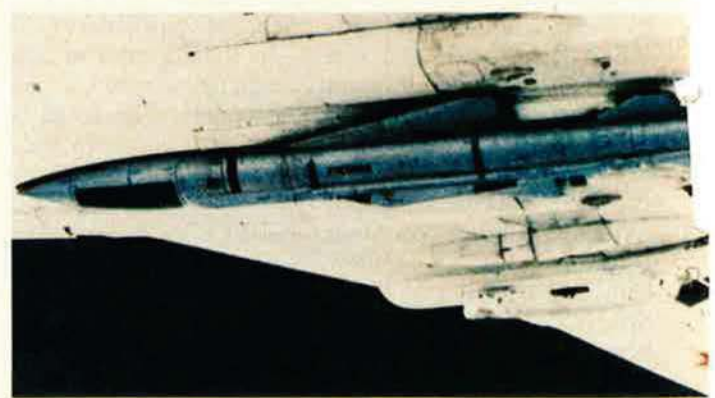
Two other new Soviet cruise missiles that have not yet been given a specific designation by US intelligence appear to be much larger than any existing or planned US cruise missile. (While the new US document does not say so, these missiles probably operate at speeds above Mach 2.) One variant of the thirty-seven-foot-long missile is meant for sea-launch while the other one is a ground-launched weapon. Both versions could become operational within two years.

At the outset, each of these five new Soviet cruise missiles will be fitted with nuclear warheads and will be capable of attacking hardened targets. But US intelligence expects that these missiles will eventually become accurate enough to permit the use of conventional war-

heads. If this happens, they would pose a significant threat to US and NATO airfields and nuclear weapons in a nonnuclear conflict.

Soviet Strategic Defense Capabilities

The Soviets, the US document points out, are in a position to field "relatively quickly" a nationwide anti-ballistic missile system. This ABM system involves sites deployable "in months rather than years" and consists of engagement radars, guidance radars, above-ground launchers, and high-acceleration interceptors. Large phased-array radars, along with congeries of older radars, are meant to complement this potentially nationwide ABM system. In turn, the ABM system is linked to an operational ballistic missile early warning system that includes a launch detection satellite network as well as over-the-horizon and large phased-array radars located primarily on the periphery of the USSR.



TOP: The submarine-launched SS-NX-21 cruise missile has a range of 3,000 kilometers and can be launched from standard torpedo tubes. **ABOVE:** A Backfire carrying the new supersonic AS-4 air-to-surface missile. Older Bear bombers are also being reconfigured to carry the AS-4.

Widespread deployment to protect important target areas in the Soviet Union could be accomplished within the next ten years, the new issue of *Soviet Military Power* asserts.

Protection against air-breathing threats, including

cruise missiles, is furnished by more than 7,000 radars of various types at about 1,200 sites. These systems provide virtually complete coverage at medium to high altitudes over the Soviet Union and beyond its borders as well as protection against low-altitude targets in high-priority areas in Western Russia.

The Soviets also appear to be working toward a network of satellites in geostationary orbit designed to provide real-time indications of SLBM launches. Such a network, the US intelligence community believes, could be operational by the end of the decade.

The current Soviet ABM system is being augmented by the SA-10 and SA-X-12 surface-to-air missiles, both of which can intercept some types of US strategic ballistic missiles. These systems could, under certain circumstances, add significant point-target coverage to the Soviet ABM capability.

Directed-energy weapons could play a major role in future Soviet ABM as well as antisatellite (ASAT) and air defense systems. US intelligence experts believe that the Soviets could have prototypes of ground-based lasers for ballistic missile defense ready for initial testing by the late 1980s. By the late 1990s, they might be able to start testing space-based prototypes of particle-beam weapons.

The Soviet ASAT system that has been operational for more than a decade uses a radar sensor and a pellet-type warhead to attack targets in various orbits during their first two revolutions. An intercept in the first orbit reduces the time available for a target satellite to take evasive action. The ground-based Soviet ASAT interceptors can reach targets orbiting at an altitude of "more than 5,000 kilometers" (about 3,125 miles) and are launched from the Tyuratam missile complex. Two launchpads and storage for spare interceptors and launch vehicles make it possible for the Soviets to launch several interceptors a day from either pad.

In addition to the orbital interceptors, the Soviets have two ground-based test lasers that could be used against satellites, the new issue of *Soviet Military Power* points out. They also have the means to "conduct electronic warfare" against US space systems.

US intelligence experts believe also that the Soviets are working toward setting up a network of ground-based antisatellite lasers. They could have a number of laser ASAT sites in operation within a decade. Alternatively, they might also deploy laser-equipped satellites either available for launch on command or maintained in orbit, or both. Such a system would obviously have significant advantages over a conventional orbital interceptor, especially through greater range, multishot capabilities, and greater capacity to overcome the target's defensive measures. The US intelligence community believes that the Soviets might test a prototype laser antisatellite weapon late in this decade and achieve operational status by the early 1990s.

The Soviet high-energy laser program got under way in the mid-1960s and is being carried out at numerous, tightly guarded facilities. Supporting this work is research and development involving such ancillary fields as efficient power sources and high-quality optical components. Especially noteworthy in this context is the development of a rocket-driven magnetohydrodynamic generator that produces fifteen megawatts of electric

power in a short burst. There is presently no Western counterpart to such a generator to provide a compact, lightweight power source for mobile or transportable laser weapons.

The Soviets are also working on laser weapons for air defense. Included are lasers intended for defense of high-value strategic targets in the USSR, another type tailored for point defense of ships at sea, and a third category designed for theater forces air defense. The territorial defense laser has probably advanced beyond the prototype stage and could be operational in about ten years. The schedule for the theater forces laser weapon is similar, while the shipboard weapon might take longer. Limited deployment of an airborne laser weapon could get under way in the early 1990s, and this could encompass such missions as antisatellite defense, protection of high-value assets, and cruise-missile defense.



The Soviets are augmenting their antiballistic-missile defenses by deployment of the new SA-X-12 surface-to-air missile. This missile system is capable of intercepting some types of US ICBMs.

Soviet Theater Forces

Over the past two decades, the Soviets have beefed up and upgraded their theater warfare forces in every category of weapon systems. This is true for all relevant ground, naval, and air components. In the case of the Soviet tactical air force, the modernization extends from high-performance aircraft to advanced theater missiles of increased range, payload, and accuracy. The massive infusion of advanced tactical weapons, along with changing political objectives, has led to significant adjustments in Soviet tactics.

The Soviets at this time probably envision as many as three main theaters for the Eurasian land mass: Western, Southern, and Far Eastern, each with a set of political objectives affecting military operations within the theater. Each main theater, in turn, is divided into "theaters of military operations" (TVDs) to facilitate operational command and strategic planning. In the case of the Western theater, encompassing all of Europe, there are three continental TVDs—Northwestern, Western, and Southwestern—and two maritime TVDs, one covering the Arctic and the other the Atlantic. This organizational approach makes it easier to match forces

and weapons with the specific political objectives in a given geographic region.

In the Western TVD, the war objective is to defeat NATO and to occupy Western Europe before it can be reinforced. This means a rapid combined-arms operation to reach the Atlantic in the shortest time possible. Soviet ground formations would have to advance at a rate of up to 100 kilometers per day. Second-echelon forces would reinforce rapidly any formations meeting stiff resistance from NATO forces. Operational Maneuver Groups (OMGs) would be expected to destroy enemy forces by means of sharp, deep thrusts. Augmenting the advancing Soviet ground forces would be attack helicopters to provide close air support and help maintain the momentum of the advance.

In addition, transport helicopters and aircraft would be used to inject airmobile and air-assault units rapidly and on a massive scale between fifty to 100 kilometers ahead of a main attack to disrupt the enemy, seize essential territory, and support operations by the OMGs. At the same time, Soviet special-purpose forces, known as SPETSNAZ, would be employed throughout Western Europe for reconnaissance, to disrupt communications, destroy bridges, seize chokepoints, and direct attacking aircraft to prime targets. Soviet air, missile, and naval forces would all be employed in support of these operations.

Under such a scenario, the Soviets would attach great importance to nuclear weapons, which they believe can have a direct influence on the course and outcome of a war. They also seem to recognize that their war aims can only be achieved by the combined operations of all forces in a systematic fashion, controlled by centralized strategic command authorities.

The Soviets allow for the possible escalation of a conventional conflict in Europe to nuclear dimensions and, therefore, have developed comprehensive plans either to preempt a NATO nuclear strike by launching a massive attack or to launch a devastating first strike against prime NATO targets. In the case of such a contingency, they would bring to bear ballistic missiles, rockets, nuclear-capable aircraft, and artillery for massed strikes against sets of targets extending from the battle line to the rear of the theater. The Soviets plan to continue their rapid combined-arms offensive against NATO after a nuclear strike or exchange and, therefore, have trained and equipped their ground forces for sustained operations in a nuclear environment.

Theater Nuclear Forces

Soviet emphasis of theater nuclear warfare, US analysts believe, drives the massive, steady expansion and modernization of their tactical medium- and long-range nuclear arsenal. As of the end of last year, the Soviets had deployed a total of 602 long-range theater missiles, compared to the twenty-five systems fielded by the US. The Soviet intermediate-range nuclear forces (INFs) consist of 378 SS-20s, of which 243 are deployed opposite NATO. The remainder of that force are older missiles, mainly of the SS-4 type.

The SS-20, a weapon that can deliver three MIRVed warheads over a distance of about 5,000 kilometers, is mobile and capable of on-road and off-road operation. These missiles, therefore, are hard to detect and to

target once they are deployed in the field. In addition, the Soviets have built up a stockpile of missiles for refire by the reloadable SS-20 launchers. *Soviet Military Power, 1984* estimates that the Soviets might increase the number of SS-20 launchers by fifty percent by the end of this decade, that they are working on improved models of the SS-20, and that, by the early 1990s, a new short-range ballistic missile will be fielded. In addition to the latter design, the Soviets are also working on long-range cruise missiles to further beef up their theater nuclear forces.

The Soviets also augment their land-based theater missile force with thirteen *Golf-II* and two *Hotel-II* class ballistic missile submarines. Each sub carries three SS-N-5 SLBMs. Lastly, the Soviets are modernizing their theater nuclear forces with the introduction of shorter-range tactical weapons. These include the 120-km-range SS-21, the 500-km-range SS-22, and the 900-km-range SS-23.

Changed Air Force Structure

Far and away, the most significant development in Soviet airpower over the past two decades has been the reorganization of the command and control structure for tactical air assets, the new US analysis points out. This revamping occurred as part of the general reorganization of Soviet military forces and is the result of the new emphasis on TVDs as the basic element of future military operations.

The reorganization led to a merger of strategic and tactical air and air defense assets in most land border areas of the USSR as well as to streamlined operational control. The air defense interceptor (APVO) regiments in these areas were shifted from the PVO Strany to the Soviet Air Forces. They became part of a new structure, the "Air Forces of the Military District," that also includes most of the assets of the former tactical air armies. The Air Forces of a Military District (MD) include all air assets in their geographic area except for Strategic Aviation and transport aircraft. These assets can be used either offensively or defensively. While the new structure boosts defensive capabilities, its most significant impact is that it facilitates massed offensive air operations in the various TVDs.

Technological advances in weapon systems and in command control and communications are thought to have impelled this reorganization. The Soviet Air Forces are currently adapting to their new organizational structure as well as to new weapon systems. Over the next few years, as they learn to live with the new structure, they can be expected to experiment with new tactics and training procedures and to define new roles and missions more clearly.

Among the first palpable results of the reorganization, Soviet Air Forces of MDs now provide tactical air support to frontal operations. The missions assigned to these Air Forces have remained essentially the same as those formerly performed by the tactical air armies, but they incorporate the introduction of modern, more capable aircraft and reflect changes in pilot training.

Along with this emphasis of airpower in general, and of air superiority in particular, the Soviets have shown over the past five years a remarkable proclivity for experimenting with new tactics. They are, the US analy-

sis points out, "developing training for a variety of new missions, including fighter escort, ECM escort, maneuvering air combat, independent search missions, and air accompaniment of ground forces. They have increased the percentage of 'dissimilar' intercept training, and the number of multievent training sorties."

Many of the new missions obviously place much greater demands on pilot initiative and independence than was previously the case in the Soviet Air Forces. Seemingly emulating the US Air Force, this new approach not only increases capabilities but also makes better use of high-performance fighter aircraft and allows Soviet pilots to take better advantage of the increased range, weapons, and maneuvering capabilities of these aircraft.

Such new Soviet fighters as the MiG-29 Fulcrum and the Su-27 Flanker are supersonic, all-weather counterair designs with look-down/shoot-down weapon systems



The T-80 is the Soviet Union's most modern tank. More than 1,400 of this type are deployed against NATO.

and beyond-visual-range air-to-air missiles. They may have a secondary ground-attack role.

The Western TVD has been assigned the highest percentage of modern aircraft—more than ninety percent of its inventory. The air assets in this region number about 2,850 aircraft and include every operational Soviet airframe except the Foxhound. Capabilities in this area are believed to be very good and are believed to be constantly improving.

Air support to the Southwestern TVD is generally comparable to the Western TVD. There are fewer aircraft in this area, however, because it faces a numerically

smaller NATO force. Soviet Air Forces in this region total some 1,250 aircraft.

The Northwestern TVD has a very small number of air assets, reflecting less emphasis on air support in this region. It has few long-range aircraft; there are no Fencers in this region.

The Soviets continue to modernize their Air Forces in the Far East with late-model Flogger and Fencer aircraft. Currently, 1,800 aircraft—more than ninety percent of which are third generation—are in position for operations against China and Japan. The Soviets also have about 170 long- and medium-range bombers in the Far East. Of this number, some forty Backfire bombers are assigned to the Soviet Air Forces in the region, according to *Soviet Military Power, 1984*.

Soviet Ground Forces

Soviet concern with NATO is manifest by the number of ground forces assigned to adjacent areas. Out of a total of 194 active tank, motorized rifle, and airborne divisions, sixty-five are located in the western part of the country, thirty are stationed in Eastern Europe, and an additional twenty are assigned to the Transcaucasus and North Caucasus Military Districts. All of these units are available for offensive operations against NATO. There are also strategic reserves in the form of seventeen low-strength divisions centrally located in the USSR.

The Soviets have another six divisions in place in the Turkestan MD and four divisions engaged in combat operations in Afghanistan. These forces could be reinforced by the twenty divisions from the Caucasus MDs, provided they were not engaged against NATO. Soviet forces in the Far East consist of fifty-two tank and motorized rifle divisions. The Soviet ground forces are augmented by fifty-five active divisions from other Warsaw Pact member nations.

While the modernization of Soviet ground forces is comprehensive, it is especially intense in terms of those forces arrayed against NATO. More than 1,400 of the Soviet Union's most modern tanks, the T-80s, are assigned to these forces, along with a large arsenal of nuclear-capable, self-propelled artillery. The 220-mm multiple rocket launcher, capable of firing chemical as well as conventional high-explosive munitions, is also being deployed opposite NATO.

Soviet Naval Advances

The Soviet Navy, with a personnel strength of about 476,000, is composed of the Northern, Baltic, Black, and Pacific Fleets as well as the Caspian Sea Flotilla. During the past year, two new classes of nuclear-powered submarines were launched, the *Mike* and *Sierra*. The *Mike*-class, at more than 9,700 tons' displacement, and the *Sierra*-class, at about 8,000 tons, are indicative of the trend toward larger designs. The *Sierra* is about twenty percent larger than its immediate predecessor, the *Victor-III*, which was introduced only four years earlier. The new submarines are high-technology designs using pressure hulls made of titanium. They can operate at great depth and are more survivable because of their great hull strength.

Other significant Soviet naval developments disclosed by the new US intelligence assessment include deployment of a second *Oscar*-class nuclear-powered

cruise missile submarine; the beginning of sea trials for a second *Kirov*-class nuclear-powered guided missile cruiser; the addition of five other attack submarines, six major surface combatants, forty-six fighter-bombers, and more than forty helicopters, mostly antisubmarine warfare versions; and one long-range ASW Bear-F aircraft. A new carrier, thought to be nuclear-powered and designed for conventional takeoff and landing aircraft, is under construction at the Nikolayev shipyard on the Black Sea.

Among the more significant operational developments involving the Soviet Navy in the past year were the expansions of its support facilities at Cam Ranh Bay in Vietnam and on the Dahlak Archipelago off Ethiopia in the southern Red Sea. The Soviets kept a force of between twenty and twenty-five warships at Cam Ranh Bay last year, along with a number of long-range Bear-D naval reconnaissance and Bear-F antisubmarine warfare



The titanium-hulled, deep-diving Alfa-class attack submarine poses a threat to US reinforcement of NATO.

aircraft. Late in 1983, about ten strike, tanker, and electronic combat variants of the medium-range Tu-16 Badger were deployed to Cam Ranh Bay.

Special Purpose Forces

One of the least-known aspects of Soviet military operations involves the Special Purpose Forces, known by the Russian acronym SPETSNAZ. The new US report disclosed that these forces are controlled by the Main Intelligence Directorate of the Soviet General Staff, the GRU, and are trained to conduct a variety of sensitive missions that include covert action abroad. SPETSNAZ units under KGB control, for instance, handled the assassination of Afghan President Hafizullah Amin in 1979.

During peacetime, the GRU carefully coordinates reconnaissance programs that are geared to meet the intelligence requirements for Soviet forces in war. In wartime, SPETSNAZ forces would operate far behind enemy lines for extended periods of time. They would conduct sabotage, reconnaissance, and attacks on a wide variety of military and political targets.

Wartime missions of GRU special-purpose troops are planned under the direction of the General Staff and are integral to the Soviet combined-arms operations. Intended to support theater as well as front or fleet opera-

tions, SPETSNAZ forces are capable of operating throughout the enemy homeland. Organized into brigades, these forces will infiltrate and fight as small teams. In a war, each of these brigades can field approximately 100 SPETSNAZ teams. A typical team includes an officer as leader with a warrant officer or senior sergeant as second in command. Other members of the group are trained as radio operators and weapons and demolition experts. In addition to the normal military training, all are trained in:

- Infiltration tactics.
- Sabotage methods using explosives, incendiaries, acids, and abrasives.
- Parachute use.
- Clandestine communications.
- Hand-to-hand combat and silent killing techniques.
- Language and customs of the target country.
- Survival behind enemy lines.
- Reconnaissance and target location.

To make training as realistic as possible, SPETSNAZ brigades have facilities equipped with accurate full-scale models of key targets, such as enemy installations and weapon systems. The brigades intended for operations against NATO share similar demolition training and equipment familiarization. Training facilities are equipped with mockups of NATO nuclear systems including Pershing, Lance, and GLCM, as well as airfields, nuclear storage sites, and communications facilities. The missions of SPETSNAZ make a significant addition to Soviet combat effectiveness.

In both peace and war, these SPETSNAZ forces pose an important threat. In peacetime, they are a formidable instrument with which the Soviets can project limited but decisive force abroad, especially into the Third World. In war, major facilities and important weapon systems would be the object of their attacks.

Among the most alarming facts brought out by the new issue of *Soviet Military Power* is the intense Soviet research effort in the field of genetic engineering, apparently as a part of their biological warfare program. The Soviets seem to transfer selected aspects of their genetic engineering research to their biological warfare centers. As the US report points out, "For biological warfare purposes, genetic engineering could open up a large number of possibilities. Normally harmless, non-disease-producing organisms could be modified to become highly toxic or produce diseases for which an opponent has no known treatment or cure. Other agents, now considered too unstable for storage or biological warfare applications, could be changed sufficiently to be an active agent." The US report concluded that, under Soviet doctrine, "the biological weapon is seen as a strategic weapon for the spread of infectious disease." There is the ominous assertion that "many of the Soviet long- and intermediate-range missile systems are technically capable of disseminating large quantities of disease agents over large areas."

In sum, the evidence of growing Soviet military capabilities would seem to support Secretary Weinberger's declaration in the document's Preface that "we must sustain not only our unity of purpose as a nation, but also our determination to complete the task we have begun—to restore the strength necessary to maintain peace with freedom." ■

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In the Beginning...

Seventy years before Tom Wolfe wrote his book, Benny Foulois proved that he had "the right stuff."

BY JOHN L. FRISBEE

WHEN Lt. Benjamin D. Foulois was introduced to the airplane in 1909, pilots were, in his words, "regarded as fit inmates for insane asylums." Of the handful of aviators in the United States and Europe, thirty-two were killed in crashes that year.

Popular opinion aside, survival in a new and alien environment demanded not madness but a cool head, iron nerves, an ability to learn quickly, and a lucky star. The five-foot-six-inch Foulois had demonstrated those qualifications many times prior to his first flight with Orville Wright at Fort Myer, Va., on July 30, 1909. He had served for five years in the Philippines, most of the time in active combat with insurgents, and was one of three officers trained to fly the Army's first crude dirigible.

The Army accepted the Wright A airplane after Benny Foulois's flight with Orville and moved its one-plane air force to College Park, Md., where the Wrights had agreed to train two officers—Lts. Frederic Humphreys and Frank Lahm—as pilots. Foulois joined that first class as the Wrights were completing their training commitment. He logged fifty-four minutes with Wilbur Wright and flew for two hours with Humphreys, who had soloed a week earlier after three hours of instruction. Then Humphreys and Lahm damaged the plane before Foulois was ready to take it up alone. The Wrights repaired the damage and returned to Dayton, Humphreys and Lahm were ordered back to their respective branches of the Army, and Foulois was directed by Chief Sig-

nal Officer James Allen to take Airplane No. 1 to Fort Sam Houston, Tex., and "teach yourself to fly."

The Wright A was not an easy bird to fly. For takeoff, it was catapulted along a single rail (it had no wheels) by a heavy weight dropped from a tower at the rear of the track as an assist to the cranky little thirty-horsepower engine. Flight controls were operated by two long levers: The left one moved the elevators, which were ahead of the pilot; the right one warped the wings (it had no ailerons) and moved the rudder by a fore or aft motion to turn left or right. In flight, the plane had a bad tendency to "buck" and stall in the slightest turbulence. In that event, the Wrights wrote Foulois, "put the nose down and stay with the airplane"—sound advice since until 1919 Army pilots didn't have parachutes. Landings on the plane's skids were generally with the engine shut down.

On March 2, 1910, Benny Foulois was set up and ready to solo. That day he made four flights adding up to just under an hour. The last landing put No. 1 in the shop until March 12, when Foulois was almost thrown out of the plane in turbulence. He solved that problem by inventing the safety belt. Next came wheels to replace the skids and thus free the takeoffs from the catapult.

In the weeks following his solo flight, the self-taught Foulois weathered three major crashes—two on

the Fort Sam drill field and one in the Rio Grande while on a reconnaissance mission. By the end of September, he had completed sixty-one hops, not always ending with No. 1 intact. These hazardous and exciting adventures were further enlivened by occasional low-altitude, preraveille runs over the Maneuver Division's tents and the headquarters latrine.

The "crazy aviator" was joined in April 1911 by a second airplane and three pilots who had been partially trained in Glenn Curtiss's new school at San Diego. One of them threw in the towel after a crash landing. A month later, Lt. George Kelly, for whom Kelly AFB is named, became the first Army pilot killed in a crash. The Fort Sam commander decreed that there would be no more flying from his drill field, and the Army's two-plane force was moved to College Park. Foulois, the Army's most experienced pilot, was sent to a nonflying post on the War Department staff.

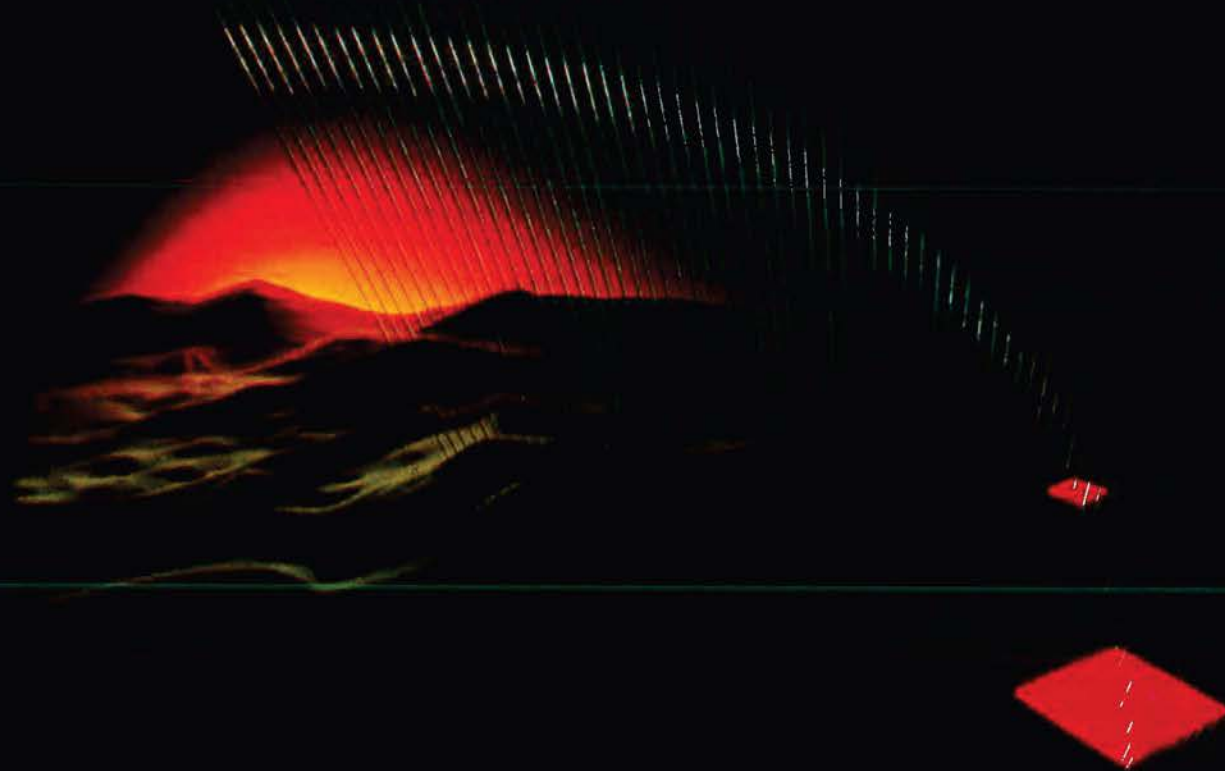
Despite alarming casualty rates (in 1912, eight of fourteen Army pilots died in crashes), Foulois continued to fly whenever he could wangle permission. He was finally assigned once more to full-time flying duty and subsequently led the 1st Aero Squadron in the Army's initial tactical use of aviation during the Punitive Expedition against Mexican bandit Pancho Villa in 1916.

Benny Foulois remained an active pilot throughout a stormy career that led to his appointment as two-star Chief of the Air Corps in 1931. His many contributions to the development of military aviation during the 1930s are often overlooked. Perhaps he is destined to be remembered best as a valiant pioneer in the days when flying was a perilous venture—doubly perilous for a courageous lieutenant who mastered piloting alone, with the threat of disaster as his constant companion. ■



In 1910, self-taught Benny Foulois was a one-man air force.

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THE BULLETIN BOARD

By James A. McDonnell, Jr., MILITARY RELATIONS EDITOR

Civilian Employee and Military Attitudes Surveyed

Two surveys made last year are now being evaluated. They draw an interesting picture of both the federal employee and the military work force.

The preliminary results of the 1983 Federal Employee Attitude Survey show high employee satisfaction, according to Donald J. Devine, Director of the US Office of Personnel Management. This is so, says Mr. Devine, even in the face of wide-ranging reforms taking place in the performance appraisal system and benefits package. Twenty thousand employees, fifty percent more than ever surveyed before, answered a variety of questions about their jobs, the first such detailed look at the force since 1979.

Seventy-six percent said they were satisfied with their jobs, and eighty-five percent liked working for the government. Though the performance appraisal process has become more rigorous in the past three years, the majority of employees—fifty-three percent—reported it "fair and objective," and, interestingly, sixty-nine percent agreed on the measure of their performance. Health and retirement benefits packages were also looked at, and employees were asked to react to projected changes. The employees' willingness to consider changes "was favorable," said Mr. Devine.

"The bottom line," he concluded, "is that we have good working relations in the federal government. This is so in spite of major changes in personnel policy." He noted that the current Administration has taken "aggressive steps to improve the federal personnel system."

On the uniformed side of the house, the Air Force is summing up a 1983 survey on quality of life, which drew responses from some 24,000 members both in the States and overseas, by hailing a marked improvement in the percentage of career-oriented blue-suiters.

The survey looked at career intent, economic considerations, work-related aspects, leadership and supervi-

sion, base facilities and services, health care, and family matters. A greater percentage of Air Force members was found to be career-oriented in comparison with responses from previous surveys. Fewer than half of those responding said they were career-oriented when they entered the Air Force—yet, seven out of ten now plan to remain until retirement. The results were similar for both officers and enlisted members.

Officers rated their job, retirement, and pay, in that order, as factors leading to a positive career decision. Airmen listed training and education, security of Air Force life, pay, and retirement as their reasons for staying. Raising a red flag, the results also identified erosion of retirement benefits as the number-one factor that would cause both officers and enlisted people to consider leaving the Air Force.

Almost seventy-five percent felt that the Air Force is a good organization to work for. However, nearly half believed that today's discipline is too lenient. A

significant majority was pleased with the quality of medical care, both for themselves and for their families. Also, although many were not familiar with the Family Support Center Program, of those who have used it, a majority expressed satisfaction with its operation.

About fifty percent of both officers and enlisted have spouses working outside the home. The prime reason given for this—"need for additional income." More than seventy-five percent of the married respondents indicated agreement between the member and spouse on the member's career plans. This is a positive increase over responses to the same question three years ago.

POW Treatment Draws Praise and Criticism

The Veterans Administration's Advisory Committee on Former Prisoners of War met recently in Washington, D. C., to review actions taken since its last meeting in June 1983. Retired Air Force Lt. Gen. John P. Flynn is the



*USAF recently brought to Washington all past Chief Master Sergeants of the Air Force for a few days of consultation with the incumbent, CMSAF Sam E. Parish. In support of this program, AFA hosted the Chiefs at a dinner meeting. Here, in the order in which they served (bottom row first, left to right), are retired CMSAFs Paul W. Airey, Donald L. Harlow, Richard D. Kisling, Thomas N. Barnes, Robert D. Gaylor, James M. McCoy, Arthur L. Andrews, and CMSAF Sam Parish. AFA recently announced that its affiliate—the Aerospace Education Foundation—will shortly publish a book, sponsored by AFA's Enlisted Council, to be titled *The Chiefs*, which will tell the story of these unique Air Force leaders.*

Chairman. (General Flynn also serves as AFA's volunteer Advisor on Veteran Matters.)

The committee, meeting with Veterans Administrator Harry N. Walters, commended the Veterans Administration headquarters for its actions aimed at implementing the recent broadening of POW-related health care and treatment. However, it chided Veterans Administration field stations for "still not complying with the spirit and intent of the new directives." It believes that information on the new programs has not yet fully reached the "worker level." Nonetheless, the committee reported, the actual health care and treatment, when received, has been "uniformly excellent and without complaint."

The committee gave high marks to the POW hot line installed last December. Statistics reveal that seventy-five percent of the callers are getting resolution of their problems right on the telephone. The hot line number—800-821-8139—has handled more than 3,000 calls since it went into operation.

Also, the committee took note of pending legislation to proclaim July 20 as National POW/MIA Recognition Day and the plans of the US Mint to strike a commemorative coin in honor of POWs.

Meanwhile, the Veterans Administration announced that a recent law change added dysthymic disorder (depressive neurosis) to a list of diseases that, if incurred by a former POW, are presumed to be related to the POW experience. This allows the veteran to qualify for VA disability payments without additional proof. The committee thanked Congress for adding this condition to the list of such presumptive diseases, which now includes chronic dysentery, helminthiasis, and such nutritional deficiencies as beriberi and pellagra.

Dysthymic disorders have been defined as a mental state somewhere between a reactive depression to an unpleasant happening, such as a broken romance or divorce, and a major depression, which is deep, prolonged, and not necessarily related to a life experience. Dysthymic disorders may be manifested by anxiety—a feeling of fear and apprehension for which there is no visible source—or a feeling of dejection, pessimism, hopelessness, loss of interest or zest, suicidal thoughts or actions, or pre-occupation and impaired work performance.

The Veterans Administration urges all former POWs to register with their nearest Veterans Administration office so that the entire range of bene-

fits now available by law may be explained and applied for, where applicable.

Military Chaplains Draw Attention

For some time now, a case (Katcoff vs. Marsh) has been moving through the courts that would, if decided for the plaintiffs, abolish the military chaplaincy.

Recently, the US District Court, Eastern District of New York, ruled in favor of the US government (the "Marsh" in the case is Army Secretary John O. Marsh, Jr.). The judge found that the US Army Chaplaincy is not a violation of the establishment clause of the First Amendment to the US Constitution.

According to the newsletter of the Military Chaplains Association, the decision was based, in essence, on the "great deference" argument. "Simply stated," the publication notes, "the judge found that Congress has the authority to establish a military chaplaincy and did so to provide for the free exercise rights of military personnel. Given the obligations and restrictions imposed on those in the military, Congress may constitutionally do no less." The judge did not rule as to whether a civilian chaplaincy offers a viable alternative, but noted that Congress's decision that only a military chaplaincy would do must be given "great deference."

"It is not without significance," the judge wrote in his decision, "that the first Congress drafted the First Amendment and, at the same time, authorized a paid Chaplain for the Army. The Army chaplaincy program is a constitutionally permissible means to the constitutionally mandated end."

It is expected that further appeals of the ruling will be made and that the case will continue through the courts. But, for now, the government has won.

In a related action, Rep. Thomas M. Foglietta (D-Pa.) has introduced a bill that would "provide for greater balance in the proportion of military chaplains of different faiths as compared to the proportion of different faiths represented among the total membership of the armed forces."

Titled the "Military Chaplains Faith Balance Act of 1984," the measure would call on DoD to determine the representation of different faiths among military members and then request leaders of those faiths found underrepresented in the chaplaincy to make available more clergy for chaplain service. It would also direct the Defense Department to bring on

active duty those reserve chaplains who are from the faiths underrepresented, without regard to other limits on the Chaplain Corps number.

The bill is now at the Pentagon for comment. There appears to be no strong effort to move it along the legislative pathway prior to the end of the Ninety-eighth Congress this year. Thus, it will probably die this session.

USAF Continues Basketball Domination

The Air Force has won its second consecutive all-service basketball championship, beating the Army in a best-of-three contest.

Army trounced Navy to reach the finals. Then, in the first playoff game, Air Force racked up an easy 97-79 win over the ground troops. The second game saw an inspired Army team capture a close 83-80 decision to hand Air Force its first tournament loss. However, the blue-suit hoopsters, with the championship on the line, rallied to a 69-64 win in the final fray.

Navy wound up in third place by defeating the Marine team, 102-81. Five Air Force players and the coaches of the Air Force team will represent the services in subsequent national competition. Named to the interservice squad were Carl Fortson, Eglin AFB, Fla.; Virgil Odum, McClellan AFB, Calif.; Charles Caldwell, Little Rock AFB, Ark.; Charles Hightower, Griffiss AFB, N. Y.; and James Lomax, Lackland AFB, Tex. Team coaches are Maj. Ted Albers, USAFA, Colo.; and SMSgt. Moses Griffins, Jr., Beale AFB, Calif.

VA Commissions Survey of Female Veterans

The Veterans Administration has awarded a \$790,000 contract to Louis Harris and Associates, Inc., of New York, to conduct a survey of female veterans. The survey, to be completed by 1985, will poll an estimated 3,000 women nationwide to help determine their future needs. There are currently a little more than a million female veterans, and that number is expected to grow to 1,260,000 by the year 2000.

Information gathered will be used to plan for the future care of women veterans. It will focus on the specific needs and demographic expectations for this particular group. Veterans Administrator Harry N. Walters says that the agency needs to know what the female veterans know about, and feel toward, the Veterans Administration now, and what future support needs are most likely.

While not part of this study, the Administrator also expressed his support for a study being considered by

THE BULLETIN BOARD

the Centers for Disease Control on the possible effects of exposure to herbicides on women who served in the armed forces in Vietnam. This study has been proposed by the Veterans Administration's Advisory Committee on Women Veterans (see related item in the December '83 "Bulletin Board").

Meanwhile, both the House and the Senate have legislation pending that would designate the week beginning next November 11 as "National Women Veterans Recognition Week." Stating that lack of recognition "has denied women veterans the public appreciation and praise they deserve," the bill's sponsors want to express the nation's appreciation for women's service in the military and to inspire "more responsive care and services for women veterans." They hope that local communities will join government agencies in recognition keyed to appropriate programs, ceremonies, and activities.

MAC Actions

Military Airlift Command has a new motto and some new space-available procedures.

MAC has been testing the space-A options at five test sites. Response from passengers has been so positive that MAC has now extended the test to all its stations. At the moment, it is an open-ended test so far as a projected termination date is concerned.

Briefly, the new program allows wait-and-hope space-A'ers to sign up

for flights fifteen days ahead of desired departure and then not have to revalidate for fifteen days. Each day, at the terminal, the Military Airlift Command processing agent will ask the assembled passengers, by show of hands, to indicate the date they signed up (if an exceptionally large number has signed up on any given day, hourly increments may be used to sort out priorities).

In contrast to the previous three-day revalidation procedure, the new rules give the traveler some flexibility in that individuals know that they won't lose their place on the roster for fifteen days even if they are unable to show up for several days at a time. Key to the procedure is that the passenger must be on hand to respond to the daily roll call to be eligible for flights that day. Also, the new procedures still maintain the priority for travel by certain categories decreed by regulation.

A spokesman for Military Airlift Command told news media that "finding the optimum procedures to enhance space-A travel has been a long and laborious task." They think they're on the right track with the test and that the results will be in conso-

nance with their theme of "caring for people." Speaking of MAC's "theme," it is noteworthy that its official command motto has been changed from "Global in Mission—Professional in Action" to "MAC—The Backbone of Deterrence."

Responding to an AIR FORCE Magazine query as to the reason for the change, a MAC spokesman referred to MAC CINC Gen. Thomas M. Ryan's previously released explanation that, while MAC has continued to perform the traditional airlift role that sparked its formation, "our mission has expanded as the world has changed around us."

General Ryan went on to point out that the increasing complexity of world affairs has moved MAC more to the forefront than before. "Our new motto," he says, "captures in a few words the powerful presence of all facets of the Military Airlift Command in the defense of liberty."

Vet Centers a Success Story

By early this year, the Veterans Administration's network of Veterans' Readjustment Counseling Centers had counseled about a quarter of a million veterans and some 50,000 family members since the program began in late 1979. During February of this year, a record number of more than 8,600 veterans made their first visit to a Vet Center.

The House Subcommittee on Hospitals and Health Care of the Committee on Veterans' Affairs wants to beef up the program. Subcommittee Chairman Bob Edgar (D-Pa.) says that more employees and more sites—there are currently 135 locations—are needed to keep the program at the high level of acceptance and performance it has reached. According to Congressman Edgar, the program has matured without losing "any of the dynamism or spirit of dedication that have made it so successful."

The Veterans Administration is happy with it, too. Dr. Donald L. Custis, VA's Chief Medical Director, refers to the program as "the spearhead of the Agency's outreach and counseling services to veterans of the nation's longest and most difficult war."

The Vietnam vets, for whom the Centers were first designed, are also, from all indications, pleased with the services offered. With all of this going for it, Representative Edgar feels that now is the time to plan for a substantial expansion of the program, even if funds for such expansion must be moved from some other FY '85 budget allocation. At press time, the House Appropriations Committee was looking at this possibility.



Twenty-seven people assigned to the Manned Space Flight Support Group at the Johnson Space Center, Houston, Tex., recently gave a vivid example of community involvement when they took part in the Houston Area Cerebral Palsy National Telethon. A total of \$103,000 was raised. The Air Force contingent helped by manning phones, taking pledges, and providing administrative assistance.

Short Bursts

Air Force Maj. Ronald J. Tenaglia has been named the first blue-suiter clinical social work officer to head up a triservice Alcoholism Recovery Facility, this one at Tripler Army Medical Center, Honolulu. He was also the first clinical social work officer to direct an Air Force alcoholism rehab center, back in 1973, at Wright-Patterson AFB, Ohio.

The Veterans Administration wants members of the Reserves and Guard to know that they too are **eligible for burial in a national cemetery** if death occurs while performing, or as a result of, active duty for training.

The Air Force has replaced its Scouting Liaison Program with a **National Youth Relations Program** headquartered at Kelly AFB, Tex. The program serves as a clearinghouse for support to the Boy Scouts, Girl Scouts, Camp Fire, Inc., and other national youth organizations.

Army Specialist Fourth Class **Charles A. Hayes III**, from Dallas, Pa., was recently named **Military News-film Photographer of the Year**. Specialist Hayes, assigned to the Army and Air Force Hometown News Directorate at Kelly AFB, Tex., swept four first places and one second in recent judging of film and videotape entries. The lone Air Force first-place winners were the team of **MSgt. James M. Barschow, A1C Brian J. Perkins, MSgt. Michael G. Fleck, and SSgt. Larry E. Blaker**. They won for coverage of Silver Flag Alpha, which was a TAC exercise of base ground-defense procedures.

Air Force members who supported US military operations in Lebanon from June 1, 1983, to a yet-to-be-determined future date may be eligible to receive the **Armed Forces Expeditionary Medal**. Needed are thirty consecutive days in the area of operations or sixty nonconsecutive days; engagement in actual combat or duty at least as hazardous, regardless of time in area; or participation as a regular crew member of an aircraft flying into, out of, within, or over the area. Base personal affairs offices have details.

Europe-bound blue-suiters making an official move on chartered commercial flights will now be leaving from **Philadelphia International Airport** instead of McGuire AFB, N. J. About 140,000 passengers a year will be affected, all part of a DoD move to shift charter passenger traffic from military air bases to civil airports.

The Air Force wants writers of officer effectiveness reports to stop using duty titles and job descriptions that are unclear. **Too much technical**

language, frequently confusing to promotion boards and assignment officers, is creeping in. This could have the unintended effect of working against a person doing an outstanding but highly technical job. Rates are urged to seek writing guidance.

If an Air Force retiree died while in an armed forces medical facility, it used to be up to the next of kin to assume responsibility for transportation to the burial site. A recent policy change will now allow a **government-paid move** within the zone of interior and no further away than the deceased's last place of residence.

Some 50,000 **National Service Life Insurance term policyholders** over the age of seventy will have their premium rates capped at the age seventy rate. Twenty-five thousand more veterans will become eligible in 1985 for this new benefit, which is being funded from surplus reserve funds in the NSLI program. Because term insurance premiums increase with age, some policyholders renewing at age eighty are paying as much as \$150.40 per month for their \$10,000 coverage.

Rep. G. V. (Sonny) Montgomery (D-Miss.) has once again urged the Administration to **upgrade the Veterans Administration to Cabinet status**. This would make the Veterans Administration, which ranks second only to DoD in number of employees, a department instead of an agency. Congressman Montgomery has asked other Presidents to take this action—none has, and observers see little likelihood that it will happen this time.

Military people in the Atlantic, Latin America, or Pacific ZIP code areas (ZIPs beginning with 09, 34, or 96 or 98) will no longer have to **pay postage when sending personal correspondence to others within the same geographic area**. DoD emphasizes that the free mailing does not include correspondence from the US or that which is registered, certified, or insured.

Senior Staff Changes

RETIREMENT: B/G Gordon P. Masterson.

CHANGES: Col. (B/G selectee)

Frank S. Goodell, from Dir., Materiel Mgmt., Ogden ALC, AFLC, Hill AFB, Utah, to Dep. Dir., Log. Plans & Prgms., DCS/L&E, Hq. USAF, Washington, D. C., replacing B/G Richard L. Stoner . . . **B/G Richard L. Stoner**, from Dep. Dir., Log. Plans & Prgms., DCS/L&E, Hq. USAF, Washington, D. C., to Dir. of Maintenance & Supply, DCS/L&E, Hq. USAF, Washington, D. C., replacing retired B/G Gordon P. Masterson. ■



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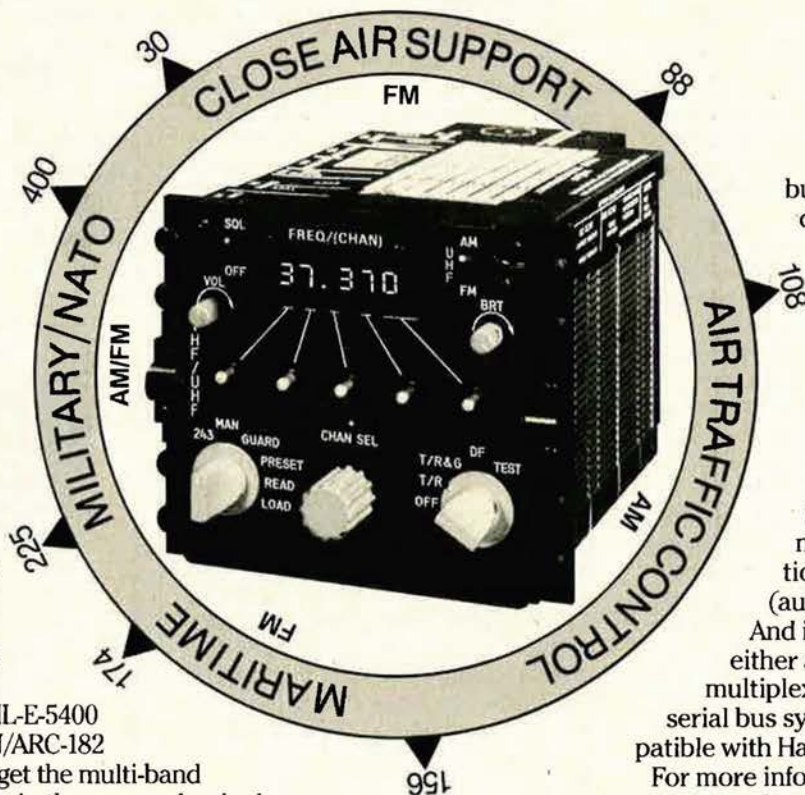
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The pale grey camouflage of the Panavia Tornado F. Mk 2 blends well with the English landscape below

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PANAVIA TORNADO ADV

RAF designation: Tornado F. Mk 2

Rollout of the first two production Tornado F. Mk 2 interceptors, on 28 March 1984, marked a major step in the Royal Air Force's fighter re-equipment programme. A possible air defence role for the Tornado was considered by the RAF when the interdiction/strike (IDS) programme was inaugurated in 1968, and low-key studies leading to an air defence variant (ADV) were initiated in the following year. These were given impetus in 1971, when the Ministry of Defence issued Air Staff Target (AST) 395 covering the development of an interceptor with a new advanced technology radar and XJS21 Sky Flash air-to-air missiles. Changes from the IDS Tor-

nado were to be minimal, and costs kept as low as possible.

It soon became clear that a configuration using the existing RB199 engines and having the four Sky Flash missiles on underwing pylons would have too high a drag factor and would not meet the performance requirement. The solution therefore adopted was to semi-submerge the Sky Flash in tandem pairs under the fuselage, and to anticipate further performance benefits from ongoing development of the RB199 engine.

Full-scale development of the Tornado ADV was authorised on 4 March 1976, and the RAF will include 165 of this long-range interceptor model, designated F. Mk 2, in its total procurement of 385 Tornados, to re-equip two Lightning squadrons and seven squadrons of Phantoms.

Most of the ADV Tornados will be based in the United Kingdom (including two squadrons at Leuchars in Scotland, two at Binbrook, Lincolnshire, and three at Leeming, Yorkshire), both for the air

defence of the UK and to protect the northern and western approaches of NATO. The F. Mk 2, equipped with a tactical display that can cover the entire North Sea, will also fulfil the RAF's commitments to provide long-range air defence of Britain's maritime forces, over a wide UK air defence region extending from the Atlantic approaches to the Baltic, and from Iceland to the English Channel; and to contribute towards air defence in the Central Region of Europe. It will be able to loiter on patrol for several hours, using in-flight refuelling when necessary, and to detect, identify, and destroy enemy aircraft approaching at supersonic speeds at high, medium, or low altitudes, using its snap-up/snap-down missiles. Its fire control system will be able to engage multiple targets in rapid succession; its weapons systems will be highly resistant to enemy ECM; and it will be able to operate from damaged airfields by virtue of its good short-field performance. Supersonic acceleration is better than that of the IDS version. A genuine long-range auto-

mous capability will enable it to operate more than 350 nm (645 km; 400 miles) from its base by day and night, in bad weather, in heavy ECM conditions, against multiple targets at low level.

Two main airframe modifications distinguish the ADV externally from the IDS version. The principal one is a 1.36 m (4 ft 5½ in) increase in fuselage length, forward of the front cockpit to accommodate the longer radome of the Marconi Avionics AI-24 Foxhunter radar, and a small 'stretch' aft of the rear cockpit to allow the four Sky Flash missiles to be carried in two tandem pairs. The other is that the fixed inboard portions of the wings are extended forward at the leading-edges (sweep angle 67° instead of 60°), to give additional chord and compensate for the shift in the CG. These changes also benefit performance by reducing drag, especially at supersonic speed, compared with the IDS version. Extension of the fuselage provides additional space for avionics and for an additional 10 per cent of internal fuel (909 litres; 200 Imp gallons). Other changes include deletion of one of the two IWKA-Mausers 27 mm cannon; installation of Mk 103 RB199 engines in the first 18 production aircraft and, thereafter, Mk 104 engines with extended nozzles, increased reheat combat thrust, and a digital engine control unit (DECU); fitting of a ram air turbine, radar-dedicated cold air unit, and an internally mounted retractable in-flight refuelling probe; addition of a head-down display for the pilot, and replacement of the navigator's wet-film head-down display recorder with a displayed data video recorder; fitment of a second Ferranti 1010 inertial navigator; integration with the radar of a new Cosor IFF interrogator; incorporation (when its development is completed) of a Singer-Kearfoot data link system; and introduction of new cockpit displays and redesign of symbology, together with an increase in computer storage capacity.

Although possessing some 80 per cent commonality with the IDS version, the F. Mk 2 Tornado was sufficiently different for the initial Tornado production contract to include funding for three prototypes of the fighter version. These are identified by the manufacturer as the A01 to A03, as follows:

A01 (RAF serial number ZA254). Single-stick aircraft, primarily for handling, performance, and general systems assessment; first flown on 27 October 1979. Powered by RB199 Mk 101 engines, uprated to Mk 103 performance level. Not fitted with Foxhunter radar. Has extended flight envelope clearance to an IAS of 800 knots (1,480 km/h; 920 mph), and has exceeded Mach 2 at high altitude. Spin prevention and incidence limiting system (SPILS) installed and flown on initial assessment. Rapid rolling capability demonstrated in all parts of the flight envelope and in all configurations. Predicted rates of roll in full stick rolls at high g demonstrated at all altitudes. Flutter envelope clearance programme (to Mach 2.16) completed in October 1982. Delivered to A&AEE, Boscombe Down, in early 1983 for RAF aircrew assessment of handling and engine performance. Full envelope clearance for Sky Flash missile achieved by end of 1983.

A02 (ZA267; first flight 18 July 1980). Twin-stick aircraft with full avionics fit, including 'B' model pre-production Foxhunter radar; assigned primarily to armament assessment. Firing programme of unguided Sky Flash begun in November 1981, later taken over by A01; first firing of guided Sky Flash, by A02, in early 1984. Mauser gun firing trials completed successfully, covering the subsonic flight envelope above 200 knots (370 km/h; 230 mph) from zero g to the angle of attack limit, and up to 9,140 m (30,000 ft). Refitted in early 1983 with Mk 101D engines (prototype for Mk 103) and extended afterburner nozzles; first flight in this form April 1983. Re-flown 24 February 1984 after refit with Mk 103Ds (prototype for Mk 104).

A03 (ZA283; first flight 18 November 1980). Single-stick aircraft with full avionics, for radar and avionics systems test programme. Radar and weapons system integration flight trials with prototype Foxhunter radar completed in 1982. Made first flight with 'B' model pre-production Foxhunter in March 1983.

The initial batch of 18 production F. Mk 2s, powered by Mk 103 engines, is under construction,

The first two, known as AT001 and AT002, are conversion trainers, and made their first flights in April and March 1984 respectively. They are due to go to the Aeroplane and Armament Experimental Establishment at Boscombe Down in the Summer of 1984, and C of A (Controller of Aircraft) clearance for initial operational capability is expected in early 1985. Meanwhile, in September 1984 deliveries are scheduled to begin to the Operational Conversion Unit at RAF Coningsby, Lincolnshire, where training will begin in early 1985.

A second batch of 52 Tornado F. Mk 2s was ordered in August 1982 and the third batch of 92 in January 1984, bringing the total (including prototypes) to 165. Second batch aircraft will have RB199-34R Mk 104 engines with extended afterburner nozzles, and will introduce automatic wing sweep (AWS) and an automatic manoeuvre device system (AMDS).

TYPE: Twin-engined all-weather air defence interceptor.

WINGS: Cantilever shoulder-wing monoplane. All-metal wings, of variable geometry, the outer panels having a leading-edge sweep of 25° in the fully forward position and 67° when fully swept. Fixed inboard portions also have a leading-edge sweep of 67°. Wing carry-through box is of electron-beam-welded titanium alloy; majority of remaining wing structure is of aluminium alloy, with integrally stiffened skin. The wings each pivot hydraulically, on Teflon-plated bearings, from a point in the centre-section just outboard of the fuselage. The root of the outer wing mates with the pivot pin through titanium alloy members fixed to the upper and lower light alloy panels of the outer wing box, and a 'round rib', also of titanium alloy, transmitting the normal aerodynamic force. Sweep actuators are of the ballscrew type, with hydraulic motor drive. In the event of wing sweep failure, the aircraft can land safely with the wings fully swept. High-lift devices on the outer wings include full span leading-edge slats (three segments each side), full span double-slotted fixed-vane trailing-edge flaps (four segments each side), and spoilers (two on upper surface each side). Spoilers give augmented roll control at unswept and intermediate wing positions at low speed, and also act as lift dumpers after touchdown. All flying control surfaces actuated by electrically controlled tandem hydraulic jacks. No ailerons. Entire outer wings, including control surfaces, are Italian built. Aeritalia having prime responsibility for final assembly and

production, assisted by Aermacchi, Aeronavali Venezia, Piaggio, Saca, and SIAI-Marchetti as subcontractors. Microtecnica (Italy) is prime subcontractor for the wing sweep system. Nineteenth and subsequent ADV aircraft will be fitted with automatic wing sweep (AWS) and automatic manoeuvre device system (AMDS). With AWS, four different wing sweeps can be scheduled (25° at speeds up to Mach 0.73, 45° from there up to Mach 0.88, 58° up to Mach 0.95, and 67° above Mach 0.95), enabling specific excess power at transonic speeds and turning capability at subsonic speeds to be maximised. Buffet-free handling can be maintained, to the limits defined by the SPILS, by use of the AMDS, which schedules with wing incidence to deploy either flaps and slats at 25° sweep angle or slats only at 45° sweep. Beyond 45°, both flaps and slats are scheduled 'in'.

FUSELAGE: Conventional all-metal semi-monocoque structure, mainly of aluminium alloy, built in three main sections. MBB is prime contractor for the centre fuselage section, including the engine air intake ducts and wing centre-section box and pivot mechanism. This includes responsibility for the surface interface between the movable wing and the fixed portion, to ensure both a smooth and slender external contour and proper sealing against aerodynamic pressure over a range of wing sweep positions. The present design uses fibre-reinforced plastics in these areas, and an elastic seal between the outer wings and the fuselage sides. Responsibility for the front fuselage, including both cockpits, and for the rear fuselage, including the engine installation, is undertaken by BAe Warton. Radar-transparent nosecone by AEG-Telefunken, assisted by Aeritalia and BAe, is hinged in two places to open sideways to starboard, providing access to front and rear of Foxhunter radar. Door type airbrake on each side at top of rear fuselage.

TAIL UNIT: Cantilever all-metal structure, consisting of single sweptback two-spar fin and rudder, and low-set all-moving horizontal surfaces ('tailerons') which operate together for pitch control and differentially for roll control, assisted by use of the wing spoilers when the wings are not fully swept. Rudder and tailerons actuated by electrically controlled tandem hydraulic jacks. Passive ECM antenna fairing near top of fin. Ram air intake for heat exchanger at base of fin. On 19th and subsequent ADV aircraft, with extended afterburner nozzles, base of rudder will be recon-



Four underfuselage Sky Flash missiles, plus a Sidewinder and auxiliary fuel tank under each wing, is standard combat air patrol configuration for the Tornado ADV



A longer fuselage gives the Tornado ADV a more attractive appearance than its stubby Tornado GR. Mk 1 interdictor/strike predecessor

toured to clear the repositioned thrust reversers, and tailerons to clear the revised rear fuselage outline. Entire tail unit is the responsibility of BAe.

LANDING GEAR: Hydraulically retractable tricycle type. Forward retracting twin-wheel steerable nose unit, with steering augmentation system designed to minimise "wander" on landing. Single-wheel main units retract forward and upward into central portion of fuselage. Development and manufacture of the complete landing gear and associated hydraulics is headed by Dowty Rotol. Dunlop aluminium alloy wheels, brakes, and tyres, and Goodyear anti-skid units. Runway arrestor hook beneath rear of fuselage.

POWER PLANT: Two Turbo-Union RB199-34R Mk 103 afterburning turbofan engines, with bucket type thrust reversers; in first 18 production ADVs; 19th and subsequent aircraft will have Mk 104 engines with 360 mm (14 in) extension to afterburner nozzles to increase reheat thrust. Compared with Mk 101 engine in early production IDS Tornados (rated at more than 40,0 kN; 9,000 lb st dry and more than 71,2 kN; 16,000 lb st with afterburning), the Mk 103 engine will increase both dry and reheat thrust by 5 to 10 per cent; reheat combat thrust of the Mk 104 engine will be increased by 7 per cent compared with that of the Mk 103. All internal fuel in multicell Uniroval self-sealing integral fuselage tanks and/or wing box tanks, all fitted with press-in fuel sampling and water drain plugs, and all refuelled from a single-point NATO connector. Max internal fuel capacity approx 10,000 litres (2,200 Imp gallons). Internally mounted, fully retractable in-flight refuelling probe in port side of nose, adjacent to cockpit. System also designed to accept a buddy-to-buddy refuelling pack. Provision for drop tanks of 1,500 or 2,250 litres (330 or 495 Imp gallons) capacity on all four underwing stations. Dowty Fuel Systems/Lucas/Microtecnica afterburning fuel control system. AEG-Telefunken intake de-icing system.

ACCOMMODATION: Crew of two on tandem Martin-Baker Mk 10A zero/zero ejection seats (navigator at rear), under Kopperschmidt/AIT one-piece canopy which is hinged at rear and opens upward. Flat centre windscreen panel and curved side panels, built by Lucas Aerospace, incorporate Sierracote electrically conductive heating film for windscreen anti-icing and canopy demisting. Seats provide safe escape at zero altitude and

speeds from zero up to 630 knots (1,166 km/h; 725 mph) IAS.

SYSTEMS: Generally as described for IDS version (see 1983-84 *Jane's*), with the addition of a radar-dedicated cold air unit to cool the Foxhunter radar, and a pop-up ram air turbine to assist recovery in the event of engine flameout at high altitude in a zoom climb.

AVIONICS AND EQUIPMENT: A detailed list of the avionics and equipment in the IDS Tornado can be found in the 1983-84 *Jane's*. Among those retained in the ADV are the communications equipment (Plessey VHF/UHF transceiver, SIT/Siemens emergency UHF, Rohde und Schwarz HF/SSB, Ultra communications control system, and Epsilon cockpit voice recorder); Marconi Avionics triplex fly-by-wire command stability augmentation system and autopilot/light director system (modified for increased roll rate and reduced pitch stick forces); Litef Spirit 3 central digital computer (with capacity increased from 64K to 128K) and data transmission system; Smiths electronic head-up and navigator's head-down display; Ferranti FIN 1010 inertial navigation system (to which is added a second 1010 to monitor the head-up display); Marconi Avionics Tacan; Cossor ILS; and Cossor IFF transponder. Those deleted include the Texas Instruments nose radar, Decca 72 Doppler radar with terrain following, Ferranti laser ranger and marked target receiver, and Lital standby attitude and heading reference system.

The ADV's primary airborne interception system is based on a nose-mounted Marconi Avionics AI-24 Foxhunter multi-mode track-while-scan pulse-Doppler radar with FMICW (frequency modulated interrupted continuous wave), with which is integrated a new Cossor IFF-3500 interrogator and a radar signal processor to suppress ground clutter. This system enables the aircraft to detect targets more than 100 nm (185 km; 115 miles) away, and to track several targets simultaneously. A ground mapping mode for navigation backup is also available. Ferranti is subcontractor for the Foxhunter transmitter and aerial scanning mechanism. A pilot's head-down display is added, a displayed data video recorder (DDVR) replaces the wet-film head-down display recorder, and an MSDS Hermes modular radar homing and warning receiver (RHWR) is added. Head-up/head-down displays are on front instrument panel only, radar control and data link presenta-

tions on rear panel only; both panels have weapon control and RHWR displays. A Ferranti FH 31A AC driven 3 in horizon gyro in the rear cockpit, in addition to providing an attitude display for the navigator, feeds pitch and roll signals to other avionics systems in the aircraft in certain modes. Analog electronic engine control unit on aircraft with Mk 103 engines will be replaced by Lucas digital unit (DECU) on second batch aircraft powered by Mk 104 engines. ESM (electronic surveillance measures) and ECCM are standard; a Singer-Kearfott ECM-resistant data link system, interoperable with other NATO systems, is under development for installation later. Because of its comprehensive avionics the Tornado ADV can contribute significantly to the transfer of vital information over the entire tactical area and can, if necessary, partially fulfil the roles of both AEW and ground-based radar.

ARMAMENT AND OPERATIONAL EQUIPMENT: Fixed armament of one 27 mm IWKA-Mauser cannon in starboard side of lower forward fuselage. Four BAe Dynamics Sky Flash semi-active radar homing medium-range air-to-air missiles are semi-recessed under the centre-fuselage, carried on internally mounted Frazer-Nash launchers; one or two European-built NWC AIM-9L Sidewinder infra-red homing short-range air-to-air missiles on each of the inboard underwing stations. All four underwing stations are "wet" for the carriage of auxiliary fuel tanks. Smiths Industries/Computing Devices Company missile management system (MMS), which also controls tank jettison, has provision for pilot override, optimised for visual attack. The Sky Flash missiles, each fitted with an MSDS monopulse seeker head, can engage targets at high altitude or down to 75 m (250 ft), in the face of heavy ECM, and at standoff ranges of more than 25 nm (46 km; 29 miles). A new release system, designed specially for Sky Flash, permits the missile to be fired over the Tornado's full flight envelope. Furthermore, the missile is highly capable of tracking targets in a ground clutter environment, and of discriminating between closely spaced targets. A ThornEMI active proximity fusing system allows these benefits to be realised fully in snap-down attacks against targets flying at very low level. For the future, the ADV will be able to carry, instead of Sky Flash and Sidewinder, up to six Hughes AIM-20 AMRAAM medium-range and four BAe/Bodenseewerk ASRAAM short-range air-



Foreplanes and wing leading-edge extensions of the Mirage 3 NG are shown clearly in this view

to-air missiles; studies for a 1553B multiplex digital data bus associated with these weapons are being undertaken.

DIMENSIONS, EXTERNAL:

Wing span:	
fully spread	13.90 m (45 ft 7½ in)
fully swept	8.60 m (28 ft 2½ in)
Length overall	18.06 m (59 ft 3 in)
Height overall	5.70 m (18 ft 8½ in)
Tailplane span	6.80 m (22 ft 3½ in)
Wheel track	3.10 m (10 ft 2 in)
Wheelbase	6.20 m (20 ft 4 in)

WEIGHTS: Not yet released, but in same general class as IDS version, which has an empty equipped weight of 14,091 kg (31,065 lb) and a max 'clean' T-O weight of 20,411 kg (45,000 lb) with full internal fuel

PERFORMANCE:

Max Mach number attained in level flight at altitude, 'clean'	2.16
Max level speed attained, 'clean'	
800 knots (1,480 km/h; 920 mph) IAS	
Rotation speed, depending upon AUV	
145–160 knots (269–297 km/h; 167–184 mph)	
Normal touchdown speed	
115 knots (213 km/h; 132 mph)	
Demonstrated roll rate at 750 knots (1,390 km/h; 864 mph) and up to 4g	180°/s
T-O run: with normal weapon and fuel load	760 m (2,500 ft)
ferry configuration (four 1,500 litre drop tanks and full weapon load)	
approx	1,525 m (5,000 ft)
Landing run, with thrust reversal	370 m (1,215 ft)
*Endurance	
2 h combat air patrol at 300–400 nm (555–740 km; 345–460 miles) from base, incl time for interception and 10 min combat	

*Prototype, using 1,500 litre drop tanks and having more than 5% of internal fuel left at end of mission, has demonstrated a CAP of 2 h 20 min at 325 nm (602 km; 374 miles) from base, in a total flight time of 4 h 13 min without in-flight refuelling

DASSAULT-BREGUET

AVIONS MARCEL DASSAULT—BREGUET AVIATION: 33 rue du Professeur Victor Pauchet, BP 32, 92420 Vaucresson, France

Since 1960 Dassault has delivered a total of about 1,400 aircraft in the Mirage III/5/50 series to the air forces of 20 nations. Production continues, and Dassault is engaged on important programmes to update in-service aircraft, and to develop a new-generation version of the Mirage III for customers seeking a relatively simple, well proven airframe equipped to the latest standards.

DASSAULT-BREGUET MIRAGE III/5 MODERNISATION PROGRAMME

Although the Mirage III was planned initially for an operational life of 3,000 flying hours, the oldest aircraft in service with the French Air Force have already logged more than 4,000 hours and are now expected to reach 5,000 without problems. This has encouraged several Mirage operators to modernise their fleets, and details have become available of the programme being undertaken currently for the Peruvian Air Force, which has flown single-seat Mirage 5Ps and two-seat Mirage 5DPs since 1969. The first batch of four updated aircraft returned to first-line service in mid-November 1983, and at normal rates of utilisation should still be flying in the year 2000.

In this programme, modernisation includes the installation of a new advanced technology nav/attack system based on an inertial navigation system, a head-up display with its associated symbol generator, a laser rangefinder, and a new radio communications system. The work is performed by Peruvian Air Force personnel, in Peru, with technical assistance and supervision provided by a Dassault-Breguet team.

In the air-to-air mode, modernisation enables the Peruvian Mirage 5 to carry Matra 550 Magic infrared homing air-to-air missiles. The inertial navigation system, being completely self-contained, elim-

inates the need to rely on external radio navigation aids. Numerous targets and waypoints can be programmed in the system's memory and, in the air-to-ground mode, supplemented by the laser rangefinder, a CEP of a few metres can be achieved when attacking pinpoint targets. An additional advantage offered by the laser rangefinder is that, after a low-level penetration, the pilot can designate his target while maintaining a very low altitude, so reducing the aircraft's vulnerability.

The major improvement in the modernised Mirage 5 is the switch from manual to automatic attack. Once the target has been designated, on-board weapons can be employed over a greater range, at higher speed, and in a single pass. Various attack modes are practicable, depending on the type of weapon to be used, the terrain configuration, and the degree to which the target is protected. In all modes, the target or an offset point is designated, and the ranging function aligns the system on target.

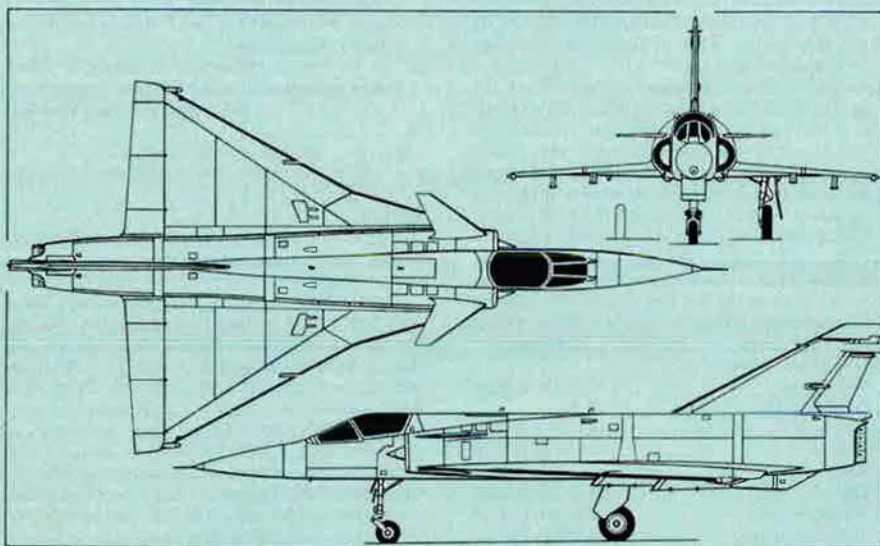
Available attack modes include continuous computation of the impact point (CCIP) for retarded bombs, guns, and rockets; CCIP with preliminary designation of an initial point (CCIP/IP); delayed CCIP for highly retarded bombs; continuous computation of the release point (CCRP) for clean bombs and certain kinds of retarded bombs, in which the system takes over control of the whole firing sequence and triggers the firing mechanism automatically; and CCRP with preliminary designation of an initial point (CCRP/IP).

DASSAULT-BREGUET MIRAGE 3 NG

This new-generation (*Nouvelle Génération*) development of the Mirage III/5/50 series is based on the same well proven airframe, but introduced features which provide much improved air combat performance and survivability in air-to-ground operations. It is powered, like the Mirage 50 and F1, by a SNECMA Atar 9K-50 turbojet engine, rated at 70.6 kN (15,873 lb st) with afterburning. New aerodynamic advances are evident in the added non-retractable sweptback foreplanes and highly swept wing root leading-edge extensions. The Mirage 3



Prototype of the new-generation Dassault-Breguet Mirage 3 NG



Dassault-Breguet Mirage 3 NG (SNECMA Atar 9K-50 turbojet engine) (Pilot Press)

NG also has a fully fly-by-wire control system derived from that of the Mirage 2000, and can be equipped for in-flight refuelling.

The nav/attack system is an up-to-date and highly reliable type composed basically of an inertial platform, CRT head-up display, and optional forward-looking sensors such as modernised Cyrano IV radar, a laser rangefinder, or Agave air-to-air/air-to-surface radar.

Maximum take-off weight is increased significantly by comparison with that of the Mirage III. This enables the external load carrying capability to be increased, notably by the addition of four lateral stores stations under the fuselage. Provision is made for adapting the Mirage 3 NG to advanced weapons as they become available, and for its use as either a specialised reconnaissance aircraft or a vehicle for mission-adapted reconnaissance packs.

The prototype Mirage 3 NG flew for the first time on 21 December 1982, and has undergone considerable development testing and demonstration flying.

DIMENSIONS, EXTERNAL:

Wing span	8.22 m (26 ft 11½ in)
Length overall	15.65 m (51 ft 4¼ in)
Height overall	4.50 m (14 ft 9 in)
Wheel track	3.15 m (10 ft 4 in)

Wheelbase	4.87 m (15 ft 11¾ in)
WEIGHTS:	
T-O weight 'clean'	10,000 kg (22,050 lb)
Max T-O weight	14,700 kg (32,400 lb)
PERFORMANCE:	
Max authorised Mach number in level flight	2.2
Max authorised speed in level flight	750 knots (1,390 km/h; 863 mph) IAS
Service ceiling at Mach 2	16,460 m (54,000 ft)

NORTHROP

NORTHROP CORPORATION (AIRCRAFT DIVISION): 3901 West Broadway, Hawthorne, California 90250, USA

NORTHROP F-20 TIGERSHARK

Information received from Northrop shortly before the April 1984 "Jane's Supplement" went to press indicated that, as stated in the 'Power Plant' paragraph, the Tigershark's General Electric F404-GE-100 turbofan engine is now rated in the 80.1 kN (18,000 lb st) class instead of the 75.6 kN (17,000 lb st) which had been quoted previously. The weight

and performance figures given in our April 1984 description were those issued earlier in relation to the 17,000 lb thrust rating; Northrop has since released the following amended figures relating to the 18,000 lb rating:

WEIGHTS:

T-O weight 'clean':
reduced by 154 kg (340 lb) to 8,255 kg (18,200 lb)
Combat weight with two Sidewinders and 50 per cent fuel:
increased by 88 kg (195 lb) to 7,264 kg (16,015 lb)
Max T-O weight:
unchanged at 12,474 kg (27,500 lb)

PERFORMANCE:

Max rate of climb at S/L: increased by 1,005 m (3,300 ft)/min to 17,100 m (56,100 ft)/min
Combat ceiling: increased by 490 m (1,600 ft) to 17,160 m (56,300 ft)

T-O distance:

'clean': reduced by 53 m (175 ft) to 435 m (1,425 ft)
at max T-O weight: reduced by 198 m (650 ft) to 1,082 m (3,550 ft)

Scramble order to brake release from cold start 37 s

Scramble order to 10,360 m (34,000 ft) 2 min 30 s

Acceleration time, Mach 0.3 to Mach 0.9 at 3,050 m (10,000 ft) 27 s

Sustained air turning rate at Mach 0.8 at 4,575 m (15,000 ft): increased by 2.1°/s to 13.2°/s

NDN

NDN AIRCRAFT LTD: Isle of Wight Airport, Sandown, Isle of Wight, UK

NDN 1T TURBO FIRECRACKER

NDN Aircraft is manufacturing a turboprop version of the Firecracker, known as the NDN 1T Turbo Firecracker, with a Pratt & Whitney Aircraft of Canada PT6A-25A engine. An order for three of this version, with options on a further four, was placed in September 1982 by Specialist Flying Training Ltd of Hamble, Hampshire. The aircraft are being marketed by a new company, known as Firecracker Aircraft Ltd; subcontractors include British Hovercraft Corporation. The first Turbo Firecracker (G-SFTR) flew on 1 September 1983.

TYPE: Two-seat turboprop powered training aircraft.

WINGS: Cantilever low-wing monoplane. Wing section NACA 23012, modified on centre-section, where forward extension of leading-edge reduces thickness/chord ratio to 9° 30' at wing root. Dihedral 5° on outer wing panels only. Incidence 3°. Leading-edge of inner wing panels swept back approximately 20°. Light alloy two-spar structure, with Frise ailerons and electrically operated single-slotted trailing-edge flaps. Trim tab in starboard aileron; balance tab in port aileron. All controls manually operated. No de-icing system.

FUSELAGE: Semi-monocoque stressed skin structure of light alloy. Hydraulically operated light alloy door-type airbrake in fuselage undersurface, at wing trailing-edge.

TAIL UNIT: Cantilever stressed skin structure of light alloy. Fixed incidence tailplane. Trim tab in starboard half of elevator and in rudder. No de-icing system.

LANDING GEAR: Hydraulically retractable tricycle type with single wheel on each unit. Steerable nosewheel retracts rearward, main units inward. Tyres remain partially exposed when retracted, to reduce damage in wheels-up landing. Oleopneumatic shock absorber in each unit. Cleveland type 551-751 mainwheels with size 6.00-6 Goodyear tyres. Cleveland type 551-753 nosewheel, with size 5.00-5 Goodyear tyre. Cleveland Model 30-83A hydraulically operated disc brakes. Parking brake. Emergency extension of main units by free fall; nose unit is extended by CO₂ pressure from an emergency bottle.

POWER PLANT: One 533 kW (715 eshp) Pratt & Whitney Aircraft of Canada PT6A-25A turboprop engine, flat rated at 410 kW (550 shp) at S/L.



The Turbo Firecracker is one of four finalists in the competition for a new RAF trainer

and driving a Hartzell type HC-B3TN-3/T10173-17 three-blade constant-speed fully-feathering and reversible-pitch metal propeller with spinner. Goodrich electric propeller de-icing standard. Two integral fuel tanks in each wing and a fuselage collector tank, with a combined capacity of 405 litres (89 Imp gallons). Two non-jettisonable auxiliary fuel tanks, each of 145 litres (32 Imp gallons), can be carried on underwing hardpoints. Overwing refuelling points for main fuel system. Oil capacity 13 litres (2.9 Imp gallons). Engine air intakes have a Centrisep particle separator for air cleaning/ice protection.

ACCOMMODATION: Two seats in tandem beneath sideways-opening (to starboard) transparent canopy. Stencil crew ejection system available optionally. Canopy can be jettisoned in emergency. Rear seat is raised 10 cm (4 in) above level of forward seat for improved view. Baggage space (0.25 m³; 9 cu ft) aft of rear seat. Accommodation heated and ventilated.

SYSTEMS: Hydraulic system, pressure 103.5 bars (1,500 lb/sq in), supplied by electro-hydraulic pump with hand operated emergency pump. Gas bottle for emergency nosewheel extension. Electrical system powered by a Prestolite engine driven 28V 70A alternator. 12V 35Ah battery for aerobatics. Air-conditioning and oxygen systems optional.

AVIONICS: Include dual VHF nav/com, DME and glideslope receivers. Becker ADF 2079 ADF, ATC 2000 transponder, AL3B audio control centre and intercom.

ARMAMENT: Four underwing hardpoints, each 181 kg (400 lb) capacity, for the carriage of two auxiliary fuel tanks and/or Portsmouth Aviation FN 7.62 mm or FFV Unipod 0.50 in gun pods; rocket launchers including Aerea AL 18-50, AL 8-70 and AL 6-80, Brandt, LAU 32, Matra F2, SNIA and SURA-D; SAMP EU 70 and EU 32 GP bombs, SAMP EU 13 fragmentation bombs; photo reconnaissance pods; and SAMAR, SATER and EMER PACK survival kits. An SP.800 HUD can be installed in the cockpit to provide the pupil pilot with information relating to weapons aiming and vital aircraft systems failure warnings.

DIMENSIONS, EXTERNAL:

Wing span	7.92 m (26 ft 0 in)
Wing chord:	
at root	1.83 m (6 ft 0 in)
at tip	1.45 m (4 ft 9 in)
Wing aspect ratio	5.28
Length overall	8.33 m (27 ft 4 in)
Height overall	3.25 m (10 ft 8 in)
Tailplane span	3.35 m (11 ft 0 in)
Wheel track	3.05 m (10 ft 0 in)
Wheelbase	2.10 m (6 ft 10 1/2 in)
Propeller diameter	2.13 m (7 ft 0 in)

AREAS:

Wings, gross	11.89 m ² (128.0 sq ft)
Ailerons (total, incl tabs)	1.20 m ² (12.89 sq ft)
Trailing-edge flaps (total)	1.23 m ² (13.20 sq ft)
Fin	0.48 m ² (5.13 sq ft)
Rudder, incl tab	0.66 m ² (7.14 sq ft)
Tailplane	1.56 m ² (16.77 sq ft)
Elevator, incl tab	1.27 m ² (13.66 sq ft)
Dive brake	0.26 m ² (2.75 sq ft)

WEIGHTS:

Weight empty, equipped	1,066 kg (2,350 lb)
Max T-O and landing weight	1,633 kg (3,600 lb)
*Military overload T-O weight	1,927 kg (4,250 lb)

PERFORMANCE (estimated at max T-O weight except where indicated):

Never-exceed speed	288 knots (533 km/h; 331 mph) EAS
Max level speed at 4,575 m (15,000 ft)	198 knots (367 km/h; 228 mph)
Econ cruising speed at 6,100 m (20,000 ft)	180 knots (333 km/h; 207 mph)
Stalling speed, flaps down and engine idling	60 knots (111 km/h; 69 mph) EAS
Max rate of climb at S/L	628 m (2,060 ft)/min
Service ceiling	8,260 m (27,100 ft)
T-O run	348 m (1,140 ft)
T-O to 15 m (50 ft)	500 m (1,640 ft)
Landing from 15 m (50 ft) at AUW of 1,450 kg (3,200 lb), normal braking with reverse thrust	677 m (2,220 ft)
Landing run at AUW of 1,405 kg (3,100 lb), normal braking, no reverse thrust	244 m (800 ft)
Range with max fuel, incl external auxiliary tanks, no reserves	1,100 nm (2,037 km; 1,265 miles)
Range with max standard fuel, no reserves	625 nm (1,157 km; 719 miles)

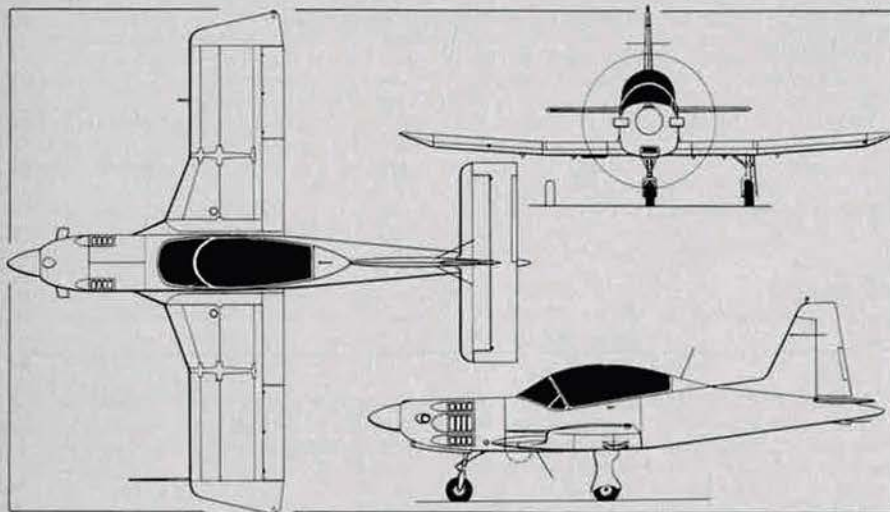
*Must be from smooth hard surface.

BOEING

BOEING AEROSPACE COMPANY: PO Box 3999, Seattle, Washington 98124, USA

The US Navy acronym TACAMO (TAke Charge And Move Out) is used to describe the airborne operation to maintain a survivable, on-station, all-ocean communications link between the US national command authority and the Navy's Trident ballistic-missile-carrying, nuclear-propelled submarine (SSBN) fleet. Of the three basic ways of providing such a link, the airborne option is the most effective. Land-based communication radios, using extra low frequency (ELF) wavebands, are unable to transmit sufficient data, and so can provide only a 'bell ringing' service ordering a particular action by the submarine. The Milstar communications satellite network, while allowing a greater traffic of data, can be used only if the submarine is on the surface, a condition clearly to be avoided in a threat situation. Best results, therefore, are obtained with an airborne relay station which, using very low frequency (VLF) wavebands, can communicate with the submarines while the latter remain submerged.

For several years the TACAMO role has been fulfilled by specially modified versions of the Lockheed C-130 Hercules. First of these was the EC-130G, of which four examples were completed. Two of these continue in operational service, with Atlantic Fleet squadron VQ-4 based at NAS Patuxent River, Maryland, and a third is retained as an EC-130 research and development aircraft. The principal TACAMO version is the EC-130Q, with more advanced avionics and less austere crew accommodation. Sixteen of these were built and 15 are currently in service, some with VQ-4 and others with VQ-3 in the western United States or at NAS Agana, on the island of Guam in the western Pacific. Loitering for an optimum period of seven hours, their offshore patrol radius is limited to some 650-870 nm (1,210-1,610 km; 750-1,000 miles), enabling them to cover only relatively small areas of the Pacific (even from Hawaii) and Atlantic, and their comparatively slow speed prevents them from reaching a potential crisis area as quickly as desired. Moreover, the service life expectancy of



NDN 1T Turbo Firecracker (Pratt & Whitney Aircraft of Canada PT6A-25A turboprop) (Pilot Press)



Retouched photograph of Boeing E-3/AWACS airframe with CFM56 engines, in E-6 TACAMO configuration

about half the EC-130 fleet does not extend beyond March 1989. By the end of that year the number of Trident SSBNs in service should have increased from four in 1984 (the USS *Ohio*, *Michigan*, *Florida*, and *Georgia*) to 11.

Studies for an EC-130 replacement, provisionally known as ECX, began as early as 1976, but proceeded at a fairly low priority until about a year ago. Then, in April 1983, the programme was given more urgent impetus in a report issued by the Presidential commission on the strategic forces. According to this report, the first defence priority is "to ensure continuing, constitutionally legitimate and full control of our strategic forces under conditions of severe stress or actual attack"; in this connection, C³ (command control and communications) "should continue to have the highest priority". The aircraft chosen to fulfil the ECX requirement is based on the Boeing 707/E-3 airframe, and has been given the US military designation E-6.

BOEING E-6 TACAMO

The main parameters of the ECX requirement were dictated by the need for an aircraft with high

subsonic speed, able to carry a payload of at least 13,610 kg (30,000 lb) initially, having a range of 5,210 nm (9,655 km; 6,000 miles) plus in-flight refuelling capability, and an unrefuelled endurance of more than 15 hours. In view of the high cost of the avionics involved, it was decided to utilise if possible an existing airframe and engines, and a number of such options were studied. The best of these would have been a version of the Boeing 747SP with CF6-50C engines, but the 707/E-3A/CFM56 combination offered almost as good a capability at substantially less cost, and on 29 April 1983 Boeing Aerospace was awarded a contract to develop such an aircraft under the designation E-6.

The airframe of the E-6 will be more than 75 per cent identical with that of the E-3A, and will be assembled on the same production line. The prototype, construction of which began in 1983, is scheduled to fly in early 1987. Initial operational capability is planned for November 1988, by which time six E-6s should have been delivered to the US Navy. At this point the Trident force will have increased to ten SSBNs, while the EC-130 TACAMO fleet will have been reduced to 12 aircraft. During

1989-91 it is intended to deliver a further eight E-6s, and the full TACAMO complement of 15 E-6s (including the refurbished prototype) and ten EC-130Qs is planned to be achieved by 1993, when all 14 Trident SSBNs will be in service.

Eight of the E-6s will be allocated to the Pacific Fleet, and the remainder to the Atlantic/Mediterranean. In each of these areas one E-6 will be required to be on station, in the air, at any given time, ready and able to relay emergency action messages to a high percentage of submarines, with an equally high chance of successful first-time reception. Another E-6 would be on standby alert, one on ready alert, and the remainder at dispersed bases or on maintenance or training.

The following details apply to the E-6 prototype:
TYPE: Long endurance communications relay aircraft.

AIRFRAME: Retains more than 75 per cent commonality with that of E-3A, main differences being deletion of the dorsal radome and its support structure, the addition of wingtip ESM/Satcom pods and HF antenna fairings, and increased corrosion protection. Also retained is the nuclear/EMP (electromagnetic pulse) 'hardening' of the E-3A airframe. Additions include incorporation of the large forward freight door of the commercial Boeing 707-320C. Landing gear is identical to that of E-3A.

POWER PLANT: Four 97.86 kN (22,000 lb st) General Electric/SNECMA F108-CF-100 (CFM56-2) turbofan engines in individual underwing pods, as on E/KE-3As for Saudi Arabia. Fuel contained in integral tanks in wings, with single-point refuelling. In-flight refuelling via boom receptacle above flight deck.

ACCOMMODATION: Basic militarised interior side-walls, ceilings, and lighting are same as in E-3A. Interior divided into three main functional areas: forward of wings (flight deck and crew rest area), overwing (eight-man mission crew), and aft of wings (equipment). Forward crew area, 50 per cent common with that of E-3A, accommodates a four-man flight crew on flight deck. Compartment immediately aft of this contains food storage, galley, dining area, toilets, and an eight-bunk rest area for spare crew carried on extended or remote deployment missions. Crew enter by ladder and hatch in floor of this compartment. Then follows the C³ overwing compartment with central and other consoles, their operators, and an airborne control officer (ACO). Through this is reached, to the rear, the compartment containing the R/T racks, transmitters, trailing wire antennae and their winches, parachutes, equipment

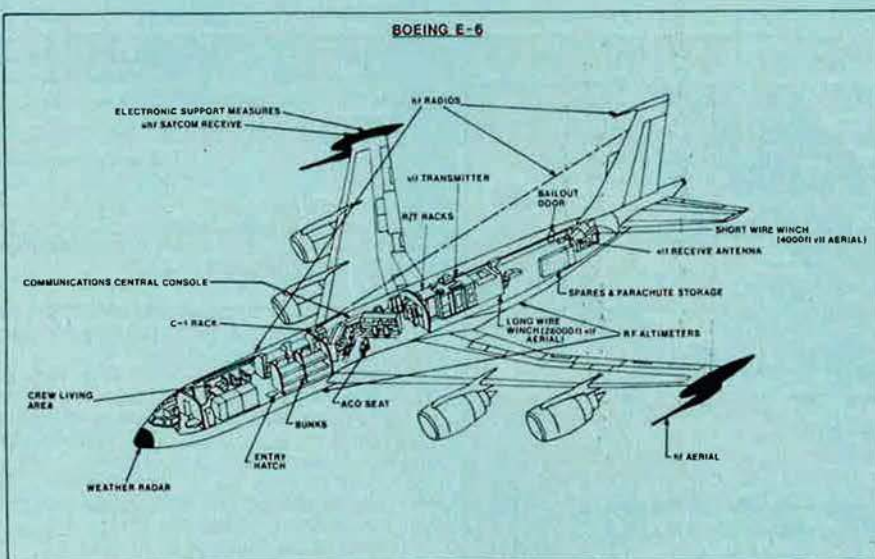


Diagram showing disposition of accommodation and equipment in Boeing's E-6 TACAMO aircraft (*Jane's Defence Weekly*)

spares, and a baggage storage area. There is a bail-out door at rear of this compartment on the starboard side.

SYSTEMS: Some 75 per cent of the E-6's systems are the same as those in the E-3A. Among those retained are the liquid cooling system for the transmitters, the 'draw-through' cooling system for other avionics, the 600kVA electrical power generation system, the APU, the liquid oxygen system, and MIL specification hydraulic oil.

AVIONICS AND OPERATIONAL EQUIPMENT: Three Collins AN/ARC-182 VHF/UHF com transceivers, all with secure voice capability; two Collins AN/ARC-190 HF com (one transceiver, one receive only); and Hughes Aircraft AIC-29 crew intercom with secure voice capability. External aerials for Satcom UHF reception in each wingtip pod; fairings beneath each pod are antennae for standard HF reception. Navigation by triplex Litton LTN-90 ring laser gyro-based inertial reference system integrated with a Litton LTN-211 VLF/Omega system and duplex Smiths Industries digital/analog flight management computer system (FMCS). Bendix APS-133 colour weather radar, in nosecone, with capability for short-range terrain mapping, tanker beacon homing, and waypoint display. Honeywell APN-222 high/low-range (0-15,240 m; 0-50,000 ft) radio altimeter, and Collins low-range (0-762 m; 0-2,500 ft) radio altimeter, with ILS and GPWS. General Instruments ALR-66(V) electronic support measures (ESM), in starboard wingtip pod, provide information on threat detection, identification, bearing, and approximate range. In overwing compartment, overseen by ACO, are two banks of three consoles and a new communications central console, which incorporate ERCS (emergency rocket communications system) receivers, Satcom cryptographic equipment, new teletypes, tape recorders, and other C³ equipment, all hardened against electromagnetic interference. In each operational area the E-6 links 'upward' with the airborne command posts and the Presidential E-4, to satellites, and to the ERCS; and 'downward' to VLF ground stations and the SSBN fleet. The main VLF antenna is a 7,925 m (26,000 ft) long trailing wire aerial (LTWA), with a 41 kg (90 lb) drogue at the end, which is winched out from the middle part of the rear cabin compartment through an opening in the cabin floor. The LTWA, with its drogue, weighs about 495 kg (1,090 lb) and creates some 907 kg (2,000 lb) of drag when fully deployed. Acting as a dipole is a much shorter (1,220 m; 4,000 ft) trailing wire (STWA), winched out from beneath the rear fuselage just forward of the tailplane. At patrol altitude, with the LTWA deployed, the aircraft enters a tight orbit and the drogue stalls, causing the wire to be almost vertical (70 per cent vertically is required for effective sub-sea communications) and the aircraft/wire combination acts like a lasso being whirled

above the head, only in reverse: i.e., the path of the drogue is that of the hand holding the rope, while the orbit of the aircraft is the lasso. Signals transmitted through the trailing wire antennae use 200kW of power, and can be received by submerged SSBNs via a towed buoyant wire antenna. Mean time between failures of complete mission avionics is approx 20 h, but the E-6 is able to carry spares, and a spare crew, to permit extended missions of up to 72 h with in-flight refuelling, and/or deployment to remote bases.

ARMAMENT: None.

DIMENSIONS, EXTERNAL:

Wing span	44.42 m (145 ft 9 in)
Length overall	46.61 m (152 ft 11 in)
Height overall	12.93 m (42 ft 5 in)
Wheel track	6.73 m (22 ft 1 in)
Wheelbase	17.98 m (59 ft 0 in)
Forward cargo door:	
Height	2.34 m (7 ft 8 in)
Width	3.40 m (11 ft 2 in)
Height to sill	3.20 m (10 ft 6 in)

AREA:

Wings, gross	283.4 m ² (3,050.0 sq ft)
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WEIGHTS: Not available for publication

PERFORMANCE:

Cruising speed at 12,200 m (40,000 ft)	445 knots (825 km/h; 512 mph)
Patrol altitude	7,620-9,150 m (25,000-30,000 ft)
On-station endurance (unrefuelled)	16 h
Max mission endurance (with in-flight refuelling)	72 h

SPECTRUM

SPECTRUM AIRCRAFT CORPORATION: Van Nuys Airport, 7120 Hayvenhurst Avenue, Van Nuys, California 91406, USA

SPECTRUM SA-550 SPECTRUM-ONE

Spectrum Aircraft Corporation has extensively modified a Cessna/Reims Aviation FTB 337G Super Skymaster centreline-thrust twin-engined business aircraft to make it more suitable for a wide variety of utility roles. The prototype (N155A) was first flown on 1 February 1983 as the SA-550 Spectrum-One, and embodies major changes to the fuselage structure.

The Super Skymaster's forward engine has been deleted and replaced by a new nose structure featuring a hinged, sideways-opening nosecone to facilitate loading from the front of long items of cargo such as pipework or helicopter rotor blades. Items up to 5.79 m (19 ft) in length can be accommodated. The fuselage has also been lengthened by 1.22 m (4 ft) immediately forward of the wing, creating a flat-floor cabin with accommodation for up to eight persons, or to provide increased cargo capacity. A 1.52 m (5 ft) double door has been incorporated in the fuselage starboard side to facilitate the loading and unloading of outsize cargo.

In place of the standard rear 168 kw (225 hp) Continental TS10-360-D turbocharged piston engine of the Super Skymaster, Spectrum Aircraft has installed a 507 kW (680 shp) Pratt & Whitney Aircraft of Canada PT6A-27 turboprop engine, flat rated at 410 kW (550 shp), driving a Hartzell three-blade reversible-pitch pusher propeller with spinner. The twin tailbooms have been lengthened and the area of the ventral fins increased. Hardpoints for underwing stores pylons have been added, and the port side cockpit window has been fitted with a bulged transparency for improved downward view. Standard fuel capacity is 473 litres (125 US gallons), with optional total capacity of 700 litres (185 US gallons).

The Spectrum-One flight test programme continued in the Spring of 1984. Spectrum Aircraft considers that the conversion of the Super Skymaster's well-proven airframe will provide an aircraft suitable for such roles as air ambulance, bush country utility freighter, law enforcement, maritime patrol, and search and rescue. A second Spectrum-One is due to fly in late 1984.

TYPE: Eight-seat utility/cargo aircraft.

WINGS: High-wing monoplane, with single streamlined bracing strut each side. Wing section NACA 2412 at root, NACA 2409 at tip. Conventional all-metal two-spar structure. Conical camber glass-fibre wingtips. All-metal Frise ailerons. Electrically operated single-slotted flaps. Hardpoints for underwing stores pylons, two per wing outboard of the wing/tailboom junction.

FUSELAGE: Conventional all-metal semi-monocoque, with forward nose section hinged on port side for cargo loading.

TAIL UNIT: Cantilever all-metal structure with twin sweptback fins supported by two metal booms.

LANDING GEAR: Hydraulically operated retractable tricycle type. Cantilever spring steel main legs. Steerable nosewheel with oleo-pneumatic shock absorber.

POWER PLANT: One rear-mounted Pratt & Whitney Aircraft of Canada PT6A-27 turboprop engine of 507 kW (680 shp), flat rated at 410 kW (550 shp), and driving a three-blade reversible-pitch Hartzell pusher propeller. Fuel in integral wing tanks, standard capacity 473 litres (125 US gallons), with optional capacity totalling 700 litres (185 US gallons).

ACCOMMODATION: Pilot and co-pilot on individual seats. Cabin may be arranged to accommodate a maximum of eight persons, an all-freight payload, or a mixed cargo/passenger load as required.

DIMENSIONS, EXTERNAL:

Wing span	11.63 m (38 ft 2 in)
Length overall	11.00 m (36 ft 1 in)
Height overall	2.84 m (9 ft 3/4 in)
Tailplane span	3.06 m (10 ft 0 1/2 in)
Cargo door:	
Height	1.09 m (3 ft 7 in)
Width	1.52 m (5 ft 0 in)
Height to sill	0.64 m (2 ft 1 in)

DIMENSIONS, INTERNAL:

Cabin:	
Length of cargo floor	5.79 m (19 ft 0 in)
Volume	5.83 m ³ (206 cu ft)

WEIGHTS:

Max useful load	998 kg (2,200 lb)
Max T-O and landing weight	2,177 kg (4,800 lb)

PERFORMANCE (at max T-O weight):

Max level speed at 4,575 m (15,000 ft)	217 knots (402 km/h; 250 mph)
Max cruising speed	217 knots (402 km/h; 250 mph)
Stalling speed, power off:	
Flaps up	72 knots (132 km/h; 82 mph)
Flaps down	58 knots (106 km/h; 66 mph)
Max rate of climb at S/L	488 m (1,600 ft)/min
T-O run	136 m (445 ft)
T-O to and landing from 15 m (50 ft)	206 m (675 ft)
Range at 208 knots (386 km/h; 240 mph) at 3,050 m (10,000 ft), no reserves:	
with 381 kg (840 lb) fuel	782 nm (1,448 km; 900 miles)
with auxiliary fuel	1,181 nm (2,188 km; 1,360 miles)



Spectrum-One, a turboprop development of the Cessna 337 Super Skymaster

AIRMAN'S BOOKSHELF

Reading on War

Military Leadership: In Pursuit of Excellence, edited by Robert L. Taylor and William E. Rosenbach. Westview Press, Boulder, Colo., 1984. 253 pages with tables. \$25 hardcover; \$15 paper.

In my judgment, all military professionals should have a professional library of books that they own, have read, and have marked up.

These books should be a source of insight and should be referred to periodically to help "charge the batteries" and to help fight the "in-box" syndrome and the "activity traps" that permeate our daily lives. At a minimum, the professional library should include books on strategy, defense policy, intelligence and logistics, military history, and military leadership.

Some of the classics that every dedicated military professional should read in depth at least once and glance over periodically include: Karl von Clausewitz, *On War*; Edward Mead Earle, *Makers of Modern Strategy*; John F. Reichart and Steven R. Sturm, *American Defense Policy*; Douglas J. Murray and Paul R. Viotti, *Defense Policies of Nations*; Sun Tzu, *The Art of War*; Russell F. Weigley, *The American Way of War*; Martin L. Van Creveld, *Supplying War*; and James M. Burns, *Leadership*.

Military Leadership: In Pursuit of Excellence clearly deserves to be in this professional library. The two editors reviewed more than 2,000 articles on military leadership and selected twenty-three of the very best.

Happily, this nation is taking a hard look at leadership and management in the business world as a result of the agonies of a long recession and the intense competition for domestic and worldwide markets, particularly from the nations of the Pacific basin. Such best-sellers as *In Search of Excellence* and *The One Minute Manager* provide excellent insights for business, government, and military leaders.

The great advantage of this book is its focus on military leadership. The

wisdom of some of the great military leaders of the last fifty years as well as that of distinguished academics and government and business leaders flows eloquently from the pages of this fine compendium.

Presented are marvelous insights on such outstanding leaders as the eighteenth-century Russian general Alexander Suvorov, French Marshal Henri Pétain in World War I, George Marshall, and many others. Equally important are quotes that would be useful to anyone in a leadership position. Some of them:

From James L. Stokesbury: "As long as we do not know exactly what makes men get up out of a hole in the ground and go forward in the face of death at a word from another man, then leadership will remain one of the highest and most elusive of qualities. It will remain an art."

From Matthew Ridgway: "During a critical phase of the Battle of the Bulge, when I commanded the 18th Airborne Corps, another corps commander just entering the fight next to me remarked: 'I'm glad to have you on my flank. It's character that counts.' I had long known him and I knew what he meant. I replied: 'That goes for me, too.' There was no amplification. None was necessary. Each knew the other would stick however great the pressure; would extend help before it was asked, if he could; and would tell the truth, seek no self-glory, and everlastingly keep his word. Such feeling breeds confidence and success."

From William E. Turcotte: "[I]n large organizations, the leader must project the required goals and organizational climate for their attainment through several hierarchical levels. . . . The leader/executive must take into account the various organizational filters, the communication leakages and misinterpretations, sometimes deliberate, of desired policy, goals, and priorities."

Here at the National War College, I teach an elective course on the leadership of large and complex organizations to students from NWC and the Industrial College of the Armed Forces. This book was most helpful to

me; in that respect, I think it would also be useful to many of our military men and women who face the great challenges and joys of leadership.

—Reviewed by Maj. Gen. Perry M. Smith, USAF, Commandant, National War College, Fort McNair, Washington, D. C.

Slated for Command

George S. Brown, General, U.S. Air Force, "Destined for Stars," by Edgar F. Puryear, Jr. Presidio Press, Novato, Calif., 1983. 306 pages with photos and index. \$16.95.

The last time I saw George Brown was on a leisurely Sunday. He was then Chairman of the Joint Chiefs of Staff—at least the most important military leader this side of Moscow. I was one of the anonymous retired.

The General wheeled up to my motel in his old station wagon to gather me for a tennis workout. No entourage, no bodyguards, not even a driver. That evening we reminisced—two Cavalry brats who had defected to the Air Force.

When we were boys, we lived several houses apart at Fort Riley in Kansas. This was in the late 1920s, a peacetime period when the Army was miniscule, grossly underpaid, and considered a backwater and thus neglected by the powers that were.

If an elite corps existed in those days, the Army's Cavalry certainly had a claim to the title. This was based on polo, show jumping, and the mandatory affectations of London riding boots and tailored uniforms on paupers' salaries.

George's father—T. K.—played polo, as did other neighbors, such as Lucian Truscott, Terry Allen, Charlie Gerhart, and Fred Boye. These and others would figure prominently in news from World War II battlegrounds.

"Skinny" Wainwright acted as Master of the Hounds, the most important figure on the Sunday drag hunts, which were family affairs. Youngsters—both male and female—were

encouraged to participate, provided they were acquainted with the etiquette and were up to the jumps.

That was George's background, in elegant if impoverished isolation from the civilian world beyond the post's gates. It was a prologue that virtually ensured attending West Point, which most of us did.

An exceptionally handsome cadet, George Brown hit his stride at the Military Academy. In his senior year as a first classman, he was regimental adjutant, a position that calls for an impressive sleeveful of gold braid. But while his father's old branch waited expectantly for graduation and the return of the captain of the polo team, George opted for the Air Corps. From then on it was a steady rise: Ploesti, Korea, Vietnam, long years in the Pentagon—always sought after and marked for top command.

This book, in large part, presents George Brown's biography through memories of his friends. However, it is not simply an encomium but rather the story of how a straightforward, thoroughly honest, and courageous man rose to the nation's highest military post.

There is a splendid lesson in this book—one that should come across to any young person beginning a career in whatever field. The lesson is a simple one: Integrity and just plain class tend to come out on top every time.

—Reviewed by Gen. T. R. Milton, USAF (Ret.), Contributing Editor.

New Books in Brief

Foulois and the U.S. Army Air Corps, 1931-1935, by Lt. Col. John F. Shiner, USAF. This new volume from the Office of Air Force History illuminates an extremely critical period in the development of an independent US air arm and an equally critical chapter in the career of one of this nation's foremost military air pioneers (see also "Valor," p. 106 of this issue). Benny Foulois's tenure as Chief of the Air Corps began during the depth of the Depression, when funding for the military in general—much less for an upstart and largely unproven air arm—was at its ebb. Nonetheless, Foulois guided the Air Corps with great vision as he promoted the development of a clearly defined airpower doctrine, streamlined and centralized the organization of US airpower, and helped to define an undisputed mission for the Air Corps. A vigorous and sometimes abrasive advocate of change, Foulois pressed forward during that time of technological and

AIRMAN'S BOOKSHELF

strategic transition to lay the foundation for the air forces that would defeat the Axis in World War II. Here author Shiner weaves together the complementary stories of the organization and the man in a scholarly but fascinating narrative that holds many lessons for today's military professional. With photographs, notes, bibliographic notes, and index. Available from the Superintendent of Documents, US Government Printing Office, Washington, D. C. 20402, 1983. 346 pages. \$13.

Jane's All the World's Aircraft, 1983-84, edited by John W. R. Taylor. What can be said in praise of these world-class aviation annuals that hasn't already been said more eloquently many times over? Readers who are familiar with Mr. Taylor's work through the bimonthly "Jane's Supplements" that appear in this magazine are well acquainted with the thorough, definitive *Jane's* style in accounting for "all the world's aircraft" and will find no surprises in this seventy-fourth edition, while newcomers are sure to be astounded by the breadth and depth of this aircraft catalog. In his Foreword to this year's entry, the author makes note of the new generation of Soviet combat aircraft now entering service and laments the shortsightedness of those who control Western defense budgets: "The Soviet Union . . . always builds the best that its designers and engineers are capable of producing. The West builds what the monetarists say it can afford." That attitude, he contends, "is taking a great toll of our industry" even as a "new age of progress" in aviation becomes manifest through the application of advanced technology. With illustrations and indices. Jane's Publishing Inc., New York, N. Y., 1983. 906 pages. \$140.

Manned Spaceflight Log, by Tim Furniss. From Yuri Gagarin's *Vostok 1* flight of April 12, 1961, through more than 100 subsequent expeditions, author Furniss has here cataloged man's first two decades of space exploration. Listed in chronological order, each flight entry provides such basic information as date of launch, site, and mission duration and includes a short expository essay detailing the particulars of the flight. In addition,

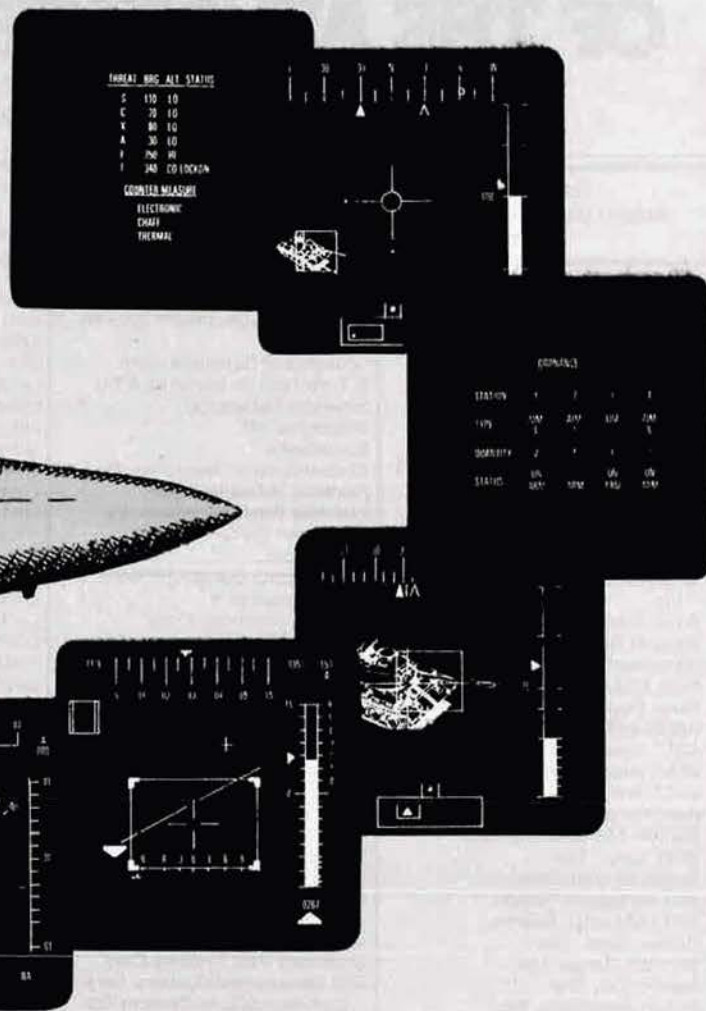
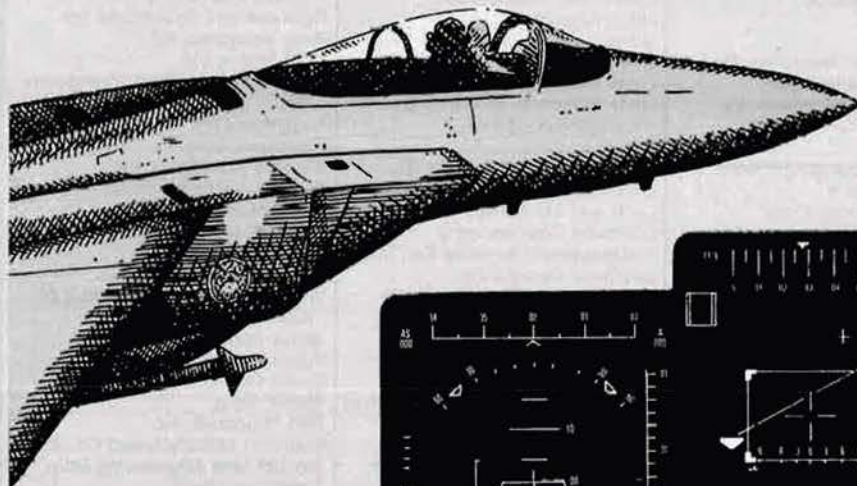
the log features reference tables on such topics as cumulative space experience, lunar walkers, X-15 pilots, Dyna-Soar pilots, and so on. The simple, uncluttered format of the book allows for quick and easy consultation. With a Foreword by Apollo Astronaut David R. Scott, and photos and index. Published by Jane's, distributed by Van Nostrand Reinhold Co., Boston, Mass., 1983. 160 pages. \$11.95.

Prelude to Overlord, by Humphrey Wynn and Susan Young. As Contributing Editor T. R. Milton points out in his "Viewpoint" column on p. 85, one important reason for the success of the D-Day invasion of France in June 1944 was the absence of enemy aircraft over the beaches of Normandy. This book surveys the efforts of Allied air leaders in the months preceding Operation Overlord to ensure that the Luftwaffe would be unable to disrupt the Allied landings. Authors Wynn and Young examine the massive offensive air operations leading up to that fateful June 6, specifying aircraft, commanders, and orders of battle for both sides. Though not intended as a comprehensive account of the air battle, this book does convey to the reader an "idea of the vast scale of effort" that went into the realization of Allied air superiority for Overlord. With photos, appendices, bibliography, and index. Presidio Press, Novato, Calif., 1983. 154 pages. \$16.95.

U.S. Defense Spending: How Much Is Enough? edited by Carol Chambers Collins. In this election year, the question of defense spending is sure to be a hotly debated topic. This Facts on File publication contributes positively to that debate by compiling recent editorials that have been published on this subject by major US and Canadian newspapers. Addressing such defense spending issues as the Soviet threat, industrial preparedness, and defense spending and unemployment, the editorials cover a wide range of viewpoints and offer the reader a "snapshot" of current thinking about these difficult and thorny questions of defense spending. The issues themselves are conveniently framed in concise, explanatory essays that precede each section of editorials. Provocative and enlightening by turns, readers are sure to find a browse through this collection to be anything but boring. With index. Facts on File, Inc., New York, N. Y., 1983. 248 pages. \$22.50.

—Reviewed by Hugh Winkler, Assistant Managing Editor.

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Bell Helicopter Textron	Grumman Aerospace Corp.	Martin Marietta Denver Aerospace	Systron Donner, Safety Systems Div.
Bendix Corp., The	Grumman Data Systems Corp.	Aerospace	Tandem Computers Inc.
Benham Group, The	GTE Government Systems Corp., Communications Systems Div.	MBB	Teledyne, Inc.
Boeing Co., The	GTE Products Corp., Sylvania Systems Group	McDonnell Douglas Corp.	Teledyne CAE
British Aerospace, Inc.	Gulfstream Aerospace Corp.	Midland-Ross Corp./Grimes Div.	Teledyne Ryan Aeronautical
British Aerospace Dynamics Group	Hamilton Technology, Inc.	MITRE Corp., The	Texas Instruments Inc.
Brunswick Corp., Defense Div.	Harris Government Communications Group	Morton Thiokol, Inc.	Thomson-CSF, Inc.
Budd Co., The	Harris Government Support Systems Div.	Motorola, Inc., Government Electronics Div.	Tracor, Inc.
California Microwave, Inc., Communication Systems Operation	Harris Government Systems Sector	NORDAM	TRW Space & Technology Group
Calspan Corp., Advanced Technology Center	Hayes International Corp.	Northrop Corp.	Turbomach Div. of Solar Turbines, Inc.
Canadair, Inc.	Hazeltine Corp.	Northrop Corp., Aircraft Div.	United Technologies Corp.
Canadian Marconi Co.	Hercules Aerospace Div.	Odetics, Inc.	UTC, Chemical Systems Div.
Cessna Aircraft Co.	Honeycomb Co. of America, Inc.	OEA, Inc.	UTC, Hamilton Standard Div.
Chamberlain Manufacturing Corp.	Honeywell, Inc., Aerospace & Defense Group	O. Miller Associates	UTC, Norden Systems, Inc.
Clearprint Paper Co., Inc.	Honeywell, Inc., Precision Weapons Systems Div.	Orbital Sciences Corp.	UTC, Pratt & Whitney Aircraft Group
Clifton Precision, Instruments & Life Support Div.	Howell Instruments, Inc.	ORI, Inc.	UTC, Research Center
Colt Industries, Inc.	HR Textron, Inc.	Oshkosh Truck Corp.	UTC, Sikorsky Aircraft Div.
Computer Sciences Corp.	Hughes Aircraft Co.	Over-Lowe Co.	Varo, Inc.
Comtech Government Systems Div.	IBM Corp., Federal Systems Div.	Pacific Car and Foundry Co.	Vega Precision Laboratories
Conrac Corp.	IBM National Accounts Div.	Pan Am World Services, Inc., Aerospace Services Div.	Vitro Corp.
Continental Page Engineers, Inc.	Information Systems & Networks Corp.	Planning Research Corp.	Western Gear Corp.
Control Data Corp.	Intermetrics, Inc.	Products Research & Chemical Corp.	Western Union Telegraph Co., Government Systems Div.
Cryomec, Inc.	Interstate Electronics Corp.	Rand Corp.	Westinghouse Electric Corp.
Cubic Corp.	Israel Aircraft Industries Int'l, Inc.	Raytheon Co.	Wild Heerbrugg Instruments, Inc.
Cypress International, Inc.	Itek Optical Systems, A Division of Litton Industries	RCA, Government Systems Div.	Williams International
Data General Corp.	ITT Defense Communications Div.	RECON/OPTICAL, Inc., CAI Div.	Wyman-Gordon Co.
Datatape, Inc.	ITT Defense-Space Group	Rediffusion Simulation, Inc.	Xerox Corp.
Dowty	ITT Federal Electric Corp.	Republic Electronics, Inc.	
Durakon, Inc.	Jane's	Rockwell Int'l Corp.	
Dynalectron Corp.		Rockwell Int'l, Collins Government Avionics Div.	
Eastman Kodak Co.			
Eaton Associates, Inc.			
Eaton Corp., ALL Div.			



Intercom

A Tribute to Tennessee Ernie Ford, Medal of Freedom Recipient

"Bless your pea-pickin' heart!" AFA Executive Director Russ Dougherty said in a telegram to his wartime buddy and B-29 crewmate, country singer Tennessee Ernie Ford. This simple statement, conveyed on behalf of Ern's many AFA friends, commemorated a grand occasion. Tennessee Ernie Ford had received America's highest civilian honor, the Medal of Freedom, from AFA charter member President Ronald Reagan in a White House ceremony on March 26.

In part, the citation pinpointed Ernie's musical talents, warm personality, and quick down-home wit as the reasons why he has "won the hearts of the American people. Ford's music, which revealed his character and soul to all who listened, inspired as well as entertained his audiences," the citation reads.

Russ Dougherty recalled Ern's musical talent at AFA's dinner dance program during the 1981 AFA National Convention: "Ernie Ford was a superb crew member and an expert with the Norden bombsight . . . but I paid a price for this expertise, for Ernie constantly sang on the interphone. Even on the bomb run, he would hum and sing. Fortunately, as those of you who have been privileged to see the configuration of a B-29 will remember, the pilot can reach the back of the helmet of the bombardier with his right foot! . . ."

That evening was marked by the gentle joshing between the two comrades-in-arms and featured Ern and his magnificent bass voice in his now-familiar roles as AFA master of ceremonies and entertainer. He has performed these tasks with gusto on many occasions over the years—at several National Conventions and Outstanding (Air Force Academy) Squadron Dinners and at local chapter functions.

The Norden Bombsight

It was at AFA's "Honors Night" at the 1964 National Convention in Washington, D. C., that Ern received a Nor-



ABOVE: Tennessee Ernie Ford is congratulated by President Reagan on receiving the Medal of Freedom. **RIGHT:** Ol' Ern performs with the Air Force Band at the 1981 AFA Convention.

den bombsight from AFA in gratitude for serving as the evening's emcee. Nicknamed "The Football" by World War II bombardiers in Europe and "The Blue Ox" by those in the Far East, the Norden bombsight was Ern's specialty during the war. Cast in black metal, roughly cylindrical in shape, and studded with knobs and apertures, the bombsight became famous for amazing accuracy and was considered one of the most important US military weapons of World War II. Still, the bombardier had to make precise calculations and be careful in inserting the data into the bombsight and methodical to assure proper synchronization on the target.

Ern was "plain old good" at it even while singing or humming a catchy tune. In 1977, Ern donated his Norden bombsight to the Confederate Air Force Museum in Harlingen, Tex., where it is on public display. Another Norden bombsight is housed in *Fifi*,



the Confederate Air Force's restored and airworthy B-29 Superfortress.

Tennessee Ernie Ford had interrupted his budding radio career in December 1941 to enlist in the Army Air Corps. He flew in heavy bombers

White House photo by Bill Fitz-Patrick



AFA's Los Angeles Airpower Chapter recently presented awards to five members of Space Division at a ceremony at Los Angeles AFS, Calif. Pictured are, from left, SPACECOM Commander Gen. James V. Hartinger, keynote speaker at the event; award winners Col. Walter S. Yager, Lt. Col. William Linton, 1st Lt. Nancy Rhoades, Capt. Joseph Carretto, and CMSgt. Floyd A. Asbury; and Space Division Commander Lt. Gen. Forrest S. McCartney. See item. (USAF photo by Mike Keefe)



TSgt. Robert Brown, left, accepts his NCO of the quarter award from Air Force Vice Chief of Staff Gen. Lawrence A. Skantze during an award ceremony sponsored by AFA's Misawa Chapter and held at Misawa AB, Japan, in March. See item. (USAF photo by SrA. Carl Beevers)



AFA's General David C. Jones Chapter recently honored Minot AFB, N. D., units and personnel at a community recognition dinner. Here, Chapter President Ruth Ziegler presents award to Col. Alan V. Rogers, Commander of SAC's 5th Bomb Wing. See item. (Photo courtesy of Minot Daily News)

as a World War II bombardier and later served as an instructor while stationed in California. There he met and married his wife, the former Betty Heminger. They have two sons, Jeffrey and Brion.

Then AFA President Jess Larson introduced Ern to the 1967 Honors Night crowd as "that pea-pickin' television tunesmith from Tennessee" (he was born in Bristol) and noted that as a World War II bombardier he "scored so many direct hits that he won his Air Force wings all over again." As emcee, Ern combined folksiness with eloquence to relate the achievements of AFA's award winners and performed what he loved to do best—show-stealing parodies of his popular songs. "Sixteen Tons" became "Thir-

ty-six Tons"—the payload of the C-141—sung in tribute to the achievements in Vietnam of the 60th Military Airlift Wing, Travis AFB, Calif., an AFA Citation of Honor winner. "Happiness Is" was performed with the Singing Sergeants and started out with these lines:

To a pilot . . . it is fly, fly, fly.
To a General . . . it is I, I, I.
In a silo, it's lunch on time.
To the recruit, it's a short chow line.

Ern brought the house down when he premiered the ballad of "The Lonesome Hobo Call."

Lending His Name

In 1977, ol' Ern lent his name to

what was formerly the San Mateo, Calif., AFA Chapter. It merged with AFA's El Camino Real Chapter in 1980. Since then, the Chapter has honored its namesake at the Tennessee Ernie Ford Night awards ceremony during which Ern presents awards, including a namesake award he sponsors himself. The first recipient was his old crewmate, Russ Dougherty, in 1982. Last year's award went to retired Gen. Robert Huyser, former Commander in Chief of the Military Airlift Command.

In his typically folksy, friendly way, Ern charms the crowd, always making the event a sellout. He furnishes his record albums as door prizes. Further, former Chapter presidents have called him "totally involved," a "strong supporter," and "most gracious and friendly to everybody." One year he joined Chapter members on a tour of Lockheed Missiles & Space Co. in Sunnyvale, Calif., and has served and helped many times as an advisor and friend.

As was stated in tribute to Ernie at the 1981 AFA Convention: "He's lent his name to the Ernie Ford Chapter . . . and has given selflessly of his rare talent and extraordinary personal charm to hundreds and hundreds of Air Force audiences across the land and overseas. . . ."

The rest of Tennessee Ernie Ford's Medal of Freedom citation says this: "His respect for traditional values, his strong faith in God, and his unlimited capacity for human kindness have greatly endeared him to his fellow countrymen. America is a nation richer in spirit because of Tennessee Ernie Ford."

So is AFA. Congratulations, you ol' pea-picker!
—By Robin Whittle

Three AFA Chapters Recognize Local Air Force Personnel

Three AFA chapters—two Stateside and one overseas—recently held award ceremonies honoring local Air Force people.

The Misawa Chapter's quarterly awards luncheon was held in March at Misawa AB, Japan, and featured Air Force Vice Chief of Staff Gen. Lawrence A. Skantze as guest speaker. General Skantze, who visited the base as part of his tour of the Pacific, was accompanied by Chief Master Sergeant of the Air Force Sam E. Parish, Air Force Comptroller Lt. Gen. George M. Browning, Jr., and Air

Force Deputy Surgeon General Maj. Gen. Murphy A. Chesney.

General Skantze presented awards in four categories to base personnel. Junior officer of the quarter honors went to 1st Lt. Michael Toder of the 6112th Air Base Wing; MSgt. David Prosser of the 6920th Electronic Security Group was named senior NCO of the quarter; TSgt. Robert Brown, also of the 6920th ESG, was recognized as the NCO of the quarter; and another member of the 6920th, SrA. David Thorne, captured airman of the quarter honors.

On the other side of the globe, AFA's General David C. Jones Chapter teamed up with the Minot (N. D.) Chamber of Commerce to sponsor a community recognition dinner for Minot AFB units and personnel who received military recognition in 1983.

Approximately 300 Minot-area civilians and base personnel attended the dinner, held in March at the Sheraton-Riverside Inn. Award plaques, donated by local businesses, were presented to nineteen units and individuals. Speakers at the event included Minot Mayor Thomas Lee and James Crawford, North Dakota State AFA President.

Finally, AFA's Los Angeles Airpower Chapter honored five individuals from Space Division at an award ceremony held in March at Los Angeles AFS, Calif. The award presentations were preceded by an executive forum dealing with the subject "Are We Ready for the Next Ten Years?", which drew fifty representatives from the military and industry. The forum is sponsored by the Chapter and is held annually in conjunction with the award ceremony.

Col. Walter S. Yager, commander of the Shuttle Activation Task Force, Vandenberg AFB, Calif., received the Lt. Gen. John O'Neill Award as the program director of the year. Lt. Col. William Linton was presented the Lt. Gen. Kenneth Schultz Award as the field-grade project officer of the year. Colonel Linton is responsible for design, development, testing, and engineering for the Defense Satellite Communications System Phase III program. Generals O'Neill and Schultz are former commanders of the Space and Missile Systems Organization (SAMS), Space Division's predecessor.

CMSgt. Floyd A. Asbury was selected as the first winner of the Lt. Gen. Richard Henry Award, established this year to recognize out-



Jim McDonnell, AFA's Assistant Executive Director for Military Relations, addresses AFA's Enlisted Council regarding its sponsorship of the forthcoming book about the eight Chief Master Sergeants of the Air Force. Entitled *The Chiefs*, the book will be published by AFA's affiliate, the Aerospace Education Foundation. Both the Enlisted Council and AFA's Junior Officer Advisory Council met recently in San Antonio, Tex. See item.

standing leadership. Sergeant Asbury is responsible for organizing the anti-satellite program activities at Edwards AFB, Calif. General Henry is a former commander of Space Division.

Outstanding company-grade officer of the year honors went to 1st Lt. Nancy Rhoades. Lieutenant Rhoades is a satellite systems test engineer for the Defense Support Program. Capt. Joseph Carretto, a Space Shuttle flight controller assigned to Space Division's Manned Space Flight Support Group at Johnson Space Center, Houston, Tex., was named the young engineer of the year.

The names of the winners will be engraved on the perpetual trophies that are on display at Space Division headquarters at Los Angeles AFS, Calif.

Two AFA Advisory Councils Meet In San Antonio

The first 1984 meeting of two of AFA's most active and productive advisory groups—the Junior Officer Advisory Council (JOAC) and the Enlisted Council—took place recently in San Antonio, Tex.

On hand to welcome the two groups were several elected AFA leaders, including National President David L. Blankenship, Vice President

for the Southwest Region Joseph Turner, and Alamo Chapter President Sandy Faust. The Alamo Chapter and the Texas State AFA organization hosted a dinner for the two groups during their stay in San Antonio.

The Councils, which advise both AFA and the Air Force on matters of particular concern to junior officers and enlisted people, each began work on their 1984 AFA project—a guidebook for junior officers and one for NCOs. Also, in response to instructions from AFA President Blankenship, the Councils are assembling a prioritized listing of those aspects of Air Force life, such as the retirement program and expanded job responsibilities, that are integral to a satisfying career.

The listing will eventually assist AFA leaders and National Convention delegates in judging the appropriate degree of AFA support for traditional benefits.

The JOAC is led by Capt. Terry L. Barton of the Squadron Officer School, Maxwell AFB, Ala., and the Enlisted Council is led by CMSgt. James C. Binnicker, Assistant for Chief Master Sergeant Matters, Randolph AFB, Tex. Maj. Gen. Robert C. Oaks, Director of Personnel Plans, Hq. USAF, is the JOAC Advisor, and CMSAF Sam E. Parish serves as the Enlisted Council Advisor.

—By James A. McDonnell, Jr.

Unit Reunions

Aerospace Audiovisual Service

Members of the Military Airlift Command Air Photographic Charting Service (APCS), Aerospace Audiovisual Service (AAVS), and all its related squadrons will hold a reunion on September 1, 1984, in Orlando, Fla. **Contact:** SMSgt. Skip Green, P. O. Box 250, Orlando, Fla. 32801. TSgt. William Britton, 3868 Orange Lake Dr., Orlando, Fla. 32819.

Bombardiers Alumni Ass'n

Members of the Bombardiers Alumni Association (BAA) will hold their reunion on August 15-19, 1984, in Nashville, Tenn. **Contact:** Bill Burmester, 485 Lincoln Ave., Mt. Vernon, N. Y. 10552. Phone: (914) 699-4196.

Mid-America Air Group

The Mid-America Air Group will hold an air show on June 30, 1984, in Ada, Okla., that will feature old warbirds, classics, and antique aircraft. **Contact:** Mid-America Air Group, P. O. Box 2621, Ada, Okla. 74820. Phone: (405) 631-3611.

Roswell AAF

The Roswell Army Airfield Veterans Association (Walker AFB, N. M.) will hold its reunion on September 28-30, 1984, at the Roswell Inn in Roswell, N. M. Membership in the RAAF Veterans Association is open to personnel who were stationed at RAAF-WAFB from 1941-67. **Contact:** RAAF Veterans Association, P. O. Box 1023, Roswell, N. M. 88201.

1st Strategic Air Depot Ass'n

Veterans of the 1st Strategic Air Depot, stationed at Honington, England (1942-45), will hold their reunion on September 20-23, 1984, in Colorado Springs, Colo. **Contact:** Warren L. Stanley, 3207 Myles Ct., #3, San Jose, Calif. 95117.

6th Combat Cargo Squadron

The 6th Combat Cargo Squadron, 2d Combat Group, will hold its eighth reunion

(fortieth anniversary) on September 28-30, 1984, at the Crown Plaza Holiday Inn in Dallas, Tex. **Contact:** Norman A. Olson, Rte. 3, Box 35, Mineral Wells, Tex. 76067.

8th Fighter Group Ass'n

A reunion will be held for members and attached squadrons and units of the 8th Fighter Group on September 20-22, 1984. The reunion will be held at the Treasure Island Inn in Daytona Beach, Fla. **Contact:** Vincent W. Steffanic, 21 Curson St., West Warwick, R. I. 02893.

10th Radio Squadron

The 10th Radio Squadron Mobile/FULANT, stationed at Chicksands, England, and personnel attached to this Air Force/Navy unit (1950-53) will hold a reunion in conjunction with the US Air Force Security Service/Electronic Security Command (USAFSS/ESC) Alumni Association on September 28-29, 1984. **Contact:** Frank Prosser, 2502 Babcock Rd., #202, San Antonio, Tex. 78229. Phone: (512) 692-7506. Ralph "Bull" Rich, 6506 Fleethill Dr., San Antonio, Tex. 78242. Phone: (512) 674-2459.

11th Bomb Group Ass'n

Members of the 11th Bomb Group will hold their reunion on September 4-9, 1984, at the Sheraton-Regal Inn, Hyannis, Mass. **Contact:** Bob May, P. O. Box 637, Seffner, Fla. 33584.

12th Observation Squadron

A reunion for the 12th Observation Squadron will be held on September 27-29, 1984, in Nashville, Tenn. **Contact:** David Sopko, 3644 Irma Ave., Youngstown, Ohio 44502. Phone: (216) 788-4734. John Florence, 4849 Delores Pl., Orlando, Fla. 32806. Phone: (305) 851-7243.

34th Bomb Group

The 34th Bomb Group will hold a reunion on September 13-16, 1984, in Nashville,

Tenn. **Contact:** Ray L. Summa, 34th Bomb Group, 2910 Bittersweet Lane, Anderson, Ind. 46011. Phone: (317) 644-6027.

38th Bomb Group

Members of the 38th Bomb Group (South Pacific) will hold a reunion on September 7-9, 1984, in Colorado Springs, Colo. **Contact:** John A. Mutu, 625 Bridger Lane, Colorado Springs, Colo. 80909. Phone: (303) 596-0114.

Class 41-E

Members of Flying Class 41-E (Barksdale, Brooks, Kelly, Maxwell, Selma, and Stockton Fields) will hold a reunion on October 5-7, 1984, in San Antonio, Tex. **Contact:** L. Berglund, 1510 Tatum Dr., Arlington, Tex. 76012. Phone: (817) 461-6450.

Class 42-A Ass'n

Veterans of Class 42-A (Brooks Field) will hold their reunion on September 13-16, 1984, at the MGM Grand Hotel in Reno, Nev. **Contact:** Clarence E. Becker, 5000 Lakeridge Dr., Reno, Nev. 89509.

Class 42-I

The Gulf Coast Training Center Class 42-I will hold its forty-second anniversary reunion in Las Vegas, Nev., on September 20-23, 1984. **Contact:** John P. Byrne, 9318 Country Club Dr., Sun City, Ariz. 85373.

46th Troop Carrier Squadron

The 46th Troop Carrier Squadron "Jungle Skippers" will hold its reunion on September 14-16, 1984, at the Ramada Inn East (Columbus Airport), Columbus, Ohio. **Contact:** Tom Soltis, 23332 Roger Dr., Euclid, Ohio 44123. Phone: (216) 732-9492.

68th Air Service Group

A reunion for the 68th Air Service Group will be held on September 11, 1984, in St. Ignace, Mich. **Contact:** Bob Pierce, P. O. Box 15061, Lakewood, Colo. 80215. Phone: (303) 985-1933.

304th Fighter Squadron Ass'n

Veterans of the 304th will hold their reunion on July 18-22, 1984, in Dayton, Ohio. **Contact:** Tracy P. Little, 3011 Westover St., Shreveport, La. 71108. Phone: (318) 635-2426.

319th Bomb Group

A reunion for current and former members of the 319th Bomb Group/Wing will be held on September 30-October 4, 1984, in Sacramento, Calif. **Contact:** Harold E. Oyster, 662 Deering Dr., Akron, Ohio 44313. Phone: (216) 836-4716.

321st Bomb Group

A reunion will be held for former members of the 321st Bomb Group (1942-49), the 321st Bomb Wing (1953-61), and the 321st Strategic Missile Wing (1964 through present) on August 1-4, 1984, in conjunction with the Grand Forks AFB, N. D., open house "Friends and Neighbors Day." **Contact:** Maj. Mel Johnson, USAF, 321st SMW/



CAP Cadet 2d Lt. Craig Hiltz displays his Massachusetts State AFA CAP Cadet Aerospace Achievement Award. Pictured with Cadet Hiltz at the 1984 Massachusetts Wing Conference Banquet are Wing Commander Col. David Gardner, left, and Chicopee Chapter President Andrew Trushaw. (Photo by Bill Stirling)

Policy and Information: A Constantly Changing And Challenging Task

By Capt. Patricia R. Rogers, USAF
CONTRIBUTING EDITOR

"We have a constantly changing and challenging task: to educate ourselves and others about key national defense issues and the critical role aerospace plays in maintaining US defenses," says Robin Whittle, the Air Force Association's energetic Director of Communications.

AFA's Policy and Information Department, headed by Assistant Executive Director Edgar Ulsamer, is responsible for carrying out that mission. The department has many functions that fall loosely into two areas: policy guidance and communications. "Our job is to inform in the broadest sense of the word," relates Mr. Ulsamer, a veteran writer and analyst of defense issues.

Mr. Ulsamer works with Kathleen McAuliffe, AFA's Director of Legislative Research, to provide background information on defense matters to AFA leaders and staff. AFA's internal and external communications are handled by Ms. Whittle and her assistant, Kathryn Ryon. Doreatha Major is the Administrative Assistant for the department.

The general AFA membership is familiar with Mr. Ulsamer's work through his "In Focus" column and his feature articles in AIR FORCE Magazine. His previous work as a foreign correspondent in Vienna covering Iron Curtain countries for United Press gives Mr. Ulsamer a good understanding of communism and the Soviet threat. He observed the Communist takeover of Eastern Europe firsthand. During World War II, he worked in Europe for the Office of Strategic Services, a forerunner of the Central Intelligence Agency. He started his career with AFA twenty years ago as a special assistant to James H. Straubel, then AFA's Executive Director, and as Associate Editor for AIR FORCE Magazine.

Mr. Ulsamer and Ms. McAuliffe, through the Executive Director, provide background information for the Association's elected national leaders concerned with drawing up AFA's Statement of Policy and Policy Papers on Force Modernization and R&D. They also work closely with pertinent elements of Congress and the Executive Branch on a wide range of national security issues.

Ms. McAuliffe is no stranger to the workings of Congress. She served three years on the staff of the minority leadership of the House of Representatives before assuming her present position with AFA in March 1980. Her succinct reporting on defense matters before Congress is featured in a monthly AIR FORCE Magazine column, "Capitol Hill." When Congress is in session, she also sends out a weekly update and analysis of national security programs in procurement and R&D to national, state, and chapter leaders.

"Simply providing information isn't good enough," says Ms. Whittle. "We've found that our people don't have time to be PR professionals, so we provide them with products they can use with the media." These products run the gamut from films, videotapes, and television public-service announcements to suggested editorials and letters to the editor. For instance, she provided editorial material countering the one-sided approach of ABC's TV movie *The Day After*, and AFA leaders used it to get letters to the editor published in twenty-seven newspapers with a combined readership of more than 6,000,000 Americans.

Ms. Whittle cites a number of successful and significant media penetrations this year, "thanks to the hard work of many

of our AFA leaders." The department works with national, state, and chapter leaders and AFA's seventy-plus communications directors to penetrate the grass-roots media. As liaison with the media at AFA's national convention and the many national symposia AFA sponsors in various cities each year, Ms. Whittle believes that some of the inaccuracies in reporting result from the assignment of cub reporters to cover "fairly sophisticated and complex presentations." She says that some AFA leaders provide a great service "in using our materials to help clarify the issues."

To keep AFA leaders informed, Ms. Whittle and Assistant Director of Communications Kathryn Ryon publish AFA's monthly newsletter "Crossfeed," which serves to "exchange ideas and programs that work so that all AFA leaders benefit," Ms. Whittle says. They also publish AFA's periodic Field Service Reports, which provide more detail on a given issue. Two recent reports on military retirement and Soviet strategy in arms control were reprinted in local newspapers, thanks to the efforts of local AFA leaders.

In addition to news releases to the media on all major AFA events, the Communications Department provides releases to local chapters and maintains an active film and videotape lending library and a speech block service. "We write the essentials of an issue in speech form so that our leaders can 'tailor' their address to the particular audience," Ms. Whittle says.

The department also produces promotional material for AFA, such as the sound/slide and videotape shows on AFA, and, this year, distributed an AFA public-service television spot featuring famed test pilot Brig. Gen. Chuck Yeager, USAF (Ret.). In addition, Ms. Whittle conceived and developed AFA's "First Nationwide Video Telecast," held during last year's convention, in which eight aerospace briefings were beamed via satellite to ten Air Force commands and divisions. This telecast recently won the Certificate of Excellence in the Special Public Relations category in the 1983 Thoth Awards Competition sponsored by the Nation's Capital Chapter of the Public Relations Society of America.

Ms. Whittle, a graduate of American University and the University of Oregon and the self-proclaimed "last hawk to leave Oregon," joined AFA's Administration Department in 1972, spent some time on the AIR FORCE Magazine staff, and then helped set up AFA's Communications Department in 1976. She became its director three years later. Ms. Ryon joined AFA in 1983.

Mrs. Major, the department's Administrative Assistant, types all of the reports, news releases, correspondence, and just about any other material that leaves the office. In addition to her numerous administrative duties, she also manages a film/video lending library of some 165 videotapes and sixteen films.

"We're getting a lot of exposure with these materials because AFA leaders are showing them to Kiwanis and Rotary Clubs, high schools, and civic groups," she said. Mrs. Major, a native of Washington, D. C., joined AFA in 1977.



AFA's Policy and Information Department includes (from left): Legislative Researcher Kathleen McAuliffe, Doreatha Major, Communications Director Robin Whittle, Assistant Executive Director Edgar Ulsamer, and Kathryn Ryon.



AFA State Contacts

Following each state name, in parentheses, are the names of the localities in which AFA Chapters are located. Information regarding these Chapters, or any place of AFA's activities within the state, may be obtained from the state contact.

ALABAMA (Auburn, Birmingham, Huntsville, Mobile, Montgomery, Selma): **Jim Patterson**, 802 Brickell Rd., N.W., Huntsville, Ala. 35805 (phone 205-837-5087).

ALASKA (Anchorage, Fairbanks): **William M. Mack**, 2620 Karluk St., Anchorage, Alaska 99504 (phone 907-279-3270).

ARIZONA (Phoenix, Sedona, Sun City, Tucson): **Thomas W. Henderson**, 4820 N. Camino Real, Tucson, Ariz. 85718 (phone 602-299-6467).

ARKANSAS (Blytheville, Fayetteville, Fort Smith, Little Rock): **Aaron E. Dickerson**, 710 S. 12th, Rogers, Ark. 72756 (phone 501-273-7038).

CALIFORNIA (Apple Valley, Edwards, Fairfield, Fresno, Hermosa Beach, Los Angeles, Merced, Monterey, Novato, Orange County, Pasadena, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, San Jose, Santa Barbara, Santa Monica, Sunnyvale, Vandenberg AFB, Yuba City): **David Graham**, 29611 Vista Plaza Drive, Laguna Niguel, Calif. 92677 (phone 714-495-4622).

COLORADO (Aurora, Boulder, Colorado Springs, Denver, Fort Collins, Grand Junction, Greeley, Littleton, Pueblo, Waterton): **William R. Morris**, 5521 S. Telluride Court, Aurora, Colo. 80015 (phone 303-693-4464).

CONNECTICUT (East Hartford, North Haven, Storrs, Stratford, Westport, Windsor Locks): **Raymond E. Choquette**, 16 Tonica Springs Trail, Manchester, Conn. 06040 (phone 203-646-4818).

DELAWARE (Dover, Wilmington): **Joseph H. Allen, Jr.**, 537 Roberta Ave., Dover, Del. 19901 (phone 302-674-3472).

DISTRICT OF COLUMBIA (Washington, D. C.): **David J. Smith**, 1750 Pa. Ave., N. W., Suite 400, Washington, D. C. 20006 (phone 202-637-3346).

FLORIDA (Brandon, Cape Coral, Daytona Beach, Fort Walton Beach, Gainesville, Homestead, Jacksonville, Leesburg, Naples, New Port Richey, Orlando, Panama City, Patrick AFB, Redington Beach, Sarasota, Tallahassee, Tampa, West Palm Beach, Winter Haven): **Morgan S. Tyler, Jr.**, 1776 6th St., N. W., Apt. 606, Winter Haven, Fla. 33880 (phone 813-299-2773).

GEORGIA (Athens, Atlanta, Columbus, Rome, Savannah, St. Simons Island, Valdosta, Warner Robins): **Thomas E. Farr**, 92 Brandon Ridge Drive, Atlanta, Ga. 30328 (phone 404-255-5213).

GUAM (Agana): **Joe Gyulavics**, P. O. Box 21543, Guam 96921 (phone 671-734-2369).

HAWAII (Honolulu): **Don J. Daley**, P. O. Box 3200, Honolulu, Hawaii 96847 (phone 808-525-6296).

IDAHO (Boise, Mountain Home, Twin Falls): **Stanley I. Anderson**, Box 45, Gowen Field, Boise, Idaho 83709 (phone 208-362-9360).

ILLINOIS (Belleville, Champaign, Chicago, Elmhurst, Peoria, Springfield-Decatur): **Kyle Robeson**, 125 W. Church St., Champaign, Ill. 61820 (phone 217-352-3936).

INDIANA (Bloomfield, Fort Wayne, Indianapolis, Lafayette, Logansport, Marion, Mentone, South Bend): **John Kagel**, 1029 Riverside Drive, South Bend, Ind. 46616 (phone 219-234-8855).

IOWA (Des Moines): **Carl B. Zimmerman**, 608 Waterloo Bldg., Waterloo, Iowa 50701 (phone 319-232-2650).

KANSAS (Topeka, Wichita): **Cletus J. Pottebaum**, 6503 E. Murrdock, Wichita, Kan. 67206 (phone 316-683-3963).

KENTUCKY (Lexington, Louisville): **Carl D. Black**, 11500 Redwood Way, Anchorage, Ky. 40223 (phone 502-245-7697).

LOUISIANA (Alexandria, Baton Rouge, Bossier City, Monroe, New Orleans, Shreveport): **James P. LeBlanc**, 5905 Flagler St., Metairie, La. 70003 (phone 504-887-8524).

MAINE (Bangor, Limestone, N. Berwick): **Alban E. Cyr, Sr.**, P. O. Box 160, Caribou, Me. 04736 (phone 207-496-3331).

MARYLAND (Andrews AFB area, Baltimore): **William L. Ryon, Jr.**, 8711 Liberty Lane, Potomac, Md. 20854 (phone 301-299-8717).

MASSACHUSETTS (Bedford, Boston, Falmouth, Florence, Hanscom AFB, Lexington, Taunton, Worcester): **John F. White**, 49 West Eagle St., East Boston, Mass. 02128 (phone 617-567-1592).

MICHIGAN (Battle Creek, Detroit, Kalamazoo, Marquette, Mount Clemens, Oscoda, Petoskey, Southfield): **Robert J. Schaeztl**, 42247 Trotwood Court, Canton, Mich. 48187 (phone 313-552-3280).

MINNESOTA (Duluth, Minneapolis-St. Paul): **Edward A. Orman**, 368 Pike Lake, Duluth, Minn. 55811 (phone 218-727-8381).

MISSISSIPPI (Biloxi, Columbus, Jackson): **Clarence Ball, Jr.**, 5813 David Davis Pl., Ocean Springs, Miss. 39564 (phone 601-875-5883).

MISSOURI (Kansas City, Knob Noster, Springfield, St. Louis): **James R.**

Hopkins, 316 Hillcrest Drive, Warrensburg, Mo. 64093 (phone 816-747-6087).

MONTANA (Great Falls): **John Phillips**, P. O. Box 685, Great Falls, Mont. 59403 (phone 406-761-3989).

NEBRASKA (Lincoln, Omaha): **Edward A. Crouchley**, 1314 Douglas On the Mall, Omaha, Neb. 68102 (phone 402-633-2125).

NEVADA (Las Vegas, Reno): **William J. Becker**, 1709 Valmora, Las Vegas, Nev. 89102 (phone 702-873-5945).

NEW HAMPSHIRE (Manchester, Pease AFB): **Robert N. McChesney**, Scruton Pond Rd., Barrington, N. H. 03825 (phone 603-664-5090).

NEW JERSEY (Andover, Atlantic City, Belleville, Camden, Chatham, Cherry Hill, E. Rutherford, Forked River, Fort Monmouth, Jersey City, McGuire AFB, Middlesex County, Newark, Old Bridge, Trenton, Wallington, West Orange, Whitehouse Station): **Frank Kula**, 264 Edgewood Drive, Toms River, N. J. 08753 (phone 201-244-2491).

NEW MEXICO (Alamogordo, Albuquerque, Clovis): **Louie T. Evers**, P. O. Box 1946, Clovis, N. M. 88101 (phone 505-762-1798).

NEW YORK (Albany, Brooklyn, Buffalo, Chautauqua, Garden City, Hempstead, Hudson Valley, New York City, Niagara Falls, Plattsburgh, Queens, Rochester, Rome/Utica, Southern Tier, Staten Island, Suffolk County, Syosset, Syracuse, Westchester): **Robert E. Holland**, 750-75A Lido Blvd., Lido Beach, N. Y. 11561 (phone 516-889-1571).

NORTH CAROLINA (Asheville, Charlotte, Fayetteville, Goldsboro, Greensboro, Kitty Hawk, Raleigh): **Hal Davis**, 1034 Manchester Drive, Cary, N. C. 27511 (phone 919-467-6511).

NORTH DAKOTA (Concrete, Fargo, Grand Forks, Minot): **James M. Crawford**, 1720 9th St., S. W., Minot, N. D. 58701.

OHIO (Akron, Cincinnati, Cleveland, Columbus, Dayton, Newark, Youngstown): **Charles B. Spencer**, 333 West 1st St., Suite 252, Dayton, Ohio 45402 (phone 513-228-1175).

OKLAHOMA (Altus, Enid, Oklahoma City, Tulsa): **Aaron C. Burleson**, P. O. Box 757, Altus, Okla. 73522 (phone 405-482-0005).

OREGON (Eugene, Portland): **Phil Saxton**, 16346 NE Tillamook St., Portland, Ore. 97230 (phone 503-255-7872).

PENNSYLVANIA (Allentown, Beaver Falls, Drexel Hill, Dormont, Erie,

Harrisburg, Homestead, Johnstown, Lewistown, Philadelphia, Pittsburgh, Scranton, State College, Washington, Willow Grove, York): **Tillie Metzger**, 2285 Valera Ave., Pittsburgh, Pa. 15210 (phone 412-881-1991).

PUERTO RICO (San Juan): **Fred Brown**, 1991 Jose F. Diaz, Rio Piedras, P. R. 00928 (phone 809-790-5288).

RHODE ISLAND (Warwick): **King Odell**, 413 Atlantic Ave., Warwick, R. I. 02888 (phone 401-941-5472).

SOUTH CAROLINA (Charleston, Clemson, Columbia, Myrtle Beach, Sumter): **James Catington**, 2122 Gin Branch Rd., Sumter, S. C. 29154 (phone 803-481-2634).

SOUTH DAKOTA (Rapid City, Sioux Falls): **Justy Berger**, RR #3, Box 89, Sioux Falls, S. D. 57106 (phone 605-339-1104).

TENNESSEE (Chattanooga, Knoxville, Memphis, Nashville, Tri-Cities Area, Tullahoma): **Jack K. Westbrook**, P. O. Box 1801, Knoxville, Tenn. 37901 (phone 615-523-6000).

TEXAS (Abilene, Amarillo, Austin, Big Spring, College Station, Commerce, Corpus Christi, Dallas, Del Rio, Denton, El Paso, Fort Worth, Harlingen, Houston, Kerrville, Laredo, Lubbock, San Angelo, San Antonio, Waco, Wichita Falls): **Bryan L. Murphy, Jr.**, 118 Broadway, Suite 234, San Antonio, Tex. 78205 (phone 817-777-4231).

UTAH (Brigham City, Clearfield, Ogden, Provo, Salt Lake City): **Bruce Hampel**, 1445 27th St., Ogden, Utah 84403 (phone 801-393-1257).

VERMONT (Burlington): **John D. Navin**, 350 Spear St., Unit 64, South Burlington, Vt. 05401 (phone 802-863-1510).

VIRGINIA (Arlington, Danville, Harrisonburg, Langley AFB, Lynchburg, Norfolk, Petersburg, Richmond, Roanoke): **C. W. Scott**, 6368 Brampton Court, Alexandria, Va. 22304 (phone 703-370-2702).

WASHINGTON (Bellingham, Seattle, Spokane, Tacoma, Yakima): **Walter P. Lepski**, 722 Villard St., Cheney, Wash. 99004 (phone 509-235-6178).

WEST VIRGINIA (Huntington): **David Bush**, 2317 S. Walnut Drive, St. Albans, W. Va. 25177 (phone 304-722-3583).

WISCONSIN (Madison, Milwaukee): **Charles Marotske**, 7945 S. Verdev Drive, Oak Creek, Wis. 53154 (phone 414-762-4383).

WYOMING (Cheyenne): **Al Guidotti**, P. O. Box 811, Cheyenne, Wyo. 82001 (phone 307-638-3361).

DO9, Grand Forks AFB, N. D. 58205.
Phone: (701) 594-3640 or 594-6732.

386th Bomb Group

Members of the 386th Bomb Group will hold a reunion in England on September 26–October 2, 1984. **Contact:** B. B. "Skip" Young, % Blue Arrow Enterprises, 1508 College Parkway, Fort Myers, Fla. 33907. Phone: (813) 939-7090.

401st Bomb Group Ass'n

Members of the 401st Bomb Group will hold a reunion on September 5–8, 1984, in Lake Buena Vista, Fla. **Contact:** Ralph "Rainbow" Trout, P. O. Box 22044, Tampa, Fla. 33622.

447th Sub Depot Ass'n

The 447th Submarine Depot, stationed at Polebrook, Northampton, England (Station 110), will hold its reunion on September 20–23, 1984, in Gettysburg, Pa. **Contact:** F. H. Larsen, P. O. Box 1, Yalaha, Fla. 32797. Phone: (904) 324-2451.

451st Bomb Squadron Ass'n

Members of the 451st Bomb Squadron, 322d Bomb Group, will hold their thirty-sixth annual reunion on September 21–23, 1984, at Stone Mountain in Atlanta, Ga. **Contact:** James J. Crumbliss, 2014 Shady Grove Dr., Bossier City, La. 71112. Phone: (318) 742-1225.

453d Bomb Squadron

The 453d Bomb Squadron will hold a reunion on August 31–September 3, 1984, in Rancho Cordova, Calif. **Contact:** C. V. Sochocki, 1314 N. Brookfield St., South Bend, Ind. 46628. Phone: (219) 233-6044.

454th Bomb Group

Veterans of the 454th Bomb Group and Headquarters, 736th, 737th, 738th, and 739th Bomb Squadrons, Fifteenth Air Force, will hold their first reunion on October 4–7, 1984, at the Four Seasons Motor Inn in Colorado Springs, Colo. **Contact:** R. P. Branstetter, 3765 Holland St., Wheat Ridge, Colo. 80033. Donald L. Bieber, 205 Tucson St., Aurora, Colo. 80011.

483d Bomb Group

Veterans of the 483d Bomb Group will hold their reunion on September 19–23, 1984, at the Marriott Hotel in Greensboro, N. C. **Contact:** Joseph W. Gawthrop, 702 Rollingwood Dr., Greensboro, N. C. 27410. Phone: (919) 299-2829.

485th Bomb Group

The 485th Bomb Group will hold its reunion on September 28–30, 1984, in Charlotte, N. C. **Contact:** E. L. Bundy, 5773 Middlefield Dr., Columbus, Ohio 43220.

509th Composite Group (VH)

Members of the 509th Composite Group will hold a reunion on August 9–12, 1984, in Philadelphia, Pa. **Contact:** Charles Levy, P. O. Box 24606, Philadelphia, Pa. 19111. Phone: (215) 342-3887.



AFROTC leaders from Texas Christian University share some thoughts on current Air Force issues with AFA Executive Director Russell E. Dougherty. Pictured, from left, are Executive Director Dougherty, Angel Flight Little Major Cindy Forney, and Cadet Cols. Robert Hertberg and Robin Sandifer. The occasion was a recent Fort Worth Chapter meeting at which AFROTC received special tribute for its participation in aerospace education activities.

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LEFT: From left, Rep. William L. Dickinson (R-Ala.) meets with Air Force Chief of Staff Gen. Charles A. Gabriel, Vice Chief of Staff Gen. Lawrence A. Skantze, and Rep. Samuel S. Stratton (D-N. Y.) following his investiture as an Aerospace Education Foundation Ira Eaker Historical Fellow. The Fellowship was sponsored by AFA's Nation's Capital Chapter and was presented at a Chapter-sponsored salute to Congressman Dickinson held in March on Capitol Hill. **RIGHT:** Chapter President Dave Smith, right, thanks Congressman Dickinson for his efforts on behalf of the men and women of the Armed Forces. The Congressman is the ranking minority member of the House Armed Services Committee and a strong supporter of people programs.

529th Fighter Squadron

The 529th Fighter Squadron, 311th Fighter Group, will hold a reunion on September 14-16, 1984, at the Illinois Hyatt Oakbrook House in Oak Brook, Ill. **Contact:** John G. Wesley, % Labelette Co., 1237 Circle, Forest Park, Ill. 60130. Phone: (312) 366-2010.

556th Bomb Squadron

The 556th Bomb Squadron, 387th Bomb Group, will hold its reunion on October 5-7, 1984, in Baton Rouge, La. **Contact:** Paul R. Priday, 7755 Harriott Rd., Plain City, Ohio 43064.

868th Bomb Squadron

The 868th Bomb Squadron "Snoopers of South Pacific" will hold a reunion on September 20-22, 1984, at the Sheraton Hotel in Arlington, Va. **Contact:** Vince D. Splane, 2676 Blanding Blvd., Middleburg, Fla. 32068. Phone: (904) 282-9371.

1708th Ferrying Wing Ass'n

The 1708th Ferrying Wing Association reunion will be held September 14-16, 1984, in San Antonio, Tex. **Contact:** Ernie Davis, 17881 SW 113th Ct., Miami, Fla. 33157.

6th Troop Carrier Squadron

Is anyone from the 6th Troop Carrier Squadron, 374th Troop Carrier Group, interested in an October 1984 meeting at the Bully Beef Express in San Antonio, Tex.?

Please contact the address below for additional information.

Norm Hardee
3705 Overton Park East
Fort Worth, Tex. 76109

8th Combat Cargo Squadron

We would like to hear from pilots of the 8th Combat Cargo Squadron, 2d Combat

Cargo Group, who served in the Pacific from October 1944 to December 1945 for the purpose of establishing a mailing list and planning a reunion.

Please contact the address below.

Paul Vaughan
4916 Wortser Ave.
Sherman Oaks, Calif. 91423

Coming Events

June 1-2, **North Dakota State Convention**, Grand Forks... June 6, **Senior Statesmen Dinner**, Washington, D. C.... June 8-9, **Alabama State Convention**, Montgomery... June 9, **Louisiana State Convention**, Alexandria... June 22-23, **Colorado State Convention**, Air Force Academy, Colorado Springs... June 23, **Ohio State Convention**, Dayton... June 29-July 1, **New Jersey State Convention**, Cape May... July 27-29, **Florida State Convention**, MacDill AFB... July 27-29, **Texas State Convention**, Abilene... August 9-11, **Utah State Convention**, Hill AFB... August 10-11, **North Carolina State Convention**, Seymour Johnson/Goldsboro... August 17-18, **New York State Convention**, Mitchel Field... August 17-18, **Arkansas State Convention**, Little Rock... August 18, **Michigan State Convention**, Southfield... August 23-25, **California State Convention**, Irvine... August 24-26, **Oregon State Convention**, Portland... September 16-20, **AFA National Convention and Aerospace Development Briefings and Displays**, Washington, D. C.

AFA's 1984 National Convention and Aerospace Development Briefings and Displays

September 16-20, 1984 • Washington, D. C.



Plan now to attend: AFA's 1984 National Convention and Aerospace Development Briefings and Displays at the Sheraton Washington Hotel. Additional rooms are available at the Shoreham Hotel across the street at lower rates than the Sheraton Washington. Both hotels are served by Metro.

Hotel reservations requests: For the Sheraton Washington, send to: Sheraton Washington Hotel, 2660 Woodley Road, N. W., Washington, D. C. 20008; for the Shoreham Hotel, send to 2500 Calvert St., N. W., Washington, D. C. 20008.

Make your reservations as soon as possible. Both hotels have a cutoff date of August 16. To assure acceptance of your reservation requests, please refer to the AFA National Convention. All reservation requests must be accompanied by one night's deposit or an American Express number and expiration date. Deposits will be refunded only if cancellation notification is given at least 48 hours prior to arrival.

Convention Activities Include: Opening Ceremonies, Business Sessions, luncheons honoring the Secretary of the Air Force and the Air Force Chief of Staff, Aerospace Education Foundation Awards Luncheon, the Annual Reception, and the black-tie 37th Air Force Anniversary Reception and Dinner Dance.

The theme for this year's convention will be "Global Access Through Aerospace" and will be highlighted by celebrating the 60th anniversary of the first around-the-world flight. Through enormous strides in aerospace technology, circumnavigation is now a common and everyday occurrence. Thanks to the pioneering efforts of Maj. Gen. Leigh Wade, USAF (Ret.), pilot of the Douglas World Cruiser *Boston* in the 1924 round-the-world flight, and his crew, the explorers and pioneers of today have a rich heritage and in-depth experience to draw on as a strong and solid base.

When a Single Accident or Illness Could Cost You Thousands of Dollars, You Need AFA CHAMPLUS® . . . for Strong Protection against Costs CHAMPUS Doesn't Cover!

For military retirees and their dependents . . . and dependents of active-duty personnel . . . more and more medical care is being provided through the government CHAMPUS program.

And, of course CHAMPUS pays 75% of allowable charges.

But today's soaring hospital costs—up to \$500 a day in some major metropolitan medical centers—can run up a \$20,000 bill for even a moderately serious accident or illness.

Your 25% of \$20,000 is no joke!

AFA CHAMPLUS® protects you against that kind of financial catastrophe and covers most of your share of routine medical expenses as well.

HOW AFA CHAMPLUS® WORKS FOR YOU!

WHO IS ELIGIBLE?

- 1) All AFA members under 65 years of age who are currently receiving military retired pay and are eligible for benefits under Public Law 89-614 (CHAMPUS), their spouses under age 65 and their unmarried dependent children under age 21 (or age 23 if in college).
- 2) All eligible dependents of AFA members on active duty. Eligible dependents are spouses under age 65 and unmarried dependent children under age 21 (or age 23 if in college).

EXCEPTIONAL BENEFIT PLAN

(See chart at right)

FOUR YEAR BASIC BENEFIT. Benefits for most injuries or illnesses may be paid for up to a four-year period.

PLUS THESE SPECIAL BENEFITS . . .

- 1) Up to 45 consecutive days of in-hospital care for mental, nervous, or emotional disorders. Outpatient care may include up to 20 visits of a physician or \$500 per insured person each year.
- 2) Up to 30 days care per insured per year in a Skilled Nursing Facility.
- 3) Up to 30 days care per insured per year and up to 60 days lifetime in a

- CHAMPUS-approved Residential Treatment Center.
- 4) Up to 30 days care per insured per year and up to 60 days lifetime in a CHAMPUS-approved Special Treatment Facility.
 - 5) Up to 5 visits per insured per year to Marriage and Family Counselors under conditions defined by CHAMPUS.

YOUR INSURANCE IS NON-CANCELLABLE

As long as you are a member of the Force Association, pay your premiums time, and the master contract remains force, your insurance cannot be cancelled.

ADMINISTERED BY YOUR ASSOCIATION . . . UNDERWRITTEN BY MUTUAL OF OMAHA

AFA CHAMPLUS® insurance is administered by trained insurance professionals on your Association staff. You get prompt, reliable, courteous service from people who know your needs and know every detail of your coverage. Your insurance is underwritten by Mutual of Omaha, the largest individual and family health insurance company in the world.

AFA OFFERS YOU HOSPITAL BENEFITS AFTER AGE 65

Once you reach Age 65 and are covered under Medicare, AFA offers you protection against hospital expenses not covered by Medicare through the *Senior / Benefit Plan of AFA Hospital Indemnity Insurance*. Members enrolled in AFA CHAMPLUS® will automatically receive full information about AFA's Medicare supplement program upon attainment of age 65 so there will be no lapse in coverage.

AFA CHAMPLUS® BENEFIT SCHEDULE

Care	CHAMPUS Pays	AFA CHAMPLUS® Pays
<i>For Military Retirees Under Age 65 and Their Dependents</i>		
Inpatient civilian hospital care	CHAMPUS pays 75% of allowable charges.	CHAMPLUS® pays the 25% of allowable charges not covered by CHAMPUS.
Inpatient military hospital care	The only charge normally made is a \$6.55 per day subsistence fee, not covered by CHAMPUS.	CHAMPLUS® pays the \$6.55 per day subsistence fee.
Outpatient care	CHAMPUS COVERS 75% of outpatient care fees after an annual deductible of \$50 per person (\$100 maximum per family) is satisfied.	CHAMPLUS® pays the 25% of allowable charges not covered by CHAMPUS after the deductible has been satisfied.
<i>For Dependents of Active-Duty Military Personnel</i>		
Inpatient civilian hospital care	CHAMPUS pays all covered services and supplies furnished by a hospital less \$25 or \$6.55 per day, whichever is greater.	CHAMPLUS® pays the greater of \$6.55 per day or \$25 of the reasonable hospital charges not covered by CHAMPUS.
Inpatient military hospital care	The only charge normally made is a \$6.55 per day fee, not covered by CHAMPUS.	CHAMPLUS® pays the \$6.55 per day subsistence fee.
Outpatient care	CHAMPUS covers 80% of outpatient care fees after an annual deductible of \$50 per person (\$100 maximum per family) is satisfied.	CHAMPLUS® pays the 20% of allowable charges not covered by CHAMPUS after the deductible has been satisfied.
<p>NOTE: Outpatient benefits cover emergency room treatment, doctor bills, pharmaceuticals, and other professional services.</p> <p>There are some reasonable limitations and exclusions for both inpatient and outpatient coverage. Please note these elsewhere in the plan description.</p>		

APPLY TODAY!

JUST FOLLOW THESE STEPS

Choose either AFA CHAMPLUS® Inpatient coverage or combined Inpatient and Outpatient coverage for yourself. Determine the coverage you want for dependent members of your family. Complete the enclosed application form in full. Total the premium for the coverage you select from the premium tables on this page. Mail the application with your check or money order for your initial premium payment, payable to AFA.



LIMITATIONS

Coverage will not be provided for conditions for which treatment has been received during the 12-month period prior to the effective date of insurance until the expiration of 12 consecutive months of insurance coverage without further treatment. After coverage has been in force for 4 consecutive months, pre-existing conditions will be covered regardless of prior treatment.

EXCLUSIONS

- This plan does not cover and no payment shall be made for:
- a) routine physical examinations or immunizations
 - b) domiciliary or custodial care
 - c) dental care (except as required as a necessary adjunct to medical or surgical treatment)
 - d) routine care of the newborn or well-baby care
 - e) injuries or sickness resulting from declared or undeclared war or any act hereof
 - f) injuries or sickness due to acts of intentional self-destruction or attempted suicide, while sane or insane
 - g) treatment for prevention or cure of alcoholism or drug addiction
 - h) eye refraction examinations
 - i) Prosthetic devices (other than artificial limbs and artificial eyes), hearing aids, orthopedic footwear, eyeglasses and contact lenses
 - j) expenses for which benefits are or may be payable under Public Law 89-614 (CHAMPUS)

PREMIUM SCHEDULE

Plan 1—For military retirees and dependents (Quarterly Premiums)

Inpatient Benefits

Member's Attained Age	Member	Spouse	Each Child
Under 50	\$19.03	\$23.30	\$14.85
50-54	\$26.16	\$32.01	\$14.85
55-59	\$36.16	\$44.28	\$14.85
60-64	\$43.62	\$53.41	\$14.85

Inpatient and Outpatient Benefits

Under 50	\$26.80	\$31.05	\$37.13
50-54	\$36.83	\$42.68	\$37.13
55-59	\$50.92	\$59.02	\$37.13
60-64	\$61.41	\$71.20	\$37.13

Plan 2—For dependents of active-duty personnel (Annual Premiums)

Inpatient Only	None	\$ 9.68	\$ 5.94
Inpatient and Outpatient	None	\$38.72	\$29.70

APPLICATION FOR AFA CHAMPLUS*

Group Policy GMG-FC70
Mutual of Omaha Insurance Company
Home Office: Omaha, Nebraska

Full name of Member _____
Rank _____ Last _____ First _____ Middle _____

Address _____
Number and Street _____ City _____ State _____ ZIP Code _____

Date of Birth _____ Current Age _____ Height _____ Weight _____ Soc. Sec. No. _____
Month/Day/Year

This insurance coverage may only be issued to AFA members. Please check the appropriate box below:

- I am currently an AFA Member. I enclose \$15 for annual AFA membership dues (includes subscription (\$14) to AIR FORCE Magazine).

PLAN & TYPE OF COVERAGE REQUESTED

- Plan Requested (Check One) AFA CHAMPLUS* PLAN I (for military retirees & dependents) AFA CHAMPLUS* PLAN II (for dependents of active-duty personnel)
- Coverage Requested (Check One) Inpatient Benefits Only Inpatient and Outpatient Benefits
- Person(s) to be insured (Check One) Member Only Member & Children Spouse Only Spouse & Children Member & Spouse Member, Spouse & Children

PREMIUM CALCULATION

All premiums are based on the attained age of the AFA member applying for this coverage. Plan I premium payments are normally paid on a quarterly basis but, if desired, they may be made on either a semi-annual (multiply by 2), or annual (multiply by 4) basis.

Quarterly (annual) premium for member (age _____) \$ _____

Quarterly (annual) premium for spouse (based on member's age) \$ _____

Quarterly (annual) premium for _____ children @: \$ _____

Total premium enclosed \$ _____

If this application requests coverage for your spouse and/or eligible children, please complete the following information for each person for whom you are requesting coverage.

Names of Dependents to be Insured _____ Relationship to Member _____ Date of Birth (Month/Day/Year) _____

(To list additional dependents, please use a separate sheet.)

In applying for this coverage, I understand and agree that (a) coverage shall become effective on the last day of the calendar month during which my application together with the proper amount is mailed to AFA, (b) only hospital confinements (both inpatient and outpatient) or other CHAMPUS-approved services commencing after the effective date of insurance are covered and (c) any conditions for which I or my eligible dependents received medical treatment or advice or have taken prescribed drugs or medicine within 12 months prior to the effective date of this insurance coverage will not be covered until the expiration of 12 consecutive months of insurance coverage without medical treatment or advice or having taken prescribed drugs or medicine for such conditions. I also understand and agree that all such pre-existing conditions will be covered after this insurance has been in effect for 24 consecutive months.

Date _____, 19____ Member's Signature _____ 6/84

NOTE: Application must be accompanied by check or money order. Form 6173GH App.
Send remittance to:
Insurance Division, AFA, 1750 Pennsylvania Ave., NW, Washington, D.C. 20006.

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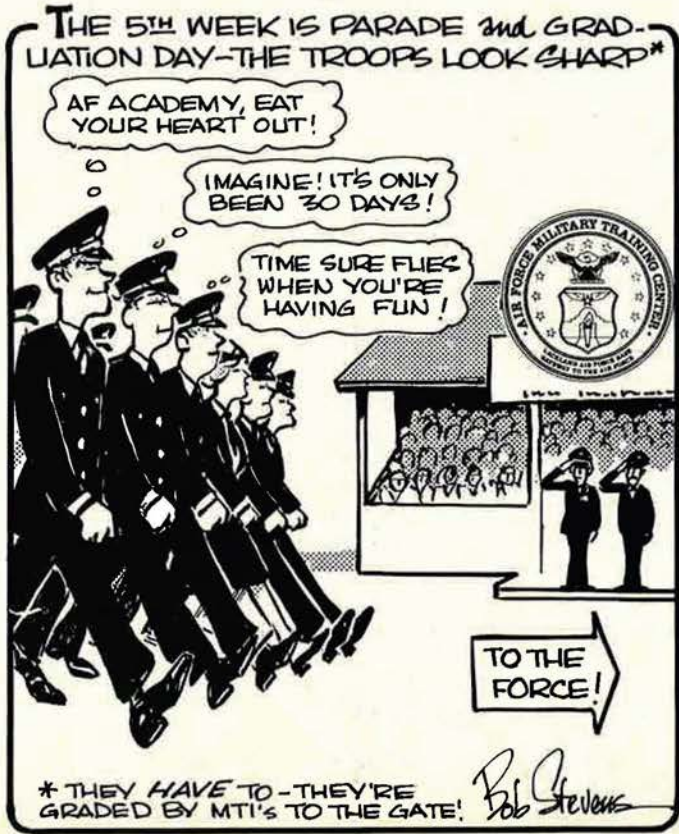
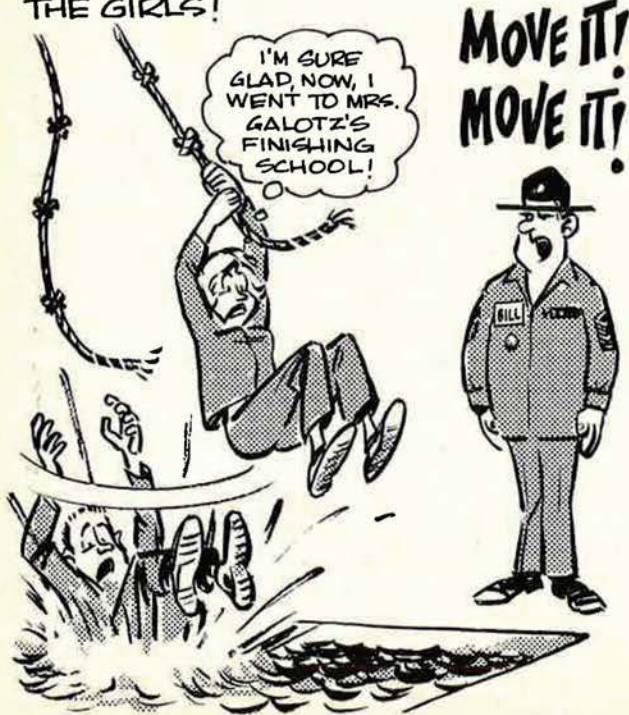
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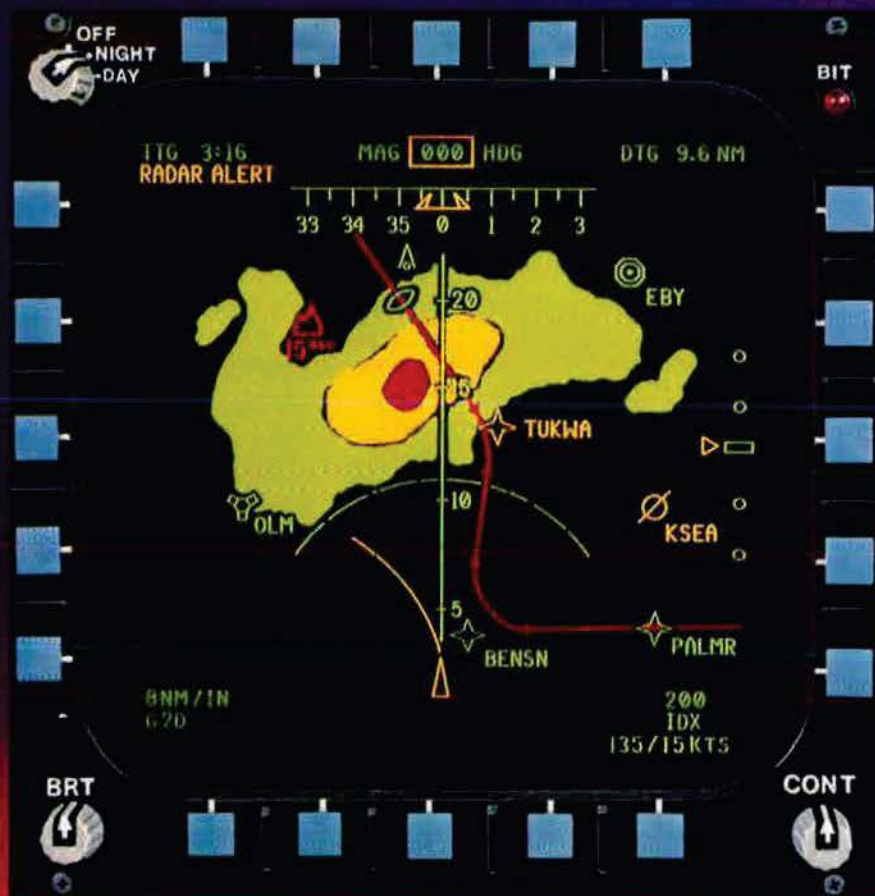
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WHAT'S THE MOST EFFICIENT WAY TO KEEP THE THREAT FROM GAINING GROUND?

Right now, America has many tactical defense needs.

We have to be ready for deep interdiction missions, to thwart an aggressor's attack at the source.

We must have systems with the adaptability, range and precision to succeed against mobile targets.

And most important, we must be able to operate around the clock in bad weather.

There's one tactical defense system that goes a long way toward meeting all those needs efficiently and effectively: The LANTIRN-equipped F-15E dual role fighter.

The air-to-air, air-to-ground Eagle can deliver up to 12 tons of armament on a deep interdiction mission, fighting its way there and back. Its speed, endurance, range and mobility make it a nimble and precise adversary against any threat.

And the F-15 is America's confident reply to any airborne threat. It owns the skies day and night, in good weather or bad. With its lookdown, shootdown capability, advanced countermeasures, APG-70 radar and advanced cockpit displays, the F-15 can meet and beat any fighter the threat has, or has planned through the end of the century.

When our defense needs challenge planners, one answer is simple: The F-15E dual role fighter.



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